Abstract

The principles of Isotype constitute the strict but pragmatic rules that gave Isotype its consistency and strength as a system. Full working knowledge of the principles forms the difference between an effective formula for communication – and imitation. This thesis describes the principles of Isotype through three interconnected levels: the philosophical, the methodological and the graphic and operational. Together they form the linear process through which Isotype visual statements are made, starting from primary data, through methods of implementation to the tools used to achieve the final visual outcome.

This linear process will be defined through the three identified core strands of transformation, graphic argument and graphic language, articulated through corresponding individual case studies, where the explicit use of the principles has been previously cited. Transformation is discussed through museum design, graphic argument is articulated through the design of charts and diagrams and graphic language is considered in relation to international pictographic systems.

The first case study is based on the Natural History Museum's New Exhibition Scheme (NES). During the 1970s, Roger Miles adopted the principle of transformation to attempt to restore user-friendly design to an institution at risk of losing touch with its audience. Using Nigel Holmes of Explanation Graphics (New York) as a paradigm of contemporary information design, the second case study explores Holmes' academic and pragmatic understanding of the principles of graphic argument and considers the extent to which he incorporates them into his design work. The third case study investigates the place of Isotype in the development of international graphic language from the late 1950s through to the early 1970s, taking as a starting point, a proposal for a symbol dictionary which involved Marie Neurath in collaboration with other international designers of the time. This case study culminates in the reasons why scholars link Otl Aicher's pictographic designs for Munich with the principles of Isotype.

The ultimate aim of the case studies is to expose the dissemination and legacy of the principles of Isotype and any adaptations that may have been made to them by others; ultimately qualifying whether they maintain their usefulness and endurance as a system in a contemporary context.

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A definition of the principles of Isotype and an investigation into their methods of diffusion and legacy

A description of Otto Neurath's original principles of Isotype followed by an investigation into their secondary diffusion in the hands of others not immediately connected with the Isotype Institute; shown through three case studies on transformation, graphic argument and graphic language with the ultimate aim of evidencing and illuminating the legacy of the principles in a contemporary context.

Submitted in fulfillment of the requirements
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Dedicated to my mother Muriel Dorothy Perks

Introduction

This doctoral thesis has been produced as part of 'Isotype Revisted', an AHRC-funded research project based in the Department of Typography and Graphic Communication at the University of Reading.[1] It draws heavily on The Otto and Marie Neurath Isotype Collection.[2]

The thesis will begin by describing the principles of Isotype, taken initially from Otto Neurath's *International Picture Language*, and Robin Kinross' unpublished MPhil thesis 'Otto Neurath's Contribution to Visual Communication (1925–45): The History, Graphic Language and Theory of Isotype',[3] supplemented by literature reviews of writing by Marie Neurath, Michael Twyman and other contemporary Isotype scholars. Precise descriptions of the principles (divided into **philosophical**, **methodological** and **graphic and operational** levels) will form a solid base to illustrate how they have been adopted and adapted by others through three case studies which correspond to one of the three interconnected strands of **transformation**, **graphic argument** and **graphic language**, which in combination form the Isotype system. Subject matter for the case studies has been selected from evidence found in scholarly papers and publications explicitly linking the principles with new bodies of work by others not primarily associated with the Isotype Institute. The case studies set about exploring and evidencing these notions, with the purpose of illuminating aspects of the legacy of the principles.

It is not the intention of this thesis to discuss philosophical, historical, or specific phases of the Isotype Institute's eventful international activities, although these elements will be touched upon as they become relevant to the discourse. Otto and Marie Neurath's visual work and the history of the Isotype Institute has been well documented by Kinross and Twyman, amongst others, and Otto's philosophical work with the Vienna Circle has been covered by Cartwright, Cat, Fleck and Uebel,[4] and other Vienna Circle philosophers.

A broader picture of the life and work of Otto Neurath can be found in *Empiricism and Sociology*,[5] from which this thesis draws on extensively for background information. In addition, the Isotype Revisited team have extended primary research on specific aspects of Isotype scholarship, which has further informed contextual knowledge of the principles.

1 Further information can be found on the Isotype Revisited website www.isotyperevisited.org.
2 The Otto and Marie Neurath Isotype Collection will be referred to as the 'Isotype Collection' throughout this thesis. The abbreviation 'IC' will be used to denote material from this archive.
3 Otto Neurath, I*nternational Picture Language* (London: Kegan Paul, 1936); Robin Kinross, 'Otto Neurath's Contribution to Visual Communication 1925–45: the History, Graphic Language and Theory of Isotype' (unpublished MPhil thesis, University of Reading, 1979).
4 Nancy Cartwright, Jordi Cat, Lola Fleck & Thomas E. Uebel, *Otto Neurath: Philosophy Between Science and Politics* (Cambridge: Cambridge University Press, 1996).
5 Otto Neurath, Marie Neurath, & Robert S. Cohen, (eds), *Empiricism and Sociology* (Dordrecht, Holland: Reidel, 1973).

This thesis will specifically aim to investigate the principles of Isotype in the hands of others, often far removed both chronologically and geographically from the Isotype Institute. It will comprise three parts:

Part one

An overview of the principles of Isotype

Part one will begin by describing the three interconnected levels of **philosophical**, **methodological** and **operational** principles of Isotype, largely from the time when Gerd Arntz joined Otto Neurath and Marie Reidemeister[6] to form the 'tri-partnership' in 1928.[7] The philosophical principles are concerned with Neurath's fundamental ideas as a philosopher and social scientist, forming the intellectual basis to Isotype. The methodological principles relate to the processes through which the philosophical principles are translated into more comprehensible forms. The graphic and operational principles are the tools used for the visual realisation of Isotype. Part one will review literature from Isotype scholars, with the aim of articulating the principles, discussing their historical and contemporary relevance and forming a bridge between the original principles and later adaptations made by others (in Part two).

Part two

Three case studies based on the core strands of transformation, graphic language and graphic argument

Part two will show how the principles of Isotype have evolved in the hands of others not immediately connected with the Isotype Institute, highlighting the work of individuals and organisations claiming to have developed an understanding of the principles through secondary or tertiary routes. Three case studies will each examine one of the core strands of transformation, graphic argument and graphic language.

- **transformation** – the process of turning factual information into an accessible pictorial form, creating a visual order which reveals the significance. It is achieved through the partnership of transformer[8] and subject specialist, best known today in a museum context. The first case study will investigate how the Natural History Museum in London used transformation to change ideas of audience-centred design in the development of the New Exhibition Scheme (NES) during the 1970s and 80s.

6 Marie Reidemeister (1898-1986) became Otto Neurath's third wife in 1941. Both her married and maiden name will be used as chronologically appropriate.

7 Artist and designer Gerd Arntz (1900–1988) was responsible for consolidating and refining the visual identity that defines what we now know as Isotype (International System Of TYPographic Education). It was formerly known as the 'Vienna Method of Visual Communication', until 1934 when the team were forced to relocate to The Hague, and the name was no longer geographically appropriate. Reidemeister coined the acronym 'Isotype' after C.K. Ogden's use of the acronym BASIC English (British American Scientific International Commercial). Neurath and Reidemeister originally developed the Vienna Method, based on a sound pedagogical approach, expressed primarily through pictures, firmly grounded in pragmatism, socialism and logical positivism. Arntz added his reductive German avant-garde design ethic to this skill set when he formally joined the staff of the Gesellschafts- und Wirtschaftsmuseum (G&W) in 1928.

8 The term 'designer' was not used at the G&W, but the activity of the transformer can be likened to that of an information designer, a design practitioner who makes information accessible.

• **graphic argument** – the mode in which graphic material is presented, allowing the viewer to draw their own conclusions. This case study will contextualise and examine the work of contemporary explanation designer Nigel Holmes, as a paradigm of his genre. It will compare Holmes' style of graphic argument with the Isotype method and assess whether Holmes' self-stated adoption of Isotype principles are based on more than an appreciation of the work of Neurath and Arntz.

• **graphic language** – the design and configuration of pictographic symbols and syntax, as seen in Otto Neurath's conception of Isotype as an international standardised pictorial language. This case study will discuss the influence of Isotype on international pictographic language from the late 1950s to the mid 1970s, investigating the reasons why scholars link Otl Aicher's 1972 Munich Olympic pictograms with the Isotype principles of graphic language.

Subject matter for case studies has been selected where an explicit connection with Isotype has been cited. They are taken from the late 1950s to the present, and involve designers and organisations working in very different circumstances and environments to the original Isotype team. The aim of the three case studies is to substantiate (or refute) evidence of the adoption of Isotype principles, and describe how they have been incorporated into new bodies of work, evidencing contemporary relevance and legacy. Examples of the diffusion of the principles by the original team of Neurath, Reidemeister and Arntz and other colleagues and collaborators will also be examined in Part two, along with relevant historical details which affected working practice, both during the life of the original team, and their individual activities working with new colleagues in different environments.

Part three

The legacy of the principles of Isotype

Part three will examine aspects of legacy, through the three stands of **transformation**, **graphic argument** and **graphic language,** using the respective case studies as starting points and projecting adaptations made to the principles into the contemporary arena. It will discuss the dissemination of the principles through the work of designers and organisations far removed from the reach of the original Isotype Institute. This section will conclude by identifying implicit examples of the application of the principles in contemporary design practice, demonstrating how they have been incorporated and/or adapted, either knowingly or unknowingly into new design contexts. Research for Part three was conducted largely through evidence taken from edited transcripts, case studies and contemporary articles written by Isotype scholars found in the Otto and Marie Neurath Isotype Collection, supplemented by other archival visits, conferences and symposia: London IDA conferences 2008 & 2012, Paris 'DD4D' (2009), Nicosia 'Lending Grace to Typography' (2010) and University for the Creative Arts (Canterbury) 'Munich '72' (2012) which have informed ideas on legacy in a broader sense.

Research methods and approach

The starting point for all research has been the Otto and Marie Neurath Isotype Collection, with particular reference to publications and articles by the Neuraths and their associates and current international scholarly activity relating to the original formulation, development and diffusion of the principles of Isotype. Particular attention has been given to how the principles were adopted, adapted and disseminated by others after the closure of the Isotype Institute in the early 1970s, and the subsequent transfer of archival material to University of Reading.

Research for Part one culminated in a description of the principles of Isotype, largely taken from material found in the Otto and Marie Neurath Isotype Collection. Particular emphasis has been given to Robin Kinross' 1979 MPhil thesis 'Otto Neurath's Contribution to Visual Communication 1925-1945: the History, Graphic Language and Theory of Isotype', and original Isotype Institute publications describing the principles, such as *International Picture Language* along with related archival material. Through an analysis of the principles of Isotype, in their original form, seen through the writing of others, a pragmatic linear process emerged, described through the philosophical, methodological and operational levels. These interrelated levels illustrate how Isotype functions as a system emanating from a sound philosophical base, through defined working processes to final graphic outcome.

Further analysis of how Isotype principles were practically applied revealed three definite interconnected strands: transformation, graphic argument and graphic language. These strands relate to museums, diagrammatic charts and symbols and were used as a basis to establish the context for case studies in Part two, which demonstrate the adoption of the principles by others without immediate connections with the Isotype Institute, and ultimately serve to reveal aspects of legacy.[9] Subject matter for Part two case studies was taken from starting points where explicit links with the principles had been cited:

- The Natural History Museum's adoption of transformation during the 1970s

- Nigel Holmes' assertion that he incorporates the principles of graphic argument into his design work with Explanation Graphics

- Scholarly claims that link Otl Aicher's 1972 Munich Olympic pictograms with the graphic language of Isotype

[9] Research for this thesis is in the most part restricted to the study of texts in the English language only.

Primary research for Part two (in connection with the three case studies) was carried out through three complementary channels:

• Formal interviews conducted with individuals with acknowledged links with Isotype (as evidenced through research into the individual case studies):
    - Michael Macdonald-Ross (transformation)
    - Dr Roger Miles (transformation)
    - Ron Nash (transformation)
    - Nigel Holmes (graphic argument)
    - Bruce Robertson (graphic argument)
    - Dr Martin Krampen (graphic language)

• Informal[10] face-to-face, email or telephone interviews
    - Informal interview with Dr Ian McLaren (graphic language)
    - Informal interview with Gerhard Joksch (graphic language)
    - Informal interview with Prof. Emeritus Michael Twyman
    - Email questionnaires from ex Natural History Museum transformers (transformation)

• Visits to other archives in the UK and Holland
    - The Natural History Museum Library and Archives, London (transformation)
    - The Gerd Arntz Archive, Gemeentemuseum, The Hague (graphic language)
    - Icograda Archive, University of Brighton (graphic language)
    - The Hochshule für Gestaltung Archive, Ulm (graphic language)

• Literature reviews:
    - Contemporary papers, periodicals and publications
    - Books and periodicals written by Otto and Marie Neurath
    - Correspondence found within archives
    - Examples of Isotype work in books, charts and periodicals
    - Critiques and papers by Isotype scholars

Formal interviews were staged with key characters chosen because of their previously acknowledged links with Isotype. Edited transcripts from these interviews are referenced throughout this thesis to support archival research.[11]

[10] 'Formal' interviews consist of recorded sessions where interviewees respond to questions sent prior to the interview. 'Informal' interviews were not recorded; notes taken during the session were used for background information.

[11] Edited transcripts from these interviews are located in Appendices 1,2 & 3. Full audio versions of interviews with Michael Macdonald-Ross, Dr Roger Miles, Ron Nash, Nigel Holmes, Bruce Robertson and Dr Martin Krampen are deposited in the University of Reading Sound and Film Archive.

The Natural History Museum case study (transformation)

The aim of this case study was to illuminate the legacy of the Isotype principle of transformation. The subject matter for this case study was chosen because of explicit references which link the Natural History Museum in South Kensington with transformation during the 1970s and 1980s through what was originally known as the 'New Exhibition Scheme' (NES). Dr Roger Miles, then head of the Department of Public Services wrote many papers, (see bibliography) and the 1982 book *The Design of Educational Exhibits,* which evidences this link.[12] In addition, the Museum's internal publication *The Transformation Reader* took the form of a training manual to propagate Miles' ideas on the way forward for NES. It was given to newly recruited designer-scientist teams charged with delivering Miles' interpretation of Neurath's original principle of transformation; a fact verified by Isotype scholars Robin Kinross and Hadwig Kraeutler.[13] To explore exactly how the NHM [14] used transformation in the context of exhibition design, I visited the Natural History Museum Library and Archives, and reviewed many boxes of largely uncatalogued material relating to the initial formulation of NES, with particular emphasis on early exhibitions such as the 1977 Pilot scheme, the 'Hall of Human Biology'. The NHM Library and Archives also houses full bound sets of *Museums Journal*, which provided an excellent commentary on how the museum community viewed what were thought of as very radical ideas in museum circles during the 1970s.

Alongside visits to the NHM Library and Archive, formal interviews took place with Michael Macdonald-Ross (previously of the Open University), Dr Roger Miles (previously head of the Department of Public Services at the NHM and Ron Nash (previously Head of NHM Exhibition Installation and Maintenance, responsible for the installation of the 'Hall of Human Biology'). Unstructured telephone interviews and email questionnaires were also arranged with many of the NHM transformers from the 1970s and 1980s. Responses can be found in the edited transcripts in Appendix 1. Questions for Roger Miles and Macdonald-Ross were composed from previous informal interviews, combined with archival evidence, and were to some extent based on prior knowledge from personally working within the NHM in the Department of Public Services during the early 1980s. Generic questions on transformation at the NHM are detailed below; they were adapted for Macdonald-Ross and Nash.

What was your involvement with the Natural History Museum?

How did you first learn about Isotype and the transformer?

12 Roger S. Miles, (in collaboration with) Michael B. Alt, David C. Gosling, Brian N. Lewis, and Alan F. Tout, *The Design of Educational Exhibits* (London: George Allen & Unwin, 1982), p. 47.

13 Robin Kinross, 'On the Influence of Isotype' *Information Design Journal,* 2: 2 (1981), 122-130; and Hadwig Kraeutler, *Otto Neurath. Museum and Exhibition Work, Spaces (Designed) for Communication* (Frankfurt, Berlin, Brussels, New York, Oxford, Vienna: Peter Lang, 2008).

14 What is now known as the Natural History Museum was formerly known as The British Museum (Natural History). For the sake of clarity it will be referred to as 'the Museum' or by the abbreviation 'NHM'. The abbreviations 'G&W' for the Gesellschafts- und Wirtschaftsmuseum, 'NES' for the New Exhibition Scheme, 'OU' for the Open University, and 'DPS' for the Department of Public Services (within the Natural History Museum) will also be used.

What were the events that led to the Natural History Museum considering the use of Isotype/ transformation as a method for designing exhibitions in the 1970s?

Who were the key people involved in introducing you to it?

In your opinion, did it influence the thinking behind the formulation of the New Exhibition Scheme?

In what ways did your knowledge of Isotype/transformation change the theoretical approach you were taking with NES in the mid 1970s?

Can you state any actual instances of aspects of Isotype/transformation being used in the formulation of the design of educational exhibits?

Was the structure of the design team directly influenced by Isotype/transformation, or did it take more from educational technology?

What other systems for designing information were in place during the 1970s?

Would you consider that the principles of Isotype/transformation are still used at the NHM, or have they been absorbed into a new system for translating complex information in a museum context?

Overall, would you consider Isotype/transformation has had a positive effect on museum design today?

Nigel Holmes case study (graphic argument)

The aim of this case study was to illuminate the legacy of the Isotype principles of graphic argument. Holmes cites the influence of Neurath and Arntz in the majority of his authored books and booklets on diagrams, pictorial maps and symbols, which forms the reason why an investigation into Holmes' work was initially chosen. Holmes' most outspoken commendation of Isotype took place in 2000, when the paper 'Pictograms: A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)' was published.[15] Holmes has also been cited by Wim Jansen and Ellen Lupton, as a designer who has taken the principles of Isotype forward.[16]

Using Holmes as a paradigm for a current explanation designer, this case study will seek to draw out the influence of the principles of graphic argument in this genre, identifying adaptations and developments made to the principles by both Holmes and his contemporaries who may have formed differing approaches to graphic argument. The case study references formal interviews with Bruce Robertson and Holmes and centres around a visual analysis of Holmes' work over four significant stages in his career. Four examples of Holmes' work, deemed typical of the type he was producing at that time (as evidenced through literature reviews of his written and graphic work) were taken through a checklist of principles from Part one.[17] By systematically noting adherence or non-adherence to each principle, an overview

15 Nigel Holmes, 'Pictograms: A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)' *Information Design Journal,* 10: 2 (2000), 133-143.

16 Wim Jansen, 'Neurath, Arntz and ISOTYPE: The Legacy in Art, Design and Statistics' *Journal of Design History,* 22: 3 (2009), 236; Ellen Lupton, 'Reading Isotype' *Design Issues,* 3: 2 (1986), 47.

17 The full visual analysis of Holmes' work can be found in Appendix 2.

of Holmes' understanding of the principles was formed, through significant encounters with Isotype over a forty-year period, with the aim of showing how he gradually assimilated the principles of Isotype into his methodology.

The case study will begin by describing how the principles of graphic argument were disseminated first hand, through Marie Neurath's educational publishing work with Wolfgang Foges during the 1960s, supported by evidence taken from the formal interview with Bruce Robertson. Robertson and his colleagues Arthur Lockwood, Edwin Taylor and David Lambert were employed by Foges in Rathbone Place, London W1, which also accommodated the Isotype Institute. Robertson admits that he took ideas from Isotype and turned them into a successful business – Diagram Visual information Ltd, creating diagrams and charts for the magazine and newspaper publishing sectors.[18] Holmes replaced Robertson at *The Sunday Times*, which forms a link between the two designers, as does their self-stated adoption of Isotype inspired graphic argument. Discussions with Robertson provided a fascinating insight into the pragmatic aspects of how book packaging and publishing functioned from World War II to the present, and served to connect Marie Neurath's later educational publishing work with contemporary explanation graphics.

Further first-hand evidence linking the work of Gerd Arntz with Nigel Holmes was found by visiting the Gerd Arntz Archive in the Gemeentemuseum in The Hague. Generic questions for Holmes on graphic argument are detailed below; they were slightly adapted for Robertson.

Where did you first learn about Isotype, and who were the key people involved in introducing you to it?

What inspired you most about it?

What inspired you to write the article in Information Design Journal?

Which principles of Isotype have been most useful to you as a designer?

What effect did Isotype have on your work intellectually?

Your work is known for communicating complex ideas simply – where did this emerge from?

How did Isotype influence the visual outcome of your work?

You've admitted that Gerd Arntz is a hero of yours – can you state why?

What are your thoughts on the idea of a universal picture language?

[18] Bruce Robertson stated that he spent his life 'trying to copy their thinking and intentions'. Letter from Robertson to Michael Twyman, 30 August 1975, relating to the 1975 'Graphic Communication Through ISOTYPE' exhibition at University of Reading, IC 7.1b.

Isotype was known as a 'helping language' yet in your book Wordless Diagrams, apart from numerals there are no words – is this an adaptation of Isotype?

Are you influenced by the style of graphic argument behind Isotype?

Overall, would you consider that Isotype has had a positive effect on information design today?

How did you get involved with the Understanding America project?

What do you consider to be the legacy of Isotype?

Otl Aicher case study (graphic language)

The aim of this case study was to illuminate the influence of Isotype principles of graphic language on international pictographic language. The initial research question surrounded the reasons why scholars such as Wim Jansen and Ellen Lupton explicitly link Otl Aicher's design for the 1974 Munich Olympic pictograms with Isotype principles of graphic language. This discourse provided the conduit to assess how principles of graphic language had influenced the design of international pictographic language from 1956–1974, Aicher's design for the pictographic system for Munich forming a logical end point to the case study. The starting point was prompted by correspondence (1956–60) found in the Isotype Collection relating to the 'Preparatory Survey for a Study of Signs and Symbols' – a proposed symbol dictionary. This project linked the Isotype Institute with key US designers of international pictographic language during the early 1960s, including industrial designer Henry Dreyfuss, proponent of the pictogram Rudolf Modley and design research scientist Martin Krampen. Evidence found in the Icograda Archive at University of Brighton revealed attempts to standardise and control pictographic language during the 1960s through links between international members of the Icograda Commission on Signs and Symbols, whose members included Masaru Katsumi, Martin Krampen and Rudolf Modley (among others). Documentary evidence found in the Icograda and Hochshule für Gestaltung Archives ultimately provided evidence to link Aicher's pictograms with the principles of graphic language, arrived at through a series of intricate connections between individuals and organisations (some of an idealist nature) and international research projects.

It was unfortunate that Otl Aicher died tragically in 1991, but a formal interview was conducted with Dr Martin Krampen, a key figure in the research and development of pictographic language during the 1960s and 70s. Krampen's work has been referenced extensively from the wealth of published books and papers dating from the 1960s to the present. His theoretical and experimental work in this field is also well documented in the Icograda Archive.

Where did you first learn about Isotype and who were the key people involved in introducing you to it?

What inspired you most about it and what effect did Isotype have on your work intellectually?

Could you describe your working relationship with Rudolf Modley and Henry Dreyfuss?

Did you meet Marie Neurath?

Did any aspects of the principles of Isotype comply with your scientific research?

Did you share any of your knowledge of Isotype with Aicher?

Can you describe the work you did with Aicher?

What inspired you to write the papers 'Classification of Graphic Symbols and the Scientific Method' and 'An approach to Classification of Graphic Symbols' submitted as part of the 1959 'Preparatory Survey on Communication through Signs and Symbols'?

It would seem that you were prominent in the development of projects on pictographic language during the 1960s. Did you learn about these projects through the Icograda Commission on Signs and Symbols?

What inspired you to write the 1965 paper 'Signs and Symbols in Graphic Communication'? Did it stem from the Preparatory Survey'? In this paper - you mention it stating 'the results are not yet available', yet the project ceased to be funded in 1961...

How do you feel about the more idealistic attempts at forming new international languages that were happening during the 1960s (such as the ideas coming from Mead and Modley) and what were your impressions of Soichi Kato?

Do you consider that the HfG really did bring bring about the beginning of information design? What was it like to be a student (and then a member of staff) there?

Was the recent book 'The World of Signs' a continuation of any of your earlier work?

Which principles of Isotype have been most useful to you as a designer?

Do you think that the pictogram still forms the way forward for international communication?

Overall, would you consider that Isotype has had a positive effect on information design today?

What do you consider to be the legacy of Isotype?

To investigate the background to Aicher's design methodology, informal interviews were staged with Gerhard Joksch (the graphic designer of the Munich Olympic pictograms) and Dr Ian McLaren, who headed one of Aicher's design teams for Munich. I was also able to correspond with Hisayasu Ihara of Kyushu University, who has written widely on the work of Rudolf Modley, a further key figure in the development of international pictographic language from the 1940s to his death in the 1970s, and Dr Wibo Bakker who has recently completed research on the development of pictograms and the place of Icograda during the 1960s and 70s.

Part three concludes by exploring the legacy of the principles seen through the three strands of transformation, graphic argument and graphic language; taking the three case studies as starting points, and projecting adaptations made to the principles (by those far removed from the original Isotype Institute) into the contemporary arena. Research for Part three was conducted mainly through evidence taken from the transcripts, contemporary articles written by Isotype scholars and archival material from the Isotype Collection, supplemented by visits to conferences in Paris, Cyprus and London.

Part one

An overview of the principles of Isotype

Part one describes the three interconnected levels of philosophical, methodological and operational principles of Isotype, largely from the time when Gerd Arntz joined Otto Neurath and Marie Reidemeister to form the 'tri-partnership' in 1928. The philosophical principles form the intellectual basis to Isotype and are concerned with Neurath's fundamental ideas as a philosopher and social scientist. The methodological principles relate to the processes through which the philosophical principles are translated. The graphic and operational principles are the tools used for the visual realisation of Isotype. Part one will review literature from Isotype scholars, with the aim of articulating the principles, discussing their historical and contemporary relevance and forming a bridge between the original principles and later adaptations made by others (in Part two).

Introduction

Otto Neurath,[19] founder and director of the Gesellschafts- und Wirtschaftsmuseum[20] (G&W) in Vienna from 1925 to 1934 formulated Isotype (originally known as the Vienna Method) as a flexible picture language for social pedagogy.[21] The progressive Social Democrat run Gemeinde Wein[22] financially supported Neurath's venture as part of the Red Vienna cultural

19 Otto Neurath (1882–1945) was born to Gertrud (née Kaempffert) and Wilhelm, a professor at the Vienna business school and prolific author on economics. The General Appendix contains an overview of Otto Neurath's life.

20 The first employee of the G&W was Marie Reidemeister who (aided by Neurath) was one of the first to transform academic data into comprehensible facts and concepts.

21 At the back of a booklet illustrating 'Compton Pictographs' from the 1939 Edition of *Compton's Pictured Encyclopedia*, there is a practical description of why Neurath began to formulate his picture language in 1922, when he was director of the Museum of Settlement and Town Planning in Vienna (a role he held from 1919–24). The booklet illustrated 'the new method for visualizing facts and ideas invented by Dr Otto Neurath, Director of The International Foundation for Visual Education at The Hague'. It stated that 'Dr Neurath watched his visitors. He saw them read the carefully prepared signs, and then heard many of them ask to have "explanations" explained. He noticed how often his assistants, in trying to help the questioners, took out paper and pencil and sketched out rough symbols and diagrams. From this almost universal habit of trying to make visual sketches of a train of thought, Dr Neurath got his inspiration. It proved to him the need for a picture language to fill the gap between written language and the lifelike illustrations provided by the artist and the photographer.' IC 7.1.

22 Vienna District Municipality.

experiment[23] which promoted education (*Bildung*) as the way forward for improving the lives of working citizens. He originally developed the principles of Isotype as a set of logical positivist inspired tools to fulfil his museological and pedagogical requirements at the G&W. Due to the complexity of the socio-economic facts, a simple method was needed to provide accessible information for an often poorly educated audience to make life-enhancing decisions. Neurath saw Isotype as the democratising tool to facilitate this social decision-making, forming an empowering bridge between illiteracy and literacy, linking symbolic language with direct experience.

The principles of Isotype were developed to maintain the strength of the system, and provide a visual hierarchy of rules driven by clarity, logic and reduction rather than aesthetics. Adherence to the principles ensured consistency and audience recognition while still allowing for flexibility in solving visual problems, putting accuracy of information and respect for the audience uppermost. The aim was to democratise knowledge through the clear presentation of social and economic facts. Comparative statistical information was clearly shown using repeated same-size symbols to represent magnitude, with symbols reduced to their most simplistic unitary form, without perspective or decoration. Neurath was well aware that Isotype could only be used to convey simple information, but it was presented in a way that the audience could readily understand concepts, and form their own opinions through a process of dialogue, debate and logical deduction. In Isotype charts, the idea behind the facts (the 'fact-picture') was immediately grasped, secondary information seen at second glance, and detail at a third glance – there were no hidden depths. Isotype was never intended as a stand-alone language, but as a 'helping language', to be used to support words, a universal fact-picture language, capable of giving objective, (not subjective) information, aiming to represent an 'education in clear thought'.[24]

From a sociological and economic stance, Neurath's work in town planning and the management of housing and allotment schemes from 1919–1924 gave him an insight into the social and economic needs of ordinary people. His commitment to the idea of socialisation[25] and turbulent experiences as a civil servant in Bavaria gave him the practical experience of how wartime planning could transform a peacetime economy. From a museological point of view, Neurath's role as director of the G&W from 1925–34 gave him the opportunity to consolidate his political, sociological and philosophical ideas, with the time, space and resources to develop his vision for a comprehensive picture language.[26]

23 Vienna was known as 'Red Vienna' between 1919 and 1934, due to the Social Democrats taking power and the city being democratically governed for the first time. Red Vienna's cultural experiment (1919–1934) took the form of a mass programme to educate the working classes to become good Social Democrat Party members through improvements in education, public health and social welfare. It was an attempt to transform the working classes by shaping their behaviour culturally and politically with the aim of developing a comprehensive proletarian counterculture. These ideas stemmed from the Austro-marxist theory that culture could play a significant role in ameliorating class struggle. See Helmut Gruber, *Red Vienna Experiments in Working Class Culture 1919–1934* (New York, Oxford: Oxford University Press, 1991).

24 Neurath, *International Picture Language*, p. 22.

25 Socialisation refers to the theoretical problems of how to transform a private economy into a collective economy.

26 Neurath had previously gained experience in museums as director of the Museum of War Economy in Leipzig in 1918 and the Museum of Settlement and Town Planning in Vienna from 1919–24.

Scholars have discussed Isotype across many platforms including the visual, the philosophical, the pedagogical, the sociological, the political and the museological.[27] Neurath, as a polymath would have found it natural to combine these disciplines, disregarding traditional academic boundaries and selecting elements from each one to form a visual system.

Neurath's ideas on visual education were taken from a variety of sources: hieroglyphics,[28] oriental writing systems, Leibnitz' scientific picture making (the 'atlas universalis'), early illustrated French *Encyclopédie*, John Amos Comenius' *Orbis Pictus*,[29] and battle plans, amongst many other varied influences. The recently published visual autobiography *From Hieroglyphics to Isotype* shows many of the diverse graphic stimuli that helped Neurath to develop his visual acuity from childhood and helped him to formulate his own ideas on visual communication. His early years were spent browsing his father's extensive library of about 13,000 volumes, containing books by Mach, Schopenhauer, Adam Smith, Darwin, Kant, Shakespeare, Mill, Boyle, Euclid, Augustine, Goethe, Hume, Galileo, Peano, Henry George, Emerson, Poe and many others.[30] Many were lavishly illustrated, and Neurath was discerning about his choice of imagery – favouring the visually informative over the decorative. Neurath's first draft of *From Hieroglyphics to Isotype* contains the following quotation, which shows how he was trying to form a consistent visual language:

> The visual material presented in this book is to support the case for consistent visual information by means of a language-like technique.[31]

In 1930 Neurath wrote the essay 'Das Sachbild' in *Die Form,*[32] which presented the Vienna Method. In this essay he set out his approach to pictorial pedagogy and internationally

27 See Otto Neurath, *From Hieroglyphics to Isotype: A Visual Autobiography*, edited by Matthew Eve & Christopher Burke, (London: Hyphen Press, 2010). This book illustrates many of the sources from which Isotype evolved. It is a newly edited version of seventeen folders of drafts located in the Isotype Collection. See also Cartwright et al., *Otto Neurath Philosophy Between Science and Politics*, Nader Vossoughian, *Otto Neurath The Language of the Global Polis* (Rotterdam: Nai Publishers, 2007) and Hadwig Kraeutler, *Otto Neurath: Museum and Exhibition Work Spaces (Designed) for Communication*.

28 'The charm of hieroglyphics has never ceased to amaze me. I disliked the fact that they changed into the characters of current writing, only legible to the initiated. Why should not everybody get a chance to learn a lot by means of pictures?' Neurath, *Empiricism and Sociology*, p. 6.

29 Neurath cited John Amos Comenius' pictorial encyclopedia/schoolbook in *International Picture Language,* pp. 106-107 as one of the historical factors behind the development of picture education, where the teaching of words and objects work together (although he points out that the relationship between words and pictures is not always clear). In the author's preface of the reprinted 1728 edition, Comenius discussed how his illustrated book would prepare children for 'deeper studies', enabling them to associate word and image, so helping them to learn their alphabets. The book consisted of a series of illustrated pages with Latin on the right and English on the left with a shared engraved image. Significant words are italicised within the text, putting them simply into context. Johan Amos Comenius (1592–1670) originally published the first encyclopedic picture book especially made for children *Orbis Sensualium Pictus*, (The Visual World) in 1657, in Nuremberg. Comenius is cited as 'the most eminent educator of the seventeenth century' in the reprinted edition of the book. It was the most popular textbook in Europe for a century. It contains an inventory of all types of 150 copperplate images, which were replaced by wood-engravings (of apparently much coarser execution) when the plates became indistinct. Images depicted included landscapes, buildings and everyday objects from all over the world. It first appeared in Latin and 'Hungary' (High Dutch). The book was still in use in schools until the end of the nineteenth century. Martin Krampen, Michael Götte & Michael Kneidl, *The World of Signs: Communication by Pictographs* (Germany: Avedition GmbH, 2007).

30 Neurath, *From Hieroglyphics to Isotype*, p. x.

31 *Ibid.*, p. xxii.

32 Otto Neurath, 'Das Sachbild' *Die Form*, (1930), p. 29.

standardised pictograms, showing symbols working together within semantic fields, allowing their individual meanings to be enhanced and extended by their relative juxtaposition. In 1936 Neurath extended his discourse by publishing *International Picture Language* to launch Isotype to an international audience.[33] He believed that an international language was needed to counteract the political unrest of the time, to 'debabelise'[34] and transcend barriers. He saw applications for Isotype in education, business and science, with the hope that by connecting these areas communities could be unified. He understood the problems of language barriers, which heightened the need for a 'helping' picture language; if pictures were accompanied by known words the native language speaker would understand, but if language formed a barrier, the pictogram would reveal the context.[35] If forced to choose between pictograms and words, Neurath believed that pictograms were more effective in removing language barriers than words alone.

Neurath's life's work was about co-operation and collaboration – with Marie Reidemeister Gerd Arntz and the rest of the team and extended 'academy' of experts at the G&W and the International Foundation for Visual Education in The Hague. But in his work in philosophy and social economics he also brought together teams of experts so that knowledge was never predicted, but taken from sound academic truths – otherwise, as he pointed out, you may as well flip a coin to establish the right pathway. This aligns with Neurath's later ideology that there is no fixed foundation to knowledge and each case must be assessed individually from an informed basis. Neurath didn't consider himself a philosopher, but preferred the label of social engineer, conscious of the need to 'orchestrate'[36] through planning and the creation of tools, methods and systems. The visual embodiment of his tool kit was Isotype.

33 It was swiftly followed by *Basic by Isotype* (1937), both this and *International Picture Language* were part of a mutually beneficial arrangement between Neurath and C.K. Ogden to promote both systems.

34 In *Genesis 11:1,* it states that God created one language for the whole of the earth, but to attempt to rival God, man built a tower to reach the heavens. God punished man's pride by preventing him from understanding his fellow man's speech.'Therefore is the name of it Babel: because the Lord did there confound the language of all the earth: and from thence did the Lord scatter them abroad upon the face of all the earth.' Umberto Ecco states 'first there was one language, and then there were – depending on which tradition we follow – seventy or seventy-two. It is this story that served as the point of departure for any number of dreams to 'restore' the language of Adam'. Ecco also states the counter argument to this attempt to return to one language by quoting *Genesis 10*, where he postulates the fact that 'If languages were differentiated not as a punishment but simply as a result of a natural process, why must the confusion of tongues constitute a curse at all?' Umberto Ecco, *The Search For The Perfect Language* (London: Fontana, 1997), pp. 9-10. The difference between ideas found in *Genesis 10* and *11* permeate throughout historical ideas on universal graphic language and forms one of the main themes in Case study 3.

35 Neurath is describing the form of wayfinding found in airports today.

36 Orchestration is a common theme in Neurath's later work.

A definition and overview of the principles of Isotype
The core principles of the Isotype system

This section describes the principles of Isotype individually and in relation to their **philosophical**, **methodological** and **operational** levels. It will discuss the reasons behind their origination and aspects of their evolution. Whilst the strict process of making Isotype charts was of a linear nature, the principles themselves cannot be regarded selectively or in isolation – when they are, their efficiency as a system is diluted (as has been seen through many historical imitations).[37] It is in their combination that the strength and consistency of the principles lies; through a process based on sound philosophical reasoning, academic data is translated using pedagogical expertise into accessible concepts, which in turn are implemented using a logical set of graphic tools.

Major sources of reference for this writing will be: Robin Kinross' 1979 MPhil thesis 'Otto Neurath's Contribution to Visual Communication (1925–45): the History, Graphic Language and Theory of Isotype';[38] Otto Neurath's 1936 *International Picture Language*, (and the 1975 University of Reading facsimile reprint with foreword by Michael Twyman); Otto Neurath's, *Empiricism and Sociology*; Nancy Cartwright, Jordi Cat, Lola Fleck and Thomas E. Uebels' *Otto Neurath: Philosophy Between Science and Politics;* Marie Neurath and Robin Kinross' recent publication *The Transformer: Principles of Making Isotype Charts;*[39] Ellen Lupton's 'Reading Isotype'; and Matthew Eve and Christopher Burke's recently edited edition of Otto Neurath's visual autobiography *From Hieroglyphics to Isotype*.

List of Isotype principles

The following list of principles is mostly[40] taken from the period when Neurath, Reidemeister and Arntz were working together in Vienna and The Hague, roughly between 1928 and 1940.[41] During this time, Neurath and Reidemeister's early philosophical and pedagogical ideas were refined and formed into a stronger, more visually empowered system by Arntz, and the principles matured into their most vigorous iteration. The principles are divided into the three interconnected levels representing the **philosophical**, **methodological** and **operational** levels.

37 Imitators and plagiarists will be discussed throughout this thesis.
38 Robin Kinross' MPhil thesis is the major work on the historical development of the principles of Isotype.
39 Marie Neurath & Robin Kinross, *The Transformer: Principles of Making Isotype Charts* (London: Hyphen Press, 2009).
40 Marie Neurath further developed the use of graphic language to form sequential explanatory images during the late 1940s onwards for her work in educational publishing. This will be discussed in Part two, Case study 2.
41 Gerd Arntz originally worked on a freelance basis for the G&W. One of the first publications that he collaborated on was *Die bunte Weld*. See Otto Neurath, *Die bunte Weld* (Vienna: Artur Wolf, 1929). Arntz became fully employed by the G&W in 1928 by virtue of the security offered by a year-long contract to design the portfolio of charts *Gesellschafts und Wirtschaft* (Leipzig: Bibliographisches Institut, 1930), M. Neurath & Kinross, *The Transformer*, p. 27.

Philosophical and intellectual principles of Isotype

1. Logical positivist/empiricist, anti-metaphysical
2. Social Democrat, socially inclusive
3. disseminated social knowledge
4. educational, non-commercial
5. international
6. promoted 'education by the eye'

Methodological principles of Isotype

1. transformation and teamwork
2. ordered information to allow its significance to become visually evident
3. reductive by nature, achieving a balance between abstraction and pictorial representation
4. symbols[42] function as repeatable units
5. universally accessible symbols and syntax
6. concerned with multiples, not uniqueness
7. stylistically as neutral as possible
8. use of simple clear language including C.K. Ogden's BASIC (British American Scientific International Commercial)
9. formed a 'helping language' (symbols supported words)
10. fidelity to material and viewer
11. symbols arranged to show comparative information
12. new symbols only added or adapted if content demanded it

Graphic and operational principles of Isotype

1. equal sized repeated symbolic units arranged horizontally, left to right in rows (unless argument dictates otherwise i.e. height) to indicate magnitude
    - five to six rows of selected statistical data as the optimum amount of information used to tell the story
    - symbols 'marked off' into groups of five or ten to aid counting

[42] The use of the word 'symbol' which according to the *Oxford English Dictionary* 'represents or denotes by suggestion' is used in a loose way in this thesis, as it has become a more contemporary word for pictogram. The term 'pictogram' will be used to describe the simple modular pictures of which Isotype is a powerful example, but the terms 'pictogram' and 'symbol' will also be used, and many examples quoted use the term 'symbol', when pictogram is inferred. In his talk given at the Association Typographique Internationale, UNESCO, 'International Signs and Symbols: an approach to the problem' (19 November 1967), Peter Kneebone, Chairman of the Icograda Commission on Signs and Symbols suggested that it was essential that everyone adopted 'a common convention' when discussing signs and symbols. 'In French and English "pictograph", "pictogram", "sign", "symbol", and "hieroglyph" were all used. All are used sometimes to mean the same things and sometimes different things'. Kneebone considered the term 'sign' as appropriate to convey 'instantly specific messages' in international non-linguistic visual communication, University of Brighton, Icograda Archive, Icograda Commission on Signs and Symbols, April 1964 – September 1968, SS67/3. Rudolf Modley and Margaret Mead (as discussed in Part two, Case Study 3) preferred the term 'glyph', which they considered to be a graphic representation of an idea, something altogether different from an Isotype 'pictogram' (which refers to a simple modular picture).

2. symbols and syntax combined to form a visual grammar
3. symbols seen in silhouette or outline form, tonally balanced, occupying a similar visual space
4. avoidance of perspective, adoption of parallel projection and elevation as drawing systems
5. meaning evident in black and white
6. colour used symbolically, taken from a limited palette
7. used Paul Renner's Futura typeface, ranged asymmetrically
8. *Führungsbild* (guide or qualifying pictures) heightened comprehension
9. rows of statistical information arranged chronologically (never according to diminishing magnitude)
10. fixed memory map of the world divided into six squares (economic areas) with fixed positions for the continents (equal area cartography), in more conventional mapping, using a mixture of the Mercator and the Eckert projections [43]
11. an axis used to show comparisons between different types of information, and highlight excesses and deficits
12. information always shown in the most direct concrete form; abstractions such as percentages avoided
13. avoidance of certain conventional statistical techniques
    - sizing circles and squares to show comparative amounts
    - absence of line graphs (Fever charts)
14. integrated pictures and text

[43] A projection of the map of the world onto a cylinder, with lines of latitude shown parallel to the equator. Neurath contracted Karl Peucker to develop cartographical techniques for the *Gesellschaft und Wirtschaft* portfolio of charts (published in 1930). Peucker was responsible for creating a map projection for world maps to be used with statistical information and introducing colouring systems to indicate elevation. To eliminate distortion, Peucker used the Mercator projection around the equator, and the Eckert Projection for the rest of the map to eliminate the strong shape distortion that would occur around the poles. See *Gesellschaft und Wirtschaft* portfolio of charts p. 100, and Hisayasu Ihara 'Otto Neurath's Atlas "Society and Economy": Design, Contents and Context' (IASDR07, 2007), p. 6.

Describing the principles of Isotype

This section will describe the principles of Isotype individually, and briefly explain the reasons behind their formulation. Although this thesis does not aim to deal with the philosophy and politics which permeate through Neurath's work, it will reference relevant fundamental philosophical ideas that relate to the development of Isotype as a visual system.[44]

Philosophical and intellectual principles of Isotype

The following section introduces Neurath's philosophical and intellectual principles and provides background information to the descriptions of the individual principles which follow. It will cover Important philosophical and intellectual areas of Neurath's life, such as his involvement with the Vienna Circle, the Unity of Science Movement, the 'boat metaphor', his disagreements with fellow philosopher of science Karl Popper and his evolving views on philosophy.

Since the mid-1970s Otto Neurath has been re-discovered by a new post-war generation.[45] Vienna Circle scholars have written about the connections between his philosophical and visual work, and this thesis has drawn from their writing.[46]

> … Neurath's philosophy finds expression in a body of thought and work, both practical and theoretical, that evolves as one whole in an exacting political setting.[47]

Neurath has been described as a philosopher, publicist, activist, economist, bureaucrat, scholar, social scientist, educator and Marxist. Add to this museum director, statistician and encyclopaedist, and the polymath emerges.[48] Neurath has also been labelled an anti-

44 See Cartwright et al., *Otto Neurath Philosophy Between Science and Politics*, and M. Neurath & Cohen (eds), *Empiricism and Sociology*.

45 This is most likely attributable to the 1975 exhibition in University of Reading Library. 'Graphic Communication through ISOTYPE (reviewed in *The Times Educational Supplement*, *The British Printer* and *The Library Association Record*, June 1975); the catalogue *Graphic Communication Through Isotype* and the 1980 University of Reading facsimile reprint of *International Picture Language*. The facsimile reprint received orders from around the world, as can be seen from letters requesting copies, and the ensuing accounts in the Isotype Collection, where many letters of appreciation can be found. The exhibition itself was well attended by designers, design students and lecturers, past employees and friends of the Isotype Institute. Noteworthy visitors included Christopher Hill (Natural History Museum), Prof. M.D. Vernon (psychologist), Dennis Young (High Wycombe College of Technology and Art), John Ellis (final Isotype Institute employee*), Kei Mori (graphic designer, Tokyo), Rudolf Modley, Rufus Segar (designer, Economist Intelligence Unit), Jorge Frascara (designer, Buenos Aires) and Bruce Robertson (Diagram Visual Information Ltd). The exhibition travelled to Vienna in 1977, IC 7.1b.
* Robin Kinross considers himself to be the last employee of the Isotype Institute courtesy of his work cataloguing the Isotype Collection during the mid-1970s.

46 *Encyclopedia and Utopia: The Life and Work of Otto Neurath (1882-1945) (Vienna Circle Institute Yearbook)* ed. by Elisabeth Nemeth & Friedrich Stadler (Vienna: Springer, 2011) provides more details on the philosophical aspects of Neurath's life.

47 Cartwright et al., *Otto Neurath Philosophy Between Science and Politics*, p. 2.

48 *Ibid.,* p. 1.

philosopher and a Marxist (who didn't read Marx very much).[49] Neurath called himself a Marxist to connect himself with the Workers' Movement, and a logical positivist to ally with the Vienna Circle,[50] but he did not believe in all their doctrines, instead incorporating some of their ideas into his own body of knowledge. Neurath's philosophy was based on observed (empirical) life experiences; he thought of himself as a social engineer with firmly held beliefs in social improvement, which he sought to realise through the gathering of information, planning, and the creation of tools, methods and systems. The visual tool he used to disseminate his ideas was Isotype.

Neurath's practical approach to Vienna Circle philosophy was 'to facilitate the penetration of the scientific world-conception into the forms of personal and public life, in education, upbringing, architecture and the shaping of economic and social life' (Carnap, Hahn and Neurath 1929). Despite having differing political allegiances, Vienna Circle philosophers[51] shared a common discourse in logical positivism (inspired by Ludwig Wittgenstein's *Tractatus Logic-Philosophicus* which states that knowledge stems only from direct experience, and that the task of philosophy lies in the clarification of problems and assertions through logical analysis). Neurath was a founding member of the Vienna Circle; his involvement allowed him the opportunity to debate ideas on the philosophy of science, logical positivism and physicalism. He formulated Isotype independently as his own visual interpretation of these ideas. Ellen Lupton succinctly articulated the link between the visual appearance of Isotype and its philosophical underpinning:

> Isotype is the popular version of logical positivism, an Isotype character is positive because as a picture it claims a base in observation; it is logical because it concentrates experienced detail into a schematic, repeatable sign.[52]

Neurath's ideas on physicalism feed directly into his visual language. Physicalism describes events which happen in time and space and attempts to characterise observed facts[53]– the real world consists only of the physical world, and the metaphysical is avoided at all costs. Neurath urged all sciences to adopt the language of physicalism, to promote the solidarity needed for co-operation and the unification of mankind. Isotype was intended as a physicalist language; its visual appearance was unambiguous, transcended written or spoken language, was stylistically as neutral as possible and based on reduction.

49 According to Rudolf Carnap, Neurath's views on socialisation were strongly influenced by Marx, See 'From Rudolf Carnap's Intellectual Autobiography', *Empiricism and Sociology,* pp. 43-45.

50 Prominent Vienna Circle philosophers from 1923-1936 included Moritz Schlick, Hans Hahn, Otto Neurath, Philipp Frank, Viktor Kraft, Herbert Feigl, Friedrich Waismann, Rudolf Carnap, Kurt Gödel, Karl Menger, and Bela Juhos, *Empiricism and Sociology*, p. v.

51 Neurath, as Director of the G&W was the only member of the Vienna Circle to not hold a university post.

52 Lupton, 'Reading Isotype', 49.

53 Neurath believed that the language of children and early peoples untainted by religion and idealism was closer to physicalist language because of its purity and lack of cultural nuances. In many respects this vision aligned with his aspirations for Isotype.

Neurath put forward the initial concept for the Unity of Science Movement in 1934 at the 8th International Congress of Philosophy at Charles University in Prague. It was his aim as a 'social technician' to orchestrate different knowledge systems[54] and lay out plans for the publication of scientific works which built connections between the social and natural sciences through an assembly of the totality of scientific knowledge, with boundaries removed between the disciplines. The Unity of Science Movement was introduced as a co-operative instrument for social change, at a time of looming international crisis. Neurath's slogan 'Metaphysical terms divide; scientific terms unite'[55] summed up his broad idea for the Movement. He saw science as a proletariat stronghold and through its unification he considered that he could bring people together and build trust amongst nations.

Neurath's practical model for realising his ideas on the Unity of Science was the *Encyclopedia of Unified Science,* based on the French *Encyclopédie* (a co-operative tool used to help liberate the masses during the French Revolution). Neurath saw his encyclopedia taking on a similar role in social change. Ideas for the formulation of the *Encyclopedia of Unified Science* were formally proposed at the First International Congress for United Science at the Sorbonne in Paris 1935, in association with Rudolf Carnap and Charles Morris in Chicago (who negotiated publication with the University of Chicago Press). The *Encyclopedia* formed an extension to Neurath's educational and museological work, upholding the Marxist belief that thinking is a tool, and providing an accessible cross-referenced assembly of all scientific knowledge. He intended it to be accompanied by a visual thesaurus, uniting science through visual means using Isotype, on the premise that not only does science unite, but pictures also unite. He envisaged the *Encyclopedia* as a collection of about 100 pamphlets on subjects such as stars, plants, stones, animals and men, with an alphabetical index allowing the thesaurus to also be used as a dictionary.

Otto Neurath's changing ideas on philosophy

Vienna Circle protocol debates[56] were concerned with how scientific method could be verified and reduced to its most simplistic form, ridding science of its irrational tendencies and removing all metaphysical elements. Neurath was originally in general agreement with the Vienna Circle's conception of what constituted truth, but related more with acceptability than truth. He had previously followed the Enlightenment idea[57] that concepts of science (including social science) could be precise and its laws universal and exact, but gradually by the mid 1930s his position began to change. He didn't feel that protocol statements served as a firm basis for knowledge and saw their acceptance as being only relative to the totality of the rest of the sentences, arguing that even abstract theories failed to be exact or precise:

54 Cartwright et al., *Otto Neurath Philosophy Between Science and Politics*, p. 3.
55 Neurath (1933) in Cartwright et al., *Otto Neurath Philosophy Between Science and Politics,* p. 179.
56 A protocol sentence reports the sensations of a particular observer at a particular time. It is thought to be irrefutable, and so forms the justification for more complex scientific statements. If a scientific statement equates with the meaning of a protocol sentence, it is considered to be true, and the scientific concept is considered to be firmly grounded in observation and experience.
57 Enlightenment philosophers developed an objective anti-metaphysical approach to science and aimed to reform society through the promotion of science and intellectual debate.

> 'If a statement is made, it is to be confronted with the totality of existing statements. If it agrees with them, it is joined by them; if it does not agree it is called untrue and rejected; or the existing complex of statements of science is modified so that the new statement can be incorporated; the latter decision is mostly taken with hesitation. There can not be another concept of 'truth' for science.'[58]

Neurath began to envision science as 'an untidy pile to rummage around in', rather than a neatly organised pyramid with physics forming the base (as the positivists largely regarded it). Neurath's aim was to replace this untidy pile with a tool kit to effect social change.[59] He attacked the Vienna Circle's belief in the fact that scientific theories could be described using model systems consisting of systematically clean and precise statements by introducing *Ballungen* to the protocol sentence debate:

> 'Complex messy statements of little cleanliness – *Ballungen* – are the basic materials of the sciences'.[60]

He stated that whilst the terms of advanced science are precise, everyday terms are imprecise, and cannot equate with each other. This made a mockery of attempts to define an exact scientific method and caused disputes between Neurath and Karl Popper,[61] who wanted to establish one universal set scientific method. Neurath and Popper publicly disagreed on the simplicity of protocol statements; Neurath criticised Popper for being too simplistic; Neurath's statements were 'congested', Popper's 'clean' and based on using one unique distinguishing set of unambiguous statements to be applied as a model to all factual sciences.[62] Neurath criticised Popper for believing that regularities could be discovered, which Neurath considered metaphysical, believing that to always reject a theory on the basis of it being disconfirmed was not a rational action.[63] Popper's account of the logical asymmetry between verification and falsifiability lies at the heart of his philosophy of science, as opposed to Neurath's view which contains no prescribed methodology. Neurath believed that set methods could only be defined through the ability to constantly inform, change, debate, plan and assess factors in relation to each other, and that there was no set foundation to knowledge. Popper disagreed with a lack of fixed rules, thinking it would led to any arbitrary system setting itself up as empirical science.[64]

Before Neurath introduced *Ballungen*, he saw the relationship between fact and hypothesis as straightforward, either sentences fitted into the protocol, or they didn't, and a decision had to be about which one to keep. After he introduced *Ballungen*, he realised that it was impossible to create a scientific model, as it was constantly changing and provided no firm basis from

58 Neurath (1931), in *Otto Neurath Philosophy Between Science and Politics,* p. 80.
59 *Ibid.*, p.x.
60 *Ibid.*, p. 229.
61 Popper will be discussed in relation to the Natural History Museum in Part two.
62 Cartwright et al., *Otto Neurath Philosophy Between Science and Politics,* p. 193.
63 *Ibid.*, p. 161.
64 *Ibid.,* p. 223.

which to start. Neurath's boat metaphors (the boat being a metaphor for knowledge) evolved over his lifetime and illustrate his changing views.[65] This early boat metaphor states that the foundations of knowledge must be adapted and built upon:

> We are like sailors who have to rebuild their ship on the open sea, without ever being able to dismantle it in dry dock and reconstruct it from the best components.[66]

A later boat metaphor states that knowledge has no set foundation and must be newly assembled each time a new model is needed; what we know can only be compared with other historically conditioned beliefs, nothing is certain, and there is no cast iron method.

> A new ship grows out of the old one, step by step – and while they are still building, the sailors may already be thinking of a new structure, and they will not always agree with one another. The whole business will go on in a way we cannot even anticipate today. That is our fate.[67]

Neurath considered that certainty was a false idea, and therefore a metaphysical claim which robbed humanity of the power to change and evolve. What is known as the Neurath Principle states that conflicting doctrines are always open to decision, whether to change a protocol or to change a theory. By 1935, Neurath had lost faith in the existence of any logical connections between scientific statements of unified science, believing that science existed as a series of disparate patterns. He based this on his realisation that logic and mathematics can't achieve unity, and therefore the idea of a system was a great scientific lie.

Neurath did offer general ideas for fixing boundaries for empirical sciences through physicalism. He stated that scientific statements should be formulated using a physicalist language, and that any new additions must be acceptable in the light of other statements and methods. He left ideas on what constituted scientific method open, by purposefully not defining how to decide which changes were acceptable. He felt it unnecessary to provide a scientific method of theory testing as the selection of important factors should be made on the basis of logic.

This section describes the individual philosophical and intellectual principles individually:

1. Logical empiricist/positivist, anti-metaphysical

Logical positivism brought together two opposing philosophical attitudes, previously seen as contradictory; rationalism, the study of reality through logic, geometry and mathematics (which could not be observed) and positivism (empiricism) which maintained that the only access to human knowledge was through direct observation.[68] Logical positivists believed that the proper

65 It is interesting to note that Neurath went to great pains to eliminate the metaphysical from Isotype and in his dealings with the Vienna Circle, but is happy to use the metaphor to stand for knowledge in this instance.

66 Neurath adapted his boat metaphor over the course of his life to reflect his changing ideas, this is the most commonly referred to version. Cartwright et al., *Otto Neurath Philosophy Between Science and Politics,* p. 89.

67 *Ibid.,* p. 165.

68 Lupton, 'Reading Isotype', 48.

task of philosophy lay in the analysis of everyday and scientific language using clear statements (the protocol statements). Their approach was methodical, based on the idea that philosophy must start with an exact logical analysis of the language in which the scientific questions were formulated, and through the elimination of the metaphysical and all vagaries of speech,[69] scientific and philosophical questions could be made clear.[70]

Neurath saw Isotype as the physical embodiment of logical positivism; a system which allowed factual information to be represented with the utmost clarity, forming accessible 'fact pictures' through the construction of clear linear statements composed of simplified pictorial units. Seen together, they depicted a statistically verifiable statement. Isotype can be regarded as a pragmatic expression of Neurath's ideas on philosophy; although language is the medium of all knowledge, empirical facts are directly received through vision, the primary source of all empirical knowledge. Vision forms an immediate bridge between the symbol and the observed experience,[71] so forming the obvious starting point in the realisation of the visual equivalent of a philosophical idea. Neurath continually emphasised what he described as 'education by the eye', believing it to be the best way to provide simple educational experiences for the audience at the G&W during the 1920s.[72] Written and spoken languages, due to their nuances, inconsistency and variable syntactical structure, form less direct or reliable media for experiencing information and understanding relationships between objects in the physical world.

2. Social Democrat, socially inclusive

Neurath's work reflects the social and cultural atmosphere of Red Vienna; as Director of the G&W he was in a prime position to help implement the Social Democrats' programme to turn Vienna into a model of socialised humanity. Neurath's ideals on pedagogy and social improvement fitted in with the dominant Social Democratic policies of Red Vienna;[73] he believed that the right to knowledge was not dependent on prior education, and developed Isotype as an inclusive communication system regardless of educational background.

69 'About Expressions One Should Try To Avoid', the following shows what Neurath meant by vagaries of speech or ambiguous aspects of language: All kinds if [sic] terms, which sound "objective", but are only "subjective". One should not speak of "good" or "bad" in an absolute way, but only of "we dislike…" or "we like…" … One should not speak of "justice", "Beauty", "Truth" etc. (who is the judge?)… One may speak of "factual information", "Documentary information" but not of "Facts", "Things"…One should speak of "human behaviour"… but not of "Soul", "Mind", therefore not of "mental". Neurath, *From Hieroglyphics to Isotype*, p. xvii.

70 L. Kolakowski, *Positivist Philosophy from Hume to the Vienna Circle* (Harmondsworth: Penguin, 1972), p. 204.

71 See Lupton, 'Reading Isotype'.

72 The Social Democrats' attempts at reforming public education included giving children of working-class families access to education from the ages of ten to fourteen, enabling them to improve themselves and become better party members. However, it would appear that only the single children of better-off parents could benefit from education up to the age of fourteen, and absenteeism in working-class districts was high, further emphasising the need for a simple accessible form of education. See Helmut Gruber, *Red Vienna Experiments in Working Class Culture 1919–1934*, pp. 73-80.

73 Neurath's ideas on social improvement stemmed from early on in his career when he established contact with the leaders of the Austrian socialisation movement and became General Secretary of Research for the Institute of Social Economy (founded in 1920) with the aim of supporting the social economy.

What is known as Red Vienna came about due to a string of events beginning with the collapse of the Habsburg Empire, following the resignations of Kaiser Wilhelm II (King of Prussia) and King Ludwig III of Bavaria and the break up of the multinational states into numerous individual nation states post World War I. German Austria was reconstituted as a republic with Vienna as one of its independent states. In 1918 Kurt Eisner proclaimed the Bavarian Republic in his role as President of the Workers' and Soldiers' Council in Munich and the Council appointed him Prime Minister in the Viennese municipal elections of May 1919.

After the collapse of the Habsburg Empire, inflation was running high. Austria was deprived of resources with shortages of food, housing and public health provision. In this difficult economic climate, the demoralised bourgeoisie lost their strength and were unable to resist the Social Democrat offensive. The Social Democrats consequently gained sole control of the Viennese government, heralding Red Vienna. Their power base had its foundations in policies based on educational reformer Max Adler's dictum that the future of democracy lay in pedagogy, not politics, placing great store on education (*Bildung).* The Social Democrats developed a widely admired programme of socially based cultural policies,[74] designed to reform the lives of the working classes, with the aim of reshaping society through the introduction of far reaching reforms in heath care, education and science.

Neurath had previously resisted active political involvement, but joined the Social Democratic party in 1918 on the initiative of Wolfgang Schumann (Neurath's general secretary at the Leipzig Museum), who convinced him that he was the best person to formulate plans for a

[74] The idea of education being used as a tool to empower the worker came about through various factors dating back to the founding of the Austrian Social Democratic Party in 1889, formed from an amalgamation of many cultural societies during a period of political liberalisation in the 1860s. The Party stressed the virtues of self-improvement and education for the workers, and defined education as the mechanism for promoting social equality, and a major tool in the struggle against the concealment of information by the church and aristocracy. Later on during the Red Vienna period, Max Adler tried to use German culture with the clear political function of bonding the diverse nations that made up Austria, Hungary and Germany. Adler opposed orthodox Marxism which stated that economic factors were the sole determinants of the psychological and intellectual development of the workers and stressed the importance of improving cultural life. Adler, like Neurath, regarded science as a crucial component of the new culture. The use of education as a tool of proletariat empowerment can also be attributed to the failure of Otto Bauer's 1919 socialisation plan (due the collapse of the Bavarian state through revolution) which left the economy in a desperate state, making a concentration on social and cultural policies a more viable (and economically feasible) alternative.

comprehensive socialisation[75] of the Bavarian economy.[76] Some of his contemporaries described this action as utopian, implying a certain political naivety when it came to his ideas on socialisation[77] and the Bavarian conflicts in which he became embroiled, but Neurath's actions can be more accurately described as social Epicurean – the generation of the right social conditions to foster community well-being, rather than the creation of personal happiness. Neurath took Marx's ideas and adapted them;[78] Marx considered that a classless society was utopian, Neurath's views on this point were much more pragmatic, but nevertheless based on a society where the worker could attain his rightful place.[79] Neurath's alignment with Social Democratic party policies of Red Vienna was in many respects serendipitous, as mobilisation and experience of war economy had propelled him to consider ideas of socialisation, along with his deep-seated belief in the power of pedagogy and desire for social improvement – an agenda he broadly shared with the Social Democrats who supported the G&W from 1925–1934.

3. Disseminated social knowledge

Neurath harnessed the power of statistics and used the medium of the museum to diffuse his ideas on the display of statistical information. This practice started as early as 1916 when he became director of the Museum of War Economy in Leipzig. The aim of this museum was to commemorate the economic achievements of World War I and create a base for spreading knowledge and research on war economy. Neurath used visual education to show how ideas learned from war economy could be adapted for a peacetime economy. His work on the visual dissemination of social facts continued in 1921 when he became general secretary of the

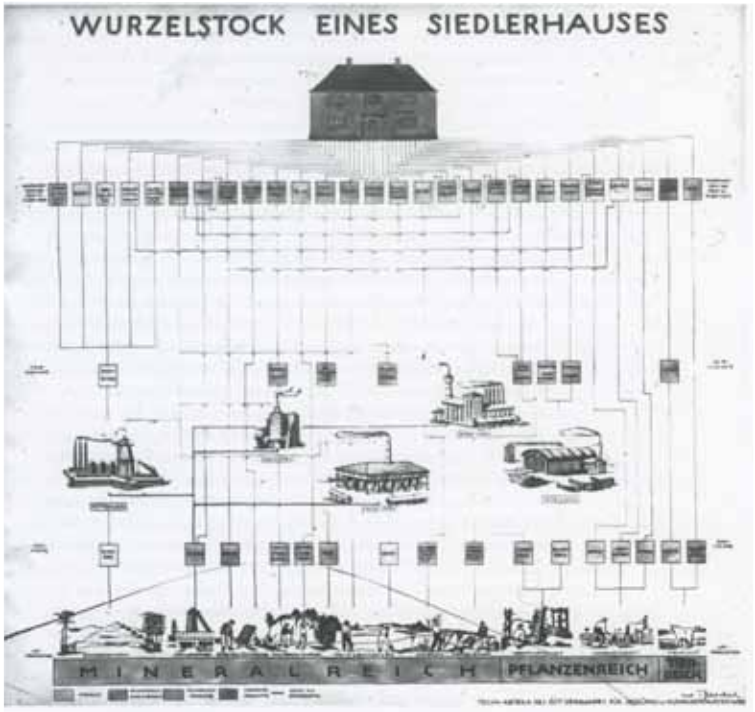
75 Socialisation refers to the theoretical problems of how to transform a private economy into a collective economy.

76 Neurath had difficulty deciding on this course of action due to his habilitation at Heidelberg University and his wife Olga's opposition to political involvement. In 1919 Neurath travelled to Munich and discussed the economic programme and its political realisation with Eisner and Jaffé (the Finance Minister). Mainly through the enthusiasm of Social Democrat Trade Minister Josef Simon, Otto was invited to create, lead and put into action a Central Planning Office for Bavaria, where he formed the first working units for economic central planning and began to work on plans for full socialisation. He also began lecturing at mass meetings and published leaflets in Munich, emerging as an empowering public speaker, being particularly well received by the mining communities of Southern Saxony. However, it was short lived, and communists, independent socialists and anarchists proclaimed Bavaria a Soviet Republic, so the Social Democrats fled. Neurath stayed on and declared allegiance to the new system. In the ensuing civil war, Neurath was arrested and tried for high treason by the bourgeoisie for his reputed allegiance to the Soviet Republic. He was imprisoned by the pre-Hitler fascist hordes and in danger of execution. The Austrian government effected his exchange to Austria, but he was banned from entering Germany until 1926. His lectureship at Heidelberg University consequently ceased and he returned to Vienna.

77 Max Weber and Erwin Weissel in *Otto Neurath Philosophy Between Science and Politics*, p. 42 & p. 54.

78 'Communism… is the genuine resolution of the antagonism between man and nature and between man and man: it is the true resolution of the conflict between existence and essence, objectification and self-affirmation, freedom and necessity, individual and species. It is the riddle of history solved and knows itself as this solution'. Economic and Philosophical Manuscripts of 1844 as cited in Singer, *Marx: A Very Short Introduction*, p. 37.

79 Marx's early work discusses the difference between the proletariat being harnessed to make wealth for others, and work that was produced for personal satisfaction. He considered that under capitalism, workers were forced to sell their labour (their only saleable commodity) in order to live, and that a worker's only real life began at the end of the day, when work ended. Marx considered that capitalists used proletariat labour to increase their wealth, and kept wages at a bare minimum to just sustain human life, keeping the workers in a degraded position. This was in contrast to the Red Vienna ideas of Social Democracy, where workers were empowered, and pedagogy harnessed in a socio-cultural programme to turn Vienna into a model of socialised harmony.



(Fig. 1)
Wurzelstock eines Siedlerhauses (Roots of a Settlement Home), showing an early example of Neurath's visual language for the *Museum für Siedlung und Städtebau* (Austrian Housing and Allotment Association).
ISOTYPE COLLECTION

Museum für Siedlung und Städtebau (Austrian Housing and Allotment Association).[80] The Museum's mission was to inform the public about Vienna's housing programmes and discuss ideas on city planning.[81] Neurath used hierarchical diagrams to illustrate these ideas. **(Fig. 1)** In 1924, financial problems signalled an end to the housing co-operative movement and Neurath made a proposal to Hugo Breitner, (the Vienna city councillor in charge of finances) that the Austrian Housing and Allotment Association should be transformed into the Social and Economic Museum (G&W). Neurath collected many signatures in support of his ideas, and the new museum opened in January 1925 with an initial subsidy of 20,000 schillings from the Gemeinde Wein, with Neurath installed as director.

4. Educational, non-commercial

Neurath's work was not driven by commercial or financial aims,[82] but by the desire to educate, inform and improve the ordinary citizen's life, in line with Social Democrat ideas of *Bildung* – education and learning for all.[83] The Social Democrats believed that the progress of humanity could only be achieved through education, which they saw as the future of democracy (rather than politics). Education was dispersed through schools, kindergarten, leisure establishments,

80 Vossoughian, *Otto Neurath: The Language of the Global Polis* provides a full account of this period of Neurath's early work.

81 Neurath believed that houses should be built for people and not profit. In 1923 an exhibition was held to inform the public of the Association's activities, to show how well-designed homes could transform life. The exhibition was held in the open air and featured full-sized furnished houses, garden produce and large charts such as *Wurzelstock eines Siedlerhauses* (Roots of a Settlement Home). **(Fig. 1)**

82 This is in direct contrast to Rudolf Modley, who 'commercialised' the Vienna Method in the US and sold pictograms for 'a dollar a piece' in New York during the mid to late 1930s. (Modley's work will be discussed in detail in Part two).

83 See Hadwig Kraeutler, 'Otto Neurath – Museum and Exhibition Work: Spaces (Designed) for Communication'. (unpublished doctoral thesis, University of Leicester, 2003); and *Otto Neurath: Museum and Exhibition Work Spaces (Designed) for Communication* (Frankfurt, Berlin, Brussels, New York, Oxford, Vienna: Peter Lang, 2008)..

libraries, museums and exhibitions, and the social integration of these institutions was necessary to provide effective, enjoyable learning for all, within convivial surroundings. The G&W had close links with schools and produced school books linking classroom and museum, and it was Neurath's intention to create a common organisation for the universal provision of such teaching materials. In 1933 he published *Bildstatistik nach Wiener Methode in der Schule,*[84] discussing how the Vienna Method could be used in schools and how principles learned by both teachers and schoolchildren could allow them to make charts together. Experiments were staged in Montessori schools, where subject matter was reduced to its most simplistic form allowing the children to construct their own symbols, while older children were able to transform statistical tables. Neurath stated that 'some of the results were thrilling'.[85]

5. International

> The question of an international language has now become important. There are a number of signs pointing to a great development of International organizations in the near future – though we are living in a time of warring interests and broken connections. Any work done on the question of international languages – with a view to making a word language, or a helping picture language – will give support to International developments generally. An international language has to take into account international needs, and at the same time it has to be as simple as possible.[86]

Neurath published *International Picture Language* in 1936 to launch Isotype (previously known as the Vienna Method) to the world, against the backdrop of the fascist threat in Europe. He launched the newly renamed Isotype system for use in education, business and science, with the hope that the connections he was making would help unify communities. At the time that it was published, Neurath and his team were working from The Hague – the organisation was known as the International Foundation for the Promotion of Visual Education; Neurath and his team had been forced to relocate to Holland due to fascist intervention. By 1936 Neurath's picture language had acquired an international reputation, finding favour in the US, UK, Holland, Germany and USSR.

> A sign at the top of a list of numbers […] makes us almost independent of the knowledge of the language, because pictures, whose details are clear to everybody, are free from the limits of language: they are international. WORDS MAKE DIVISION, PICTURES MAKE CONNECTION.[87]

Neurath understood the problems of language barriers and the need for an internationally recognisable language. The idea of a picture language appeared to be the answer. If pictures (pictograms) were accompanied by known words then the local traveller would understand,

84 'Picture statistics using the Vienna Method for schools'.
85 Neurath, *From Hieroglyphics to Isotype*, p. 115.
86 Neurath, *International Picture Language*, p. 13.
87 *Ibid.*, p. 18.

but if language formed a barrier, the pictogram would reveal the context.[88] If forced to choose between pictograms and words, Neurath believed that pictograms were more effective in removing language barriers than words alone. Neurath attempted to 'debabelize' language, and arrive at one set of standardised pictograms that would work in an international context, when used to support words to form a 'helping language'. He allied himself with C.K. Ogden's Basic English, which he considered formed an 'international instrument' against the struggle of debabelization, and that the English language was 'in general use' on an international basis.[89] Neurath died in 1945, but had he survived until the 1960s, his vision of internationalism could feasibly have taken the principles of Isotype forward for a new post-war 'jet and telecommunications age' generation.[90]

6. Promoted 'Education by the Eye'

International Picture Language featured a section dedicated to 'Education by the Eye', stating that 'the effect of pictures is frequently greater than the effect of words'. Writing in 1936, Neurath stated that it was only a question of time before a complete system of visual education would become a mainstream part of the education system.[91] He considered that vision was the primary form of empirical knowledge, and that pictorial symbols could form a bridge between direct empirical experience and symbolic language. Neurath was not a believer in the old adage that 'pictures are only for men without knowledge of reading and writing, and not for men of good education'.[92] He thought adherence to Isotype principles could change teaching methods and encourage curiosity by introducing students to general concepts through the use of clear pictures, allowing them to form a common visual base.

Methodological principles of Isotype

The following set of methodological principles are mostly characterised by transformation, which is the framework into which many of the principles in this section fit, and when seen in relation to the intellectual and philosophical principles, form the process through which academic information is made accessible to a designated audience. Methodological principles evolved alongside the philosophical principles from 1925 onwards,[93] and build the facilitating bridge between the philosophical ideas that underpin Isotype and their graphic realisation.

88 Neurath is describing the type of wayfinding found in airports today.
89 Neurath, *International Picture Language*, p. 13.
90 Later ideas on international language will be discussed in Part two.
91 Neurath, *International Picture Language*, p. 22.
92 *Ibid.*, pp. 22-26.
93 A clear description of how the principles developed is found in Kinross, (1979) 'Otto Neurath's Contribution to Visual Communication 1925–1945, pp. 59-126.

1. Transformation, teamwork

Marie Neurath and Robin Kinross's recently published book *The Transformer: Principles of Making Isotype Charts* discussed the process that originally became to be known by this name, which we might now associate with the term 'design', (a term never used at the G&W).[94] At the G&W, transformation could be described as the method through which (largely) statistical information was configured to clearly form an accessible graphic argument, produced by a structured team consisting of subject expert, transformer (often referred to as the 'trustee of the public' due to the integrity demanded of the role), the graphic artist and other technicians. Isotype was essentially characterised by teamwork; the ground rules were developed by the tri-partnership of Neurath, Reidemeister and Arntz. The wider team consisted of Neurath's 'academy' of academic advisors, and various technical staff to create artwork, set type, take photographs, colour charts and print. Many notable artists, designers, academics and technicians supported the core team which increased workflow demanded, the most notable being Erwin Bernath, Peter Alma, August Tschinkel (artists) and Josef Frank (architect). Neurath's 'Academy' of specialist advisors included Dr Alois Fischer (statistician), Robert Bleichsteiner (historian), Dr Schwieger (art historian) and Karl Peucker (cartographer). Friedrich Bauermeister worked alongside Marie Reidemeister as a transformer, Josef Sheer printed and coloured charts, Walter Pfitzner took photographs, Elizabeth Buchman coloured lantern slides, Edith Matzalik made captions and assembled charts, and Fritz Jahnel and Bruno Zuckerman worked as draftsmen.

At the G&W, subject experts conveyed academic information to transformers. The transformer's initial role was to understand the data, identify salient points and then find the best way to convey them to the audience (using the graphic and operational principles as design tools). Transformers produced coloured pencil layouts of charts indicating symbol design and configuration, the magnitude that each symbol represented, ideas for guide pictures *Führungsbild*, titling and annotation in relation to the story to be told. Graphic artists then took over the process and designed symbols (or took them from the lexicon of existing symbols), specified sizes and weights of type and took the overall aesthetic look of the chart into consideration. Symbols were cut from lino and printed on paper (in one of a small selection of colours) in modular groups. Futura metal type was set, symbols, rules and *Führungsbild* printed, cut and pasted onto standardised white paper backing sheets, in accordance with the transformer's layouts. Charts were designed in standard sizes[95] to fit within a modular framing system.[96]

94 The Transformation process differs from what we understand by design due to the fact that the transformer was responsible for the mathematical accuracy of the information, finding the best way to show the statistical story in the most clear and unbiased mode. The transformer produced pencil sketches of the structure and layout of the charts. Aesthetic decisions would be made in collaboration with graphic artists who drew the symbols, made detailed typographic decisions and finally produced the charts.

95 The plain wood frames measured 126 x 126cm. Smaller charts fitted within this overall area in standard configurations.

96 Transformation in relation to the Natural History Museum will be discussed in Part two.

2. Ordered information to allow its significance to become visually evident

> At the first look you see the most important points, at the second, the less important points, at the third, the details, at the fourth, nothing more – if you see more, the teaching-picture is bad.[97]

Information was carefully ordered by the transformer to allow the audience to deduce facts for themselves and form their own opinions based on well-constructed, visually significant statements.

3. Reductive by nature, achieving a balance between abstraction and pictorial representation

Reduction is based on finding the simplest expression of an object. Details that detract from the essence of the object are eliminated (as in shadow or decoration). Neurath stated 'it is possible to overdo things, "Less is more."'[98] Isotype symbols only include information essential to the concept, whilst still imparting objective, (not subjective) information. They are thus instantly recognisable and very often use silhouette, achieving a balance between abstraction and pictorial representation,[99] but always avoiding metaphor. It is the combination of Neurath's searching mind and Arntz's great empathy with the subject matter, combined with his ability to reduce images to their very essence as objects, which prevented Isotype from appearing mechanical.

4. Stylistically as neutral as possible

> Just through its neutrality, and its independence of separate languages, visual education is superior to word education[100]

Neurath intended Isotype symbols to be as stylistically neutral as possible, to ensure objectivity and enable them to summarise and stimulate open debate. They were not designed to be linked to any particular culture, style, time or place.[101] In Arntz's pared-down method of working, Neurath considered that he had found the perfect vehicle for visualising an unambiguous system which would allow the audience to draw their own conclusions. Arntz's socially-inspired, politically committed ideas also fitted with Neurath's ideology. However, seen through contemporary eyes, Isotype cannot be seen as stylistically neutral;[102] its visual

97 Neurath, *International Picture Language*, p. 27.
98 *Ibid.,* p. 66.
99 Lupton considered that Isotype formed the popular version of logical positivism, 'Reading Isotype', 147.
100 Neurath, 'From Vienna Method to Isotype' *Empiricism and Sociology*, p. 14.
101 Many critics, such as Clive Chizlett disagree with this statement. He stated that Isotype charts merely functioned as 'objets d'art or propaganda'. Clive Chizlett 'Damned Lies and Statistics: Otto Neurath and Soviet Propaganda in the 1930s' *Visible Language*, 26: 3-4 (1992), 303. Macdonald-Ross also considers that Isotype was limited in its application due to its predilection for projects relating to socialism (see edited transcript of formal interview in Appendix 1).
102 See Robin Kinross, 'The Rhetoric of Neutrality' in Victor Margolin (ed), *Design Discourse: History, Theory, Criticism* (Chicago: University of Chicago Press, 1989), p.131-143 for a fuller discussion on neutrality.

rhetoric signals its chronology, politics, economic climate, philosophy and design influences.[103] Stylistic neutrality is key to ensuring objectivity in symbol design,[104] but is almost impossible to achieve.[105] Isotype symbols were originally designed to be value-free, and even though their stylistic neutrality is questioned by contemporary audiences, they did appear to serve their purpose well in supplying unbiased information to the many thousands of visitors to the G&W from 1925–1934.

5. Symbols function as repeatable units

Isotype symbols were first and foremost characterised by their ability to be seen as instantly recognisable, repeatable units, without excess detail and with the capability of being divided either vertically (or preferably) horizontally. The transformer would decide on the amount that each symbolic unit represented, governed by the overall statement that the chart needed to make; a chart dealing with large amounts of information would incorporate a larger unit value than one dealing with lesser amounts. The practice of dividing individual units was avoided if possible by reassessing the unitary values. The amount that each symbolic unit represented was always stated below the chart, and kept consistent across a set of charts. Actual figures for each row of information were not stated on mature examples of Isotype charts, but did appear on early charts.[106]

6. Universally accessible symbols and syntax

Neurath uses his 1936 book *International Picture Language* to promote Isotype as an international language. Symbols were simply realised and combined for the ordinary citizen to understand, even if literacy levels were low. It was never Neurath's intention to add to the

103 Arntz was originally a member of the Gruppe Progressiver Künstler Köln, a group who wanted to turn Germany into a radically socialist state and depicted class struggle using abstract woodcuts.

104 Otl Aicher identified six forms of neutrality to ensure objectivity in symbol design: pictorial neutrality, cultural neutrality, taboo neutrality, educational neutrality, neutrality of interpretation and neutrality of design. Markus Rathgeb, *Otl Aicher* (London, New York: Phaiden, 2006), p. 118. Neutrality will be discussed in Part two, Case study 3.

105 As an example of how Isotype symbols were not seen as culturally neutral in a more contemporary light, it is worth considering Clive Ashwin's review of Modley's 1976 *Handbook of Pictorial Symbols* in *Leonardo* 12: 4 (1979), 343-344, which contains many symbols designed by Arntz:

'This book is an anthology of over 3000 pictorial symbols drawn from sources that have appeared over the last 40 years, together with a short introductory essay, a bibliography and a subject index. It is not clear for whom the book is intended, but the content of the Introduction suggests that it is directed at practising graphic artists and communications designers. Although written by a veteran of graphic symbology, the Introduction, perhaps because of its brevity, conveys a simplistic view of the characteristics and function of graphic signs, its only real value being that of identifying the sources drawn upon.

Many of the symbols included have dated conspicuously, which suggest that the collection will be of most interest to students of semiotics and the recent history of graphic communication. Page after page provides fascinating material for semiotic analysis, highlighting the problematic and often paradoxical relationship between denotation and connotation, between arbitrary and motivated signs and between semiotic concepts. Particularly striking is the emergence of the older pictographs of latent national, ethnic and social assumption in what were once regarded as completely value-free symbols. Most contemporary graphic designers would at least think twice before symbolizing Blacks by means of a frontal male black schema with bare torso, bare feet and white pants. Used in this way, the publication constitutes a useful and accessible source book on an increasingly important aspect of cultural history.'

106 This demonstrates why it was important that the transformer was proficient in mathematics, as well as having an understanding of visual aesthetics.

'Tower of Babel' of symbols, (unlike Rudolf Modley, whose work will be discussed later in relation to this point). But it was Neurath's intention to 'debabelize' and build a comprehensive, universally accessible system of picture language, which (as discussed in *International Picture Language)* would facilitate connections between business and science, and support international developments during the increasingly unstable political climate of Europe during the mid-1930s.

7. New symbols should only be added, or adapted if content demanded it

The Isotype Collection contains four volumes of loose-leaf 'symbol dictionaries', from Vienna and The Hague,[107] which consist of many hundreds of pages of catalogued symbols, presented in a selection of colours and sizes, classified under different subject areas. This is accompanied by corresponding boxes containing small envelopes of pre-printed symbols, and lino-cut artwork. This system was designed so that symbols could be selected from the existing compendium and re-used with ease. Adaptations were made and new symbols added only when new design solutions dictated, or through variation in size, composition or specific detail. The symbol dictionary was not static, but formed part of an evolving system. Evidence that Isotype symbols were adapted for more international audiences also can be seen in M. Neurath's 1950s work in Western Nigeria.[108]

8. Concerned with multiples, not uniqueness

Neurath used objects and models to enhance a point and further engage with the audience, never to fetishise unique artefacts. The transformation process involved teamwork, starting with academic and ending with technician. It was based around producing printed multiples of charts[109] for use within the G&W itself, local museum off-shoots and satellite branches in Amsterdam, The Hague, London, and Berlin-Kreuzberg. Neurath began by wanting to produce multiples of charts, but latterly wanted to replicate whole museums, through his collaboration with Paul Otlet of the Palais Mondial, Brussels.[110] During the late 1920s Neurath and Otlet put forward a joint proposal for a World Museum, or 'Mundaneum',[111] with the intention of creating a network of international museums on world culture. The museums would be filled with charts and objects, produced as multiples by Neurath in Vienna, and distributed to branches worldwide.[112] Publications and an encyclopedia were also planned.

107 IC 4/1, 4/2, 4/3 (from Vienna) and 4/4 (from The Hague).

108 See Eric Kindel on M. Neurath's work in Western Nigeria (part of the 'Isotype Revisited' project) www.isotyperevisited.org.

109 The *Gesellschaft und Wirtschaft* portfolio of one hundred charts (published 1930) is a good example of a portable set of printed charts, as is the 1939 US Tuberculosis Association travelling exhibition, which had a print run of 5,000 sets and assembly notes.

110 Otlet's background was in law, prior to becoming a museologist. He invented the Universal Decimal Classification System – a revision of the Dewey Classification System.

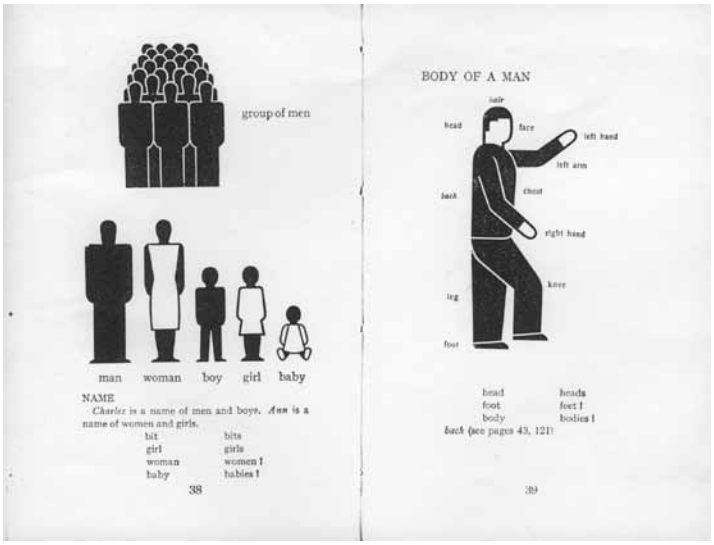
111 See Nader Vossoughian, 'The Language of the World Museum: Otto Neurath, Paul Otlet, Le Corbusier.' *Transnational Associations,* 1: 2 (2003), 82-93.

112 Le Corbusier designed a pyramidal form to house the first proposed 'New World Palace' or Mundaneum in Geneva, but the venture was never realised. All that came of it was Neurath's adoption of the name 'Mundaneum' for the international branches of the G&W which he set up in London, New York and The Hague. This was a calculated move for Neurath, as he and his team had to swiftly leave Vienna in 1934, (due to the threat of fascism) and relocate to The Hague, where the Vienna Method became known as the 'International Foundation for the Promotion of Visual Education by the Isotype Method'.

9. Use of simple clear language including C.K. Ogden's BASIC (British American Scientific International Commercial)

> … this book is in Basic English, because this international language is part of an old language in general use. [113]

International Picture Language and *Basic by Isotype* (published in 1936 and 1937 respectively) are both written using C.K. Ogden's simplified core vocabulary of 850 English words. The books were originally published by Kegan Paul and printed in the UK. Neurath and Ogden met at the G&W in Vienna in 1934, and Ogden invited Neurath to collaborate on the production of an illustrated primer (using his picture language) to introduce Basic.[114] Neurath suggested a reciprocal arrangement giving him the opportunity to produce a similarly formatted primer introducing Isotype, to be written using Basic English.[115] The acronym Isotype, (coined by Reidemeister in 1934) was inspired by Basic.[116] The association between Isotype and Basic English is an example of how a reduced simplified written language can be combined with pictorial units to make picture statistics. *International Picture Language* explained the principles behind Isotype (written using Basic English), and *Basic By Isotype* explained how to use Basic English using Isotype to enhance the text.[117]



(Fig. 2)
Isotype as a 'helping language' from *BASIC by ISOTYPE* Kegan Paul, (1937). ISOTYPE COLLECTION

113 Neurath, *International Picture Language*, p. 13.

114 Neurath, a native German speaker, was in exile in Holland when these two primers were produced. According to Michael Twyman, no German or ordinary English drafts existed of *International Picture Language*, but Neurath's foreword acknowledges the literary help of Miss L.W. Lockwood of the Orthological Institute, in translating his 'unpolished' use of English into Ogden's Basic.

115 Isotype charts also appear in Lancelot Hogben's *Interglossa: A Draft of an Auxillary for a Democratic World Order, Being an Attempt to Apply Semantic Principles to Language Design* (Harmondsworth UK & New York: Penguin Books, 1942). Interglossa was an attempt to create an International auxillary language to aid communication between speakers of different languages, as a supplement to national languages.

116 Editorial introduction to 1980 University of Reading edition of *International Picture Language* by Michael Twyman pp. 6-7.

117 Both books contain a fold-out list of the 850 Basic English words at the beginning of the book, consisting of 100 operational words (such as 'yes', 'forward,' 'up', 'down', 'get', 'give', 'because', 'north', 'south' and 'yesterday'); 400 general words (such as 'amusement', 'building', 'committee', 'month', 'unit', 'walk' and 'work'); 200 pictured words (illustrated in *Basic by Isotype*, such as 'apple', 'baby', 'church', 'hammer', 'umbrella' and 'window'); 100 general words such as 'angry', 'cheap', 'happy', 'quick', 'strong' and 'tired'); and 50 opposites (such as 'bad', 'dead', 'simple', and 'wrong'). *Basic by Isotype* contained 200 'pictured' pictographs.

10. Formed a 'helping language' (symbols supported words)

Isotype was designed as a 'helping language', not a stand-alone language without words, nor a 'sign-for-sign' dictionary equivalent where a word or corresponding picture could be cross-referenced. Pictures 'helped' or enhanced the meaning of words, rather than simply illustrating the word. Pictures also revealed vital clues if the user didn't speak the language. (Fig. 2)

> The ISOTYPE picture language is not a sign-for-sign parallel of a word language. It is a language, which may be put into words in very different ways. The units of the picture language have different senses when they are in different positions. It is not possible to give a word for every part of such a picture or a statement for every group of parts.[118]

The positioning of each 'helping' pictogram was syntactically crucial to the correct interpretation of the message, which could be further articulated by the addition of directional arrows, prohibiting crosses, negating diagonal bars and simple expressive lines to indicate transfer or emission. The helping picture language of Isotype was at its most efficient when used to represent nouns. Adjectives relating to nouns could only function in a very simple fashion, i.e. a running or walking man, described by the shape of the pictogram.[119] More complex adjectives were not attempted. Conversational or contextual words such as 'here', 'now' or 'later' could not be represented by Isotype, neither could emotional or metaphysical concepts, due to the physicalist ideas which underpinned them.

11. Fidelity to material and viewer

The transformer's role of 'trustee of the public' was a responsible position requiring great integrity. Primarily, it was the transformer's job to understand the data and turn it into reliable unbiased information, allowing the audience to draw their own conclusions. The integrity of the information and the audience was respected above all.[120]

12. Symbols arranged to show comparative information

Given a series of raw information supplied by a subject expert, it was the transformer's job to understand the data and construct the main thrust of the argument in the form of an unbiased

118 Neurath, *International Picture Language*, p. 18.

119 Aicher's 'geometric body alphabet' shows this articulation.

120 The practice of responsibly selecting the most important facts to present the most effective graphic argument was criticised by Clive Chizlett, in 'Damned Lies and Statistics. Otto Neurath and Soviet Propaganda in the 1930s', *Visible Language*, 26: 3-4 (1992), 303. Robin Kinross rebutted Chizlett's words in his 1994 reply in which he upheld the integrity of M. Neurath's approach to transformation. Robin Kinross, 'Blind Eyes, Innuendo and the Politics of Design: A Reply to Chislett', *Visible Language,* 28: 1 (1994), 68-76. An example of M. Neurath's integrity as a transformer can be seen in correspondence found in the Isotype Collection 1/49, regarding 'Project 836.' In a letter from Rudolf Modley to M. Neurath dated 19 September 1958. Modley enquired if she was interested in preparing 56 charts for a Harcourt Brace history book, where all that she would have to do (working in conjunction with Modley) was to 'indicate the titles, symbols, explanation, etc and the type size.' Her response (24 September 1958) was to refuse the job: 'I do not want to do a job like this: working from roughs which, for lack of time, could not even be discussed and agreed […] When we make charts for books (not our own) we usually see the manuscript, select the data for illustration and agree on the choice of subjects and the way of visualization with the author himself'. IC 1/49. This is an example of how Isotype can only function if the whole process of applying the principles from the assembly of the initial information through to the supply of finished artwork are adhered to.

'fact picture'. Carefully selected axial configurations of symbols were used to lend strength and purpose to the argument. The transformer needed to be skilled in mathematics to construct the most meaningful visual statement, by selecting the optimum amount for each pictogram to represent. Some information would be discarded (if it detracted from the argument) in favour of information that enhanced the argument. In the stereotypical Isotype statistical chart, rows of pictograms (ideally no more than five) would be carefully arranged to highlight excesses and deficits, allowing the visual picture to tell the story.[121] **(Fig. 3)**.



(Fig. 3)
'Vereenigde Staten Immigranten Volgens Beroepen' an example of an Isotype statistical chart showing the basic components of Isotype graphic argument. Repeated symbols show magnitude, arranged in the minimum amount of rows required to deliver the message succinctly. Signifying symbols are added to basic symbols to create specificity. *De Moderne Mensch Onststaat* (Modern Man in the Making), (Amsterdam: NV. Noord-Hollandsche Uitgevers Maatschappij, 1940), p. 95.

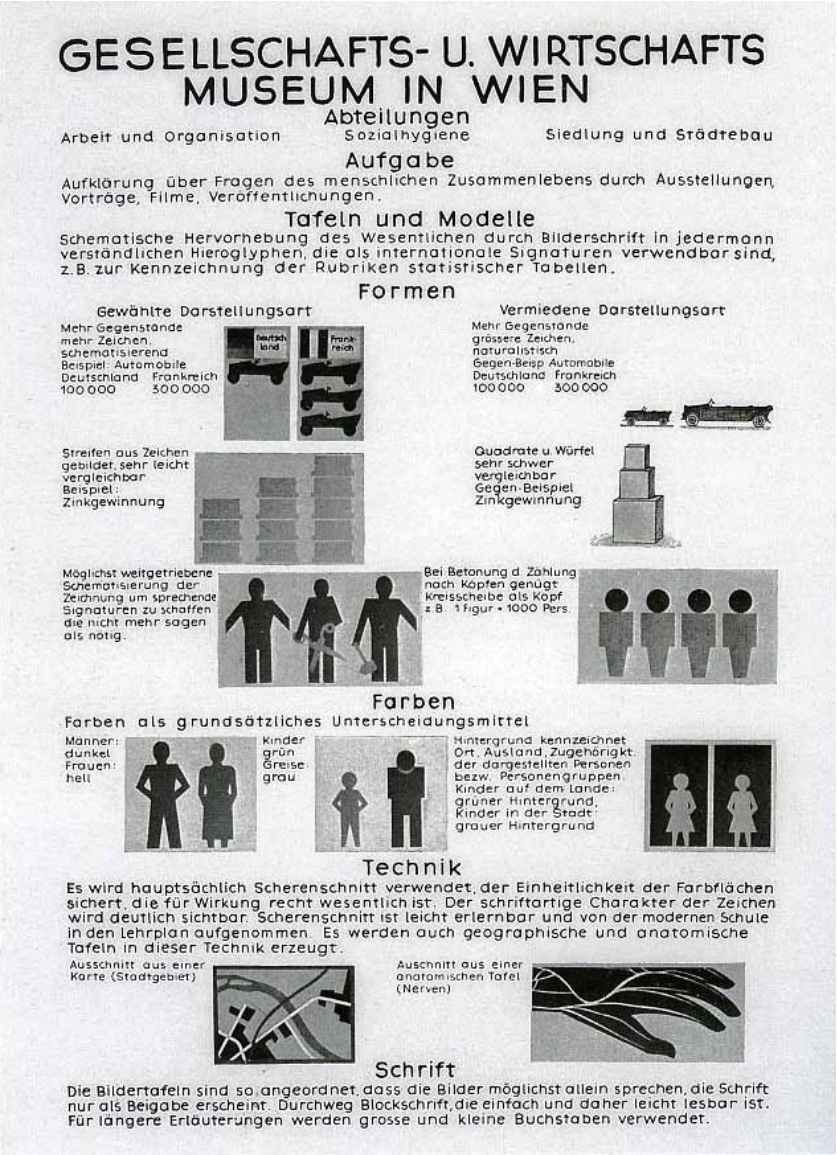
Graphic and operational principles of Isotype

The following set of operational principles form the graphic toolkit through which the visual rhetoric of Isotype is achieved and consistency maintained. They by no means formed a static system, and their use was always guided by fidelity to information and audience. Consistent implementation of the principles facilitated audience comprehension; they became familiar with graphic language, and could relate more easily to sequences of charts. Very early principles evolved from charts that Neurath produced for the Museum of War Economy in Leipzig and the Austrian Housing and Allotment Association during the early 1920s. Their appearance gradually became more refined when Neurath began to develop the Vienna Method at the G&W from 1925 onwards, but the visual clarity for which they are known today was achieved when Arntz became a permanent member of the team in 1928.

[121] Neurath considered that charts shown within museums in spacious bays were the perfect way to encourage healthy debate and lively discussion amongst the audience. He pioneered evaluative research on the presentation of museum charts at the G&W. Neurath, *From Hieroglyphics to Isotype*, p. ix.

Early graphic and operational principles

In 1925 Neurath and his small team produced an early mission statement describing the graphic and operational principles that constituted the Vienna Method at the G&W. **(Fig. 4)**. Amongst other early principles, the chart demonstrated the use of repeating units, (rather than size) to show magnitude, avoidance of perspective, the importance of same-sized symbols, and early ideas on depiction of gender (showing a rounded female and an angular male). It also described early rules on the symbolic uses of colour. The chart is constructed using scissor-cut gummed paper symbols. The first time a symbol was used to represent a simple concept occurred in 1926 (according to M. Neurath)[122] in a chart showing births and deaths **(Fig. 5)**. Symbols represented stated quantities, although in early charts the actual amount was also stated. This is in contrast to a 1926 chart produced before symbols were used; 'Police interventions in Vienna' featured line drawings of equal-sized, individually drawn, brawling



(Fig. 4)
An explanation of early principles from the G&W (1925). (An English translation of this chart can be found in the General Appendix).
ISOTYPE COLLECTION

[122] Symbols of equal sized coffins, and reclining babies were depicted. Coffins were changed to gravestones in later charts, as they misled the viewer into thinking that the coffins (being of similar size to the babies) represented infant mortality, rather than mortality in general. M. Neurath & Kinross, *The Transformer*, pp. 12-13. **(Fig. 5)**.



(Fig. 5)
'Births and Deaths in Vienna in a Year', an early Vienna Method chart showing repeated symbols and axial arrangement, *International Picture Language* (1936), p. 87. ISOTYPE COLLECTION

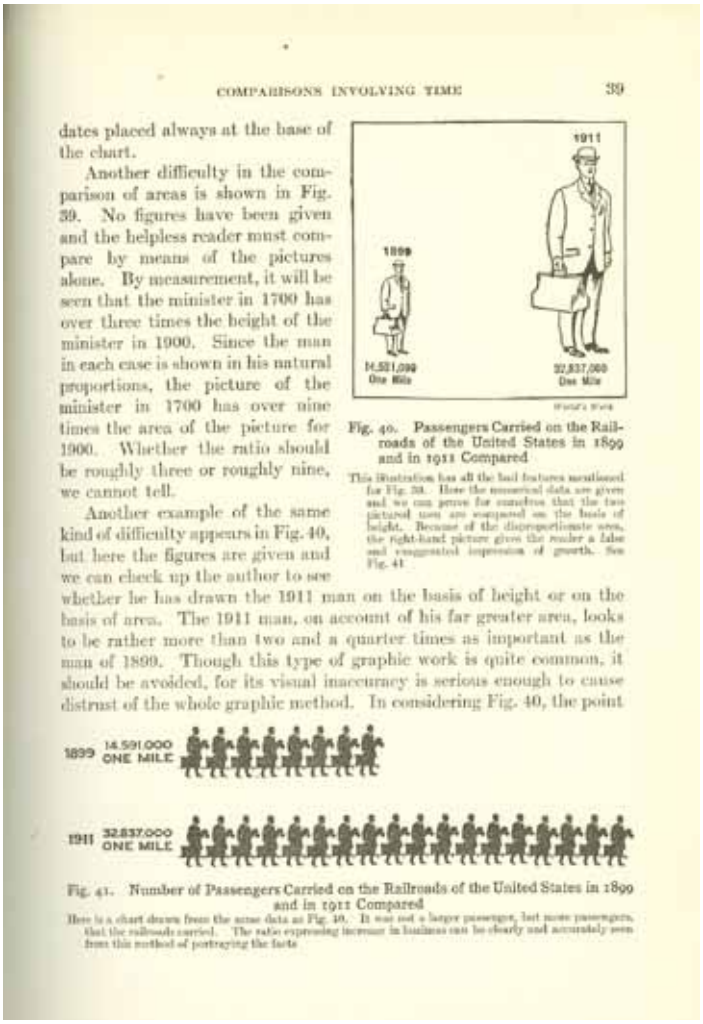


(Fig. 6)
'Polizeiliche Einschreitungen in Wein im Febr. 1925', early Vienna Method chart showing Police intervention, using individually drawn (same size) figures and numbers to represent magnitude. Later charts (as above) used symbols. ISOTYPE COLLECTION

people. Arrests through drunkenness are indicated by emboldened figures, arrests for other crimes represented using a lighter outline. Even at this early stage before symbols were used, an axial arrangement highlighted the differences between categories, with actual figures for arrests stated as totals, broken down into two categories. **(Fig. 6)**.

The principle of repeating symbols, rather than enlarging them to show magnitude was in place from the beginning of Neurath's graphic experiments, and there is much speculation on how he arrived at this method of depicting magnitude. Kinross calls this early attempt at using repeated same-size symbols 'Proto-Isotype'.[123] **(Figs. 7 & 8)**.

[123] Kinross cites a set of charts from 1898 made by Leo Hickmann for a compendium of information on education in Austria and elsewhere which shows rows of same-size symbols to show magnitude, *The Transformer,* pp. 101-102. He dismisses the myth that Neurath would have seen repeated symbols in Brinton's *Graphic Methods for Presenting Facts*, by virtue of the difficulty of obtaining a copy of an American publication in Vienna in the 1920s. **(Fig. 7)**. Dalbello and Spoerri also discuss the possibility that repeated images seen in popular almanacs from the 19th century Habsburg Empire may have given Neurath ideas on repetition, although their illustrated examples tend to show enlargement used to indicate magnitude, rather than repetition. However, these mass-produced colourful images do draw the audience into the charts, giving them the whole story at first glance, and secondary and tertiary information later. Marija Dalbello & Anselm Spoerri, 'Statistical Presentations from Popular Texts for the Ordinary Citizen, 1889-1914' *Library and Information Science Research,* 28 (2006), 83-109 and Marija Dalbello & Mary Shaw, *Visible Writings: Cultures, Forms, Readings* (New Brunswick: Rutgers University Press, 2011), pp. 151-175 **(Fig. 8)**. Perhaps a more obvious example of where Neurath saw repetition is found in the abundant collections of battle plans, hieroglyphics and other examples of quantitative and cartographic charts illustrated throughout Neurath's visual autobiography *From Hieroglyphics to Isotype*.



COMPARISONS INVOLVING TIME 39

dates placed always at the base of the chart.

Another difficulty in the comparison of areas is shown in Fig. 39. No figures have been given and the helpless reader must compare by means of the pictures alone. By measurement, it will be seen that the minister in 1700 has over three times the height of the minister in 1900. Since the man in each case is shown in his natural proportions, the picture of the minister in 1700 has over nine times the area of the picture for 1900. Whether the ratio should be roughly three or roughly nine, we cannot tell.

Another example of the same kind of difficulty appears in Fig. 40, but here the figures are given and we can check up the author to see whether he has drawn the 1911 man on the basis of height or on the basis of area. The 1911 man, on account of his far greater area, looks to be rather more than two and a quarter times as important as the man of 1899. Though this type of graphic work is quite common, it should be avoided, for its visual inaccuracy is serious enough to cause distrust of the whole graphic method. In considering Fig. 40, the point

1911

1899

14,591,000 One Mile

32,837,000 One Mile

Fig. 40. Passengers Carried on the Railroads of the United States in 1899 and in 1911 Compared

This illustration has all the bad features mentioned for Fig. 38. Here the numerical data are given and we can prove for ourselves that the two pictured men are compared on the basis of height. Because of the disproportionate area, the right-hand picture gives the reader a false and exaggerated impression of growth. See Fig. 41

1899 14,591,000 ONE MILE

1911 32,837,000 ONE MILE

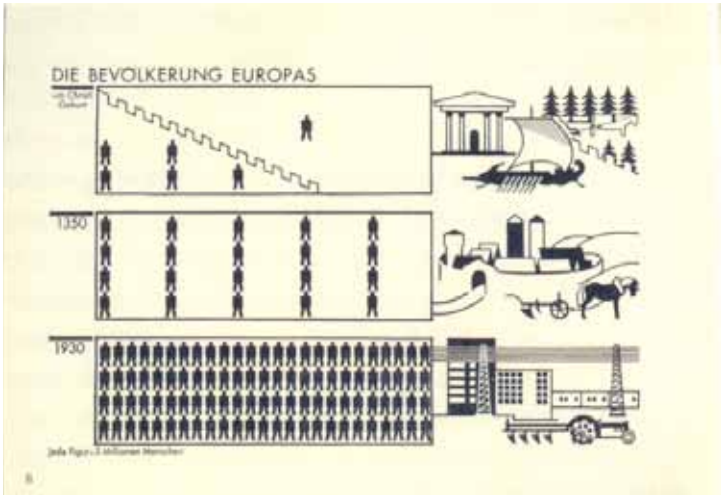
Fig. 41. Number of Passengers Carried on the Railroads of the United States in 1899 and in 1911 Compared

Here is a chart drawn from the same data as Fig. 40. It was not a larger passenger, but more passengers, that the railroads carried. The ratio expressing increase in business can be clearly and accurately seen from this method of portraying the facts

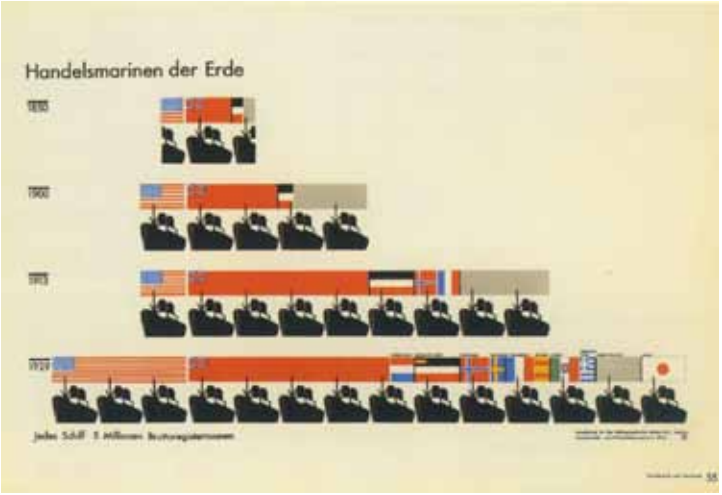
(Fig. 7)
'Proto-Isotype' – page 39 from W.C. Brinton's *Graphic Methods for Presenting Facts* (1920), showing two charts, the top one uses scale to show magnitude, the lower, repeated symbols. Kinross suggests that there is no evidence to support the idea that Neurath would have known of Brinton's work in America at that time. However, it is feasible that Neurath would have seen charts such as the one below.



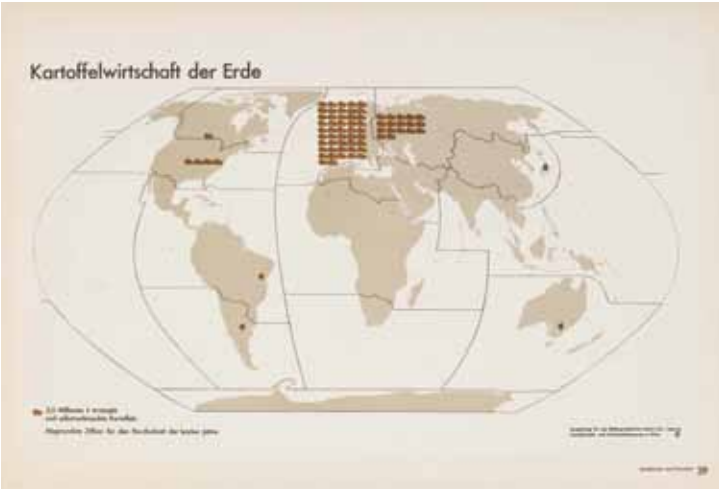
(Fig. 8)
'Proto-Isotype' taken from Marija Dalbello,'Mathematics for "Just Plain Folks"' *Visible Writings* (2010).
NATIONAL AND UNIVERSITY LIBRARY OF CROATIA, NSB 156.815.
Charts such as this were common in almanacs in Austria-Hungary while Neurath was growing up. This and the many other visual references shown in *From Hieroglyphics to Isotype: A Visual Autobiography* were thought to have informed Neurath's ideas surrounding the origination of Isotype.



(Fig. 9)
'The Population of Europe', *Die bunte Welt* (Vienna: Artur Wolf, 1929). Arntz's first commissioned work with Neurath, working freelance alongside other artists at the G&W. ISOTYPE COLLECTION



(Fig. 10)
Example of chart from the Gesellschaft und Wirtschaft portfolio of one hundred charts, produced from 1929–1930, (Leipzig: Bibliographisches Institut, 1930). This project allowed the team to consistently develop and apply evolving principles. ISOTYPE COLLECTION



(Fig. 11)
Further example of chart from the Gesellschaft und Wirtschaft portfolio of one hundred charts, produced from 1929–1930. ISOTYPE COLLECTION

Kinross states that the first period of the maturity of the principles took place from 1929–1932,[124] and the graphic and operational principles discussed in this section are largely taken from this period, after Gerd Arntz took up full-time appointment at the G&W (post 1929). His first commissioned work with Neurath can be seen in *Die bunte Welt* (1929), a picture book for

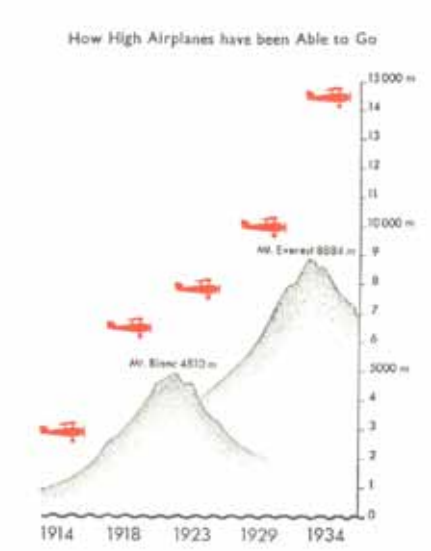
[124] M. Neurath & Kinross, *The Transformer*, p. 84.

children. **(Fig. 9)**[125] Before 1929 Arntz worked on a freelance basis alongside other artists at the G&W. His full-time employment at the G&W was facilitated by a year-long commission from 1929–1930, from a Leipzig publisher (the Bibliographisches Institut) to produce the Gesellschaft und Wirtschaft portfolio of one hundred charts, which allowed the team the financial security to develop and apply evolving principles **(Figs. 10 & 11)**. This period of economic stability allowed Arntz, (in consultation with Neurath and Reidemeister) to systematically develop and refine the operational principles of Isotype, which arguably were never bettered when the team were forced to work independently. *International Picture Language* coherently sets out the majority of the graphic and operational principles of Isotype.

1. Equal sized repeated symbolic units arranged horizontally left to right in rows (unless argument dictated otherwise) to indicate quantity

A symbol was used to represent an object or concept. Each symbol represented a quantity, stated in a key at the base of each chart. The greater the amount of same size repeated symbols, the greater the magnitude, so forming a direct, empirical statement. However, the principle of making an Isotype chart was not about the presentation of one simple line of repeated symbols, but concerned its comparison with other rows, and the significance of the information it revealed.

Various arrangements of symbols were tried before opting for the western reading pattern of a horizontal arrangement of left to right, top to bottom, (in vertical columns rising and falling from an axis), unless the information was better suited to a different orientation (i.e. to show height above ground, in 'How High Airplanes have been Able to Go'[126] **(Fig. 12)** or in the 1933 isometric example showing relative army size, casualties and deaths from both Allies and Central Powers in 'Great War 1914–18'. **(Fig. 13)**

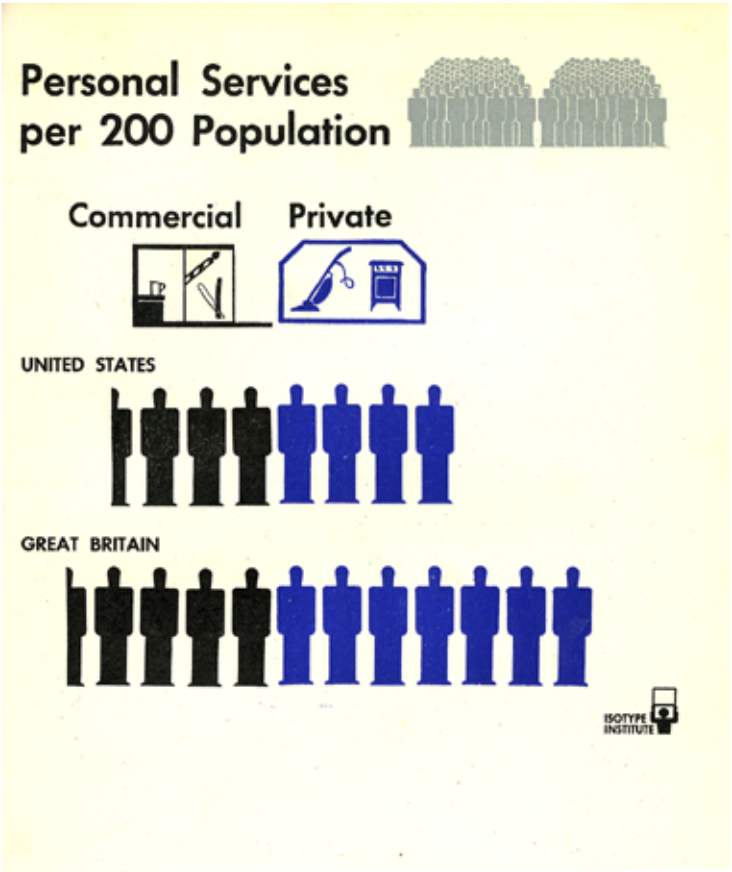


(Fig. 12)
'How High Airplanes have been Able to Go', using a vertical axis to show altitude.
International Picture Language, (1936).

125 In Arntz, (a German avant-garde socialist artist and designer) Neurath saw the perfect guiding hand to realise his ambitions for his picture language.
126 Neurath, *International Picture Language*, p. 81.



(Fig. 13)
'Great War 1914–18', example of an isometric configuration (1933) showing relative army size, casualties and deaths from both Allies and Central Powers moving in opposite directions.
ISOTYPE COLLECTION



(Fig. 14)
'Personal Services per 200 Population', showing symbols divided into fractions, *America and Britain: Our Private Lives*, (London: Harrap, 1944).

1a Division of symbolic units into halves and quarters was avoided if possible

Wherever possible the practice of dividing unitary symbols was avoided by recalculating the amount that each unit stood for during the transformation process.[127] **(Fig. 14)**

1b Five to six rows of selected statistical data was the optimum amount of information used to tell the story

The process of transformation involved identifying the significant facts and configuring the statistical material so that the story was told in the most enlightening way. Neurath's three-tier principle of grasping the main facts at first glance, secondary details at second glance and all other supporting information at third glance needed a simplistic presentation to carry it through. This is why ideally only five to six rows of comparable information were presented on each chart.

1c. Symbols 'marked off' into groups of five or ten to aid counting when large amounts of symbols are involved

When large amounts were represented, symbols were 'marked off' in groups of five or ten, with small gaps, allowing for information to be counted more easily. The size of the gap was determined by the designer's aesthetic and the configuration of symbols used.

2. Symbols and syntax combine to form a visual grammar

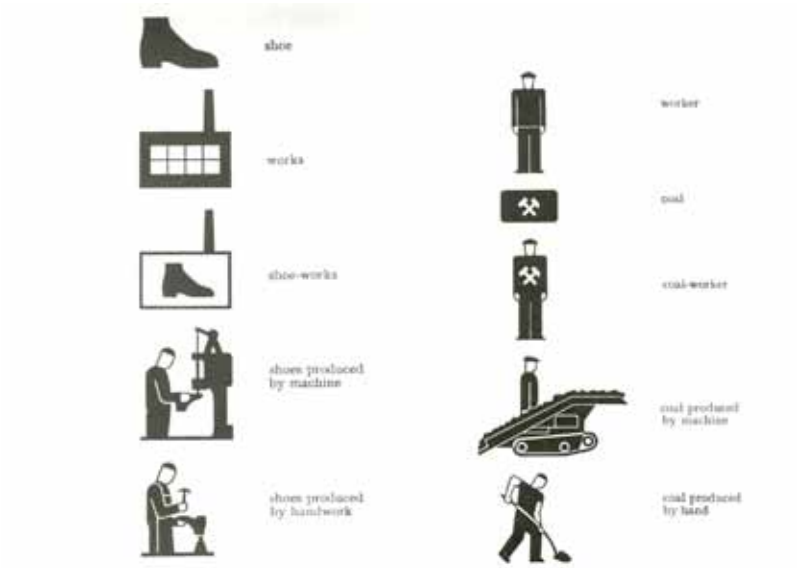
If the symbol for an activity or quality (a qualifying symbol) is applied to the symbol for an object, then a third symbol is formed through their juxtaposition, forming the syntax that allowed for more complex visual statements to be created. If the qualifying symbol for the coal trade (two crossed hammers – something which we would not recognise today) was applied to a symbol for a man (object) then the symbol for a coal miner emerges.[128] The way that these symbols are constructed can be likened to the way that the German written language uses compound nouns.[129] In *International Picture Language* Neurath cites the example of the qualifying symbol of a shoe being combined with the symbol for a factory, resulting in the symbol for a shoe factory. **(Fig. 15)**

[127] M. Neurath describes this process in response to a request from Holden's Advertising regarding an Annual Production Chart for Stewarts and Lloyds Ltd, dated 29 March 1946, IC 1/16.

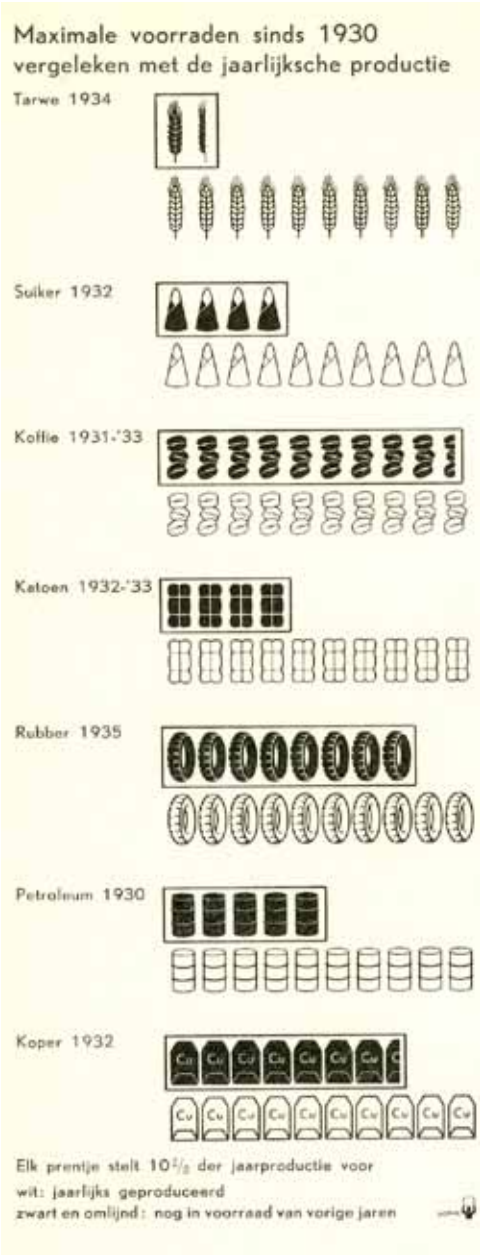
Dear Mrs McFadyean, as you realise, those halves and quarters are unacceptable for Isotype, not only for artistic reasons, but as a matter of principle. We are fighting these things in writing and talking, so we can't do this ourselves. But that doesn't mean that we cannot do "dead accurate" representations. One could perhaps do bar graphs, they can have any degree of exactness. But I assume the directors want nice little symbols plus exactness. So there is another possibility: we can redo the charts with smaller units, say 10,000 tons instead of 50,000 tons for the tubes, and say 500,000 or 250,000 or 200,000 shells instead of 1 million. That of course will mean many more and much smaller symbols, and we shall have to have the two statistics underneath one another, instead of at the side – which is another drawback. Unless we can have two pages for them, which would be rather nice. The first thing I should like to ask is to send me the exact figures. Then I shall do new sketches, till we hit on something that pleases everybody.' From the responses to this letter, it would appear that the client insisted on symbols being subdivided. It is not clear whether M. Neurath was willing to compromise.

[128] Masaru Katsumi used a similar method of symbol combination when designing the service symbols for the 1964 Tokyo Olympics. This will be discussed in Part two.

[129] See Michelle Henning, 'The Pig in the Bath: New Materialisms and Cultural Studies' *Radical Philosophy,* 145 (2007), 18.



(Fig. 15)
Use of qualifying symbols showing how Isotype picture language is constructed, *International Picture Language*, (1936). ISOTYPE COLLECTION



(Fig. 16)
'Maximale vooraden sinds 1930' showing the tonal balance achieved by different symbols occuping the same visual space, thus eliminating bias. *De Moderne Mensch Onststaat* (Modern Man in the Making), (Amsterdam: NV. Noord-Hollandsche Uitgevers Maatschappij, 1940).

3. Symbols seen in silhouette or outline form, tonally balanced occupying a similar visual space

In line with the earlier philosophical and methodological principles of Isotype, symbols were simply realised, and pared down to the minimum (the lino cutting technique would not have allowed for overly complex designs on small images). They are seen in silhouette or outline form, on the same plane, irrespective of actual size. The main criteria for the successful combination of more than one type of symbol on a chart was that they would appear tonally balanced, and occupy the same visual space, thus eliminating bias. **(Fig. 16)**

4. Avoidance of perspective, adoption of parallel projection and elevation as drawing systems

The use of perspective was considered an illusion, and therefore inappropriate for the presentation of unbiased information. Perspective does not present the true image of the object, but makes the viewer see it from a forced viewpoint, adding an extra layer to the process of comprehension. Perspective also involves making objects of the same size larger or smaller depending on their distance from the viewer (which would contradict the rule of using same-size symbols to represent magnitude). Parallel projection was used, as it was thought to show a more verifiable view, more accurately describing the three dimensional form of the object. Several forms of parallel projections were employed (orthographic and axonometric) depending on the hand of the individual artist and the best way to describe the subject matter.

5. Meaning evident in black and white

Neurath maintained that charts should be evident in black and white, and not reliant on colour for comprehension, although they could be reliant on symbols being balanced tonally to differentiate between categories of information. **(Fig. 16)**

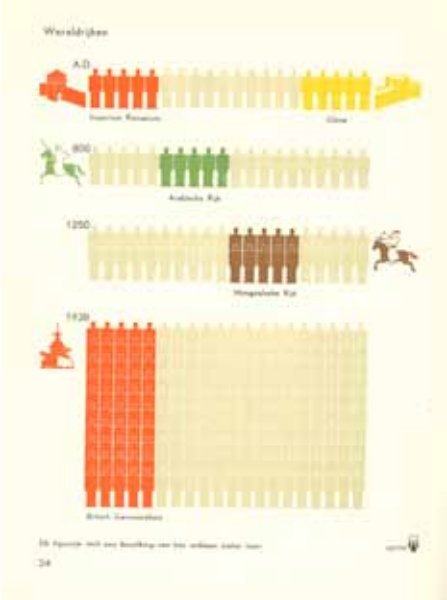
6. Colour used symbolically, taken from a limited palette

Neurath favoured a minimal palette, due to economy of means, but also because he considered that too many colours and tints went unnoticed. A palette of 7 distinctive colours and tints and outlines was used (black, red, yellow, brown, green, blue and orange), always to indicate meaning.[130] Green stood for agriculture, but also 'primitive cultures and youth', red stood for modern cultures and 'mechanised industry', blue was a colour for transport, the clothing industry, antiquated and transitional cultures. These rules developed over time, and were subject to change if the information demanded, and the budget supported it.[131] At times colour was used instead of an axis to highlight different categories of information, and colour

[130] In the same way that the visual appearance of Isotype was heavily influenced by the visual style of Gerd Arntz, so colour was influenced by the prevailing tastes and fashions of time for bold primary colours. See Herbert Spencer, *Pioneers of Modern Typography* (London: Lund Humphries, 1969).

[131] A good example of this is the use of orange and red in the 1939 National Tuberculosis Association charts, where colours took on their own meanings – orange for healthy, black for infected and causing illness, red for medical care needed, and light blue for the presence of air causing lung collapse. M. Neurath & Kinross, *The Transformer*, pp. 50-51.

combined with text was used to denote nationality.[132] **(Fig. 17)**



(Fig. 17)
Sometimes colour was used instead of an axis to highlight different categories of information. Colour combined with text was also used to denote nationality. *De Moderne Mensch Onststaat* (Modern Man in the Making), (Amsterdam: NV. Noord-Hollandsche Uitgevers Maatschappij, 1940).

7. Use of Paul Renner's Futura typeface, ranged asymmetrically[133]

It was not Arntz's decision to use the Futura typeface for Isotype charts. Neurath had already selected and purchased Futura in 1928 before Arntz's arrival at the G&W.[134] Kinross suggested that Futura had been introduced to Neurath through Jan Tschichold's connection with Paul Renner.[135] Futura fitted perfectly with the reductive style of Neurath's picture language.[136] Asymmetrical arrangements enhanced the composition of the charts, largely based on horizontal rows of symbols ranged from an axis. Renner said of Futura 'it provides the neutral elements of construction, in which every modern typographer can realize his own artistic concepts.'[137]

132 National costume and repeated symbols of flags were also used to denote nationality. However Neurath realised that national costume was seldom worn during the 1930s and that the colour configurations of flags may not immediately translate into recognition of nationality. The preferred solution to denote nationality was the use of text supported by colour, Kinross, 'Otto Neurath's Contribution to Visual Communication, 1925–1945', 71-72.

133 Initially published in Berlin in 1928. In the introduction to the 1998 English translation of Jan Tschichold, *The New Typography*, translated by Ruari McLean (Berkley, Los Angeles, London: University of California Press, 1998), Kinross describes *The New Typography* as being 'recognized as the definitive treatise on book and graphic design in the machine age. At once a key theoretical document of Central European modernism between the wars and an invaluable source of working principles for the practising designer.'

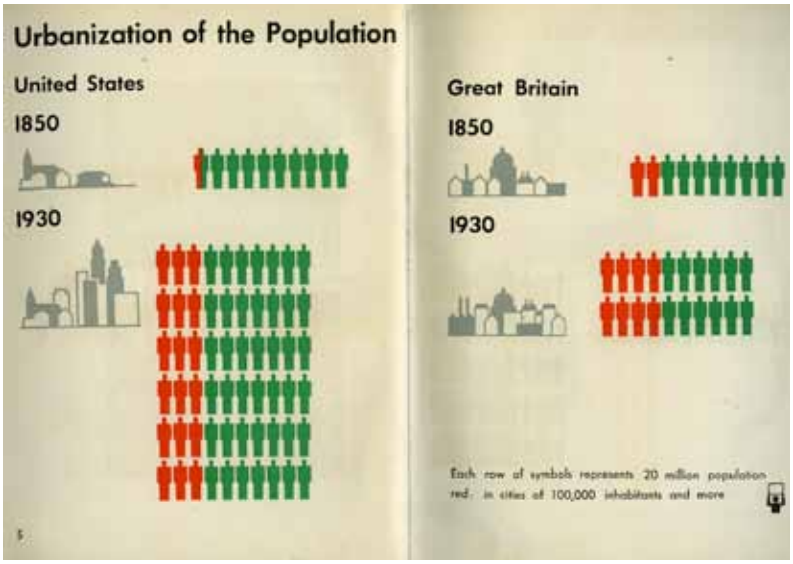
134 Kinross, 'Otto Neurath's Contribution to Visual Communication 1925–1945', 81.

135 Tschichold worked briefly with Neurath in 1929, and designed the letterhead and signboard for the G&W. Kinross, 'Otto Neurath's Contribution to Visual Communication 1925–1945', pp. 28-29 and Christopher Burke, *Paul Renner the Art of Typography* (London: Hyphen Press, 1998), p. 113. Neurath would have been naturally drawn to the personality of Renner, a progressive thinking, German-born socialist, who wanted to influence culture by using his skills as a designer, writer and teacher, to help shape life post World War I. Renner was one of many intellectuals such as Albert Einstein and Sigmund Freud who were influencing society during the early 1920s. Renner, (1878–1956) was an active member of the Deutscher Werkbund.

136 Burke points out that Futura was perfectly suited for use with Isotype; Renner had designed it by reducing it down to 'static geometric shapes, repeated in sequence'. *Paul Renner*, p. 113. Lupton also considered that Futura was associated with formal reduction, linking it to mass production and the machine age. Lupton, 'Reading Isotype', 54-55.

137 Burke, *Paul Renner*, p. 112. Futura was advertised by the Bauer Foundry as forming 'the style of the era'. They stressed its 'scientific connotations by printing testimonies from doctors attesting to the fact that the 'clarity and regularity' of Futura made it the most legible typeface ever produced.

It is easy to understand why Neurath selected Futura as his 'corporate font' for the G&W; It was the zeitgeist of its time, heavily publicised and considered by Renner to be an expression of the machine age. Futura is of simple geometric construction and as a sans serif font forms a reductive legible expression of the essential forms of the alphabet. Futura is also stylistically compatible with Neurath's simple pictorial language. Arntz demonstrated this in the typographic layouts he created at the G&W, as he experimented with different weights and uses of capital or lower case letters for headings, captioning and tabular matter and the use of rules to link chronological data with the rows of symbols.[138]



(Fig. 18)
'Urbanisation of the Population', showing *Führungsbild*, which were usually depicted in grey or a recessive colour (to not detract from primary information), *America and Britain: Our Private Lives*, (London: Harrap,1944).

8. *Führungsbild (*guide or qualifying pictures) heightened comprehension

To enhance differences between chronology and economic and geographical locations, qualifying images were often placed either to the side, above or (as a background) behind the rows of data. Typical *Führungsbild* consisted of elevations of landscapes of cities or countries with famous landmarks, or simple historical scenes or objects indicating technological advances to show periods in history. *Führungsbild* were usually depicted in grey or a recessive colour, which did not detract from the primary information (the rows of symbols). They were sometimes colour coded to highlight relevant selections of the primary symbolic units. **(Fig. 18)**

9. Rows of statistical information are arranged chronologically (never according to diminishing magnitude)

Unlike many graphical representations where diminishing quantities are shown, configured from left to right (as they appeared in early charts in *Die bunte Weld*), later work, such as the Gesellschaft und Wirtschaft portfolio of charts of 1930, arranged rows of information to follow geographically – west to east, left to right, using the Atlantic as an axis. In *The Transformer: The Principles of Making Isotype Charts*, M. Neurath described how this principle developed:

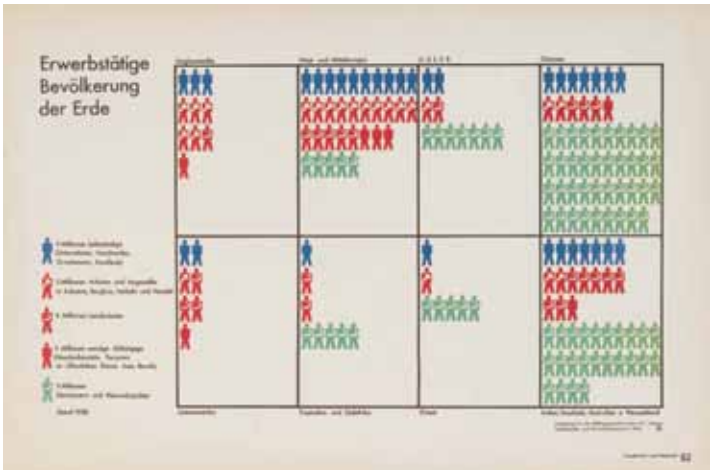
[138] The first three weights of Futura: Light, Regular and Bold were released in 1927–28, with other variants being released in 1930. Burke, *Paul Renner*, p. 109. For a full articulation of the development of typographic styling in charts from the G&W, see Kinross, 'Otto Neurath's Contribution to Visual Communication 1925–1945', pp. 81-83.

> But we soon realised that, for some comparison between countries, arrangement according to magnitude is a bad principle: one always has sequences of diminishing quantities, and the real statement has to be read from the accompanying names – not a very visual method.[139]

But there are exceptions to this rule; in the hands of the transformer the information was always arranged in such a way as to bring out the true significance of the story.

10. Fixed memory map of the world divided into six squares (economic areas) with fixed positions for the continents (equal area cartography) and avoidance of the Mercator projection of the world

Geographical ordering (from east to west), led to the principle of the division of the world into eight (later reduced to six) economic areas. This formed an aide-memoire for comparing accompanying charts. This principle first appeared in the 'Gesellschaft und Wirtschaft' portfolio of charts of 1930, and later in *Modern Man in the Making.* To show economic comparisons between parts of the world, the six divisions of (top left to right) Canada and USA; Europe; Soviet Union; (base left to right) Middle and South America; Africa, South Asia and Australia; and the Far East provided a logical pattern of six blocks in which to place configurations of symbols. **(Fig. 19)**



(Fig. 19)
Chart from Gesellschaft und Wirtschaft portfolio of one hundred charts, produced from 1929–1930, (Leipzig: Bibliographisches Institut, 1930). Geographical ordering (from east to west) lead to the principle of the division of the world into eight (later reduced to six) economic areas. This formed an aide-memoire for comparing groups of charts.
ISOTYPE COLLECTION

Neurath commissioned many different world maps with different meridians for use in the Gesellschaft und Wirtschaft portfolio of charts, allowing the world to be seen from different perspectives and serving to highlight significant geographic and economic facts and interrelationships.[140] The distortion created by the Mercator system is ably demonstrated by Karl Peucker's diagram 'Verzerrung durch Mercator-Projektion',[141] showing what would happen to a simple symbol of a walking man in projection. **(Fig. 20)**

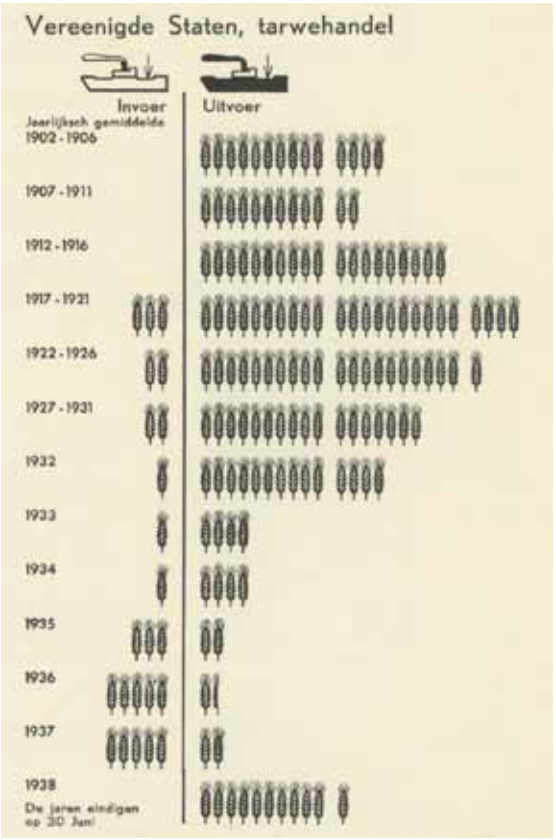
139 M. Neurath & Kinross, *The Transformer*, p. 35.
140 *Ibid.,* p. 31.
141 A chart provided with Neurath's *Bildstatistik nach Wiener Methode in der Schule* (Picture Statistics using the Vienna Method) (Vienna/Leipzig: Deutscher Verlag für Jugend und Volk, 1933). See M. Neurath & Kinross, *The Transformer*, p. 105.



(Fig. 20)
One of a set of charts provided with Otto Neurath's *Bildstatistik nach Wiener Methode in der Schule.* The distortion created by the Mercator system is demonstrated by Karl Peucker's diagram 'Verzerrung durch Mercator-Projektion', showing what would happen to a simple symbol of a walking man using this projection. Vienna/Leipzig: Deutcher Verlag für Jungend und Volk (1933). ISOTYPE COLLECTION



(Fig. 21)
'Mitropia' Gerd Arntz was already using axial divisions before he began work at the G&W as can be seen in his 1925 woodcut. GEMEENTEMUSEUM, THE HAGUE



(Fig. 22)
'Vereenigde Staten, tarwehandel', example of comparable information ranging from a central white axis (with rule) *De Moderne Mensch Onststaat* (Modern Man in the Making), (Amsterdam: NV. Noord-Hollandsche Uitgevers Maatschappij, 1940).

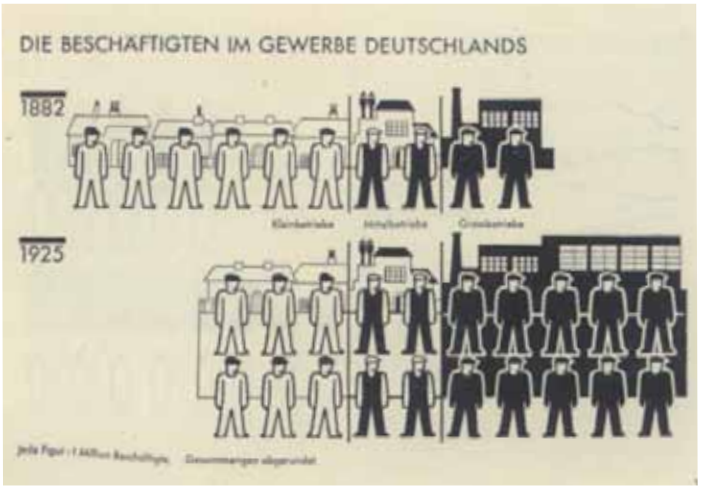
11. An axis used to show comparisons between different types of information (Fig. 21) and highlight excesses and deficits

To highlight differences between sets of comparable information, an axis and sometimes a drawn vertical dividing rule was introduced. The axis served a number of different functions:

- ranged from a centralised visual white space to separate sets of comparable information, (sometimes reinforced by a rule) **(Fig. 22)** and as seen in geographical charts where the Atlantic, or physical geography is used as a dividing axis between the US and Europe.

- as a locating point to range information from, as in 'Births and Deaths in Germany in a Year', **(Fig. 5)** all four rows of births are ranged left from a common point (a vertical rule is added to highlight this point), and all deaths are ranged right from the end of the rows of symbols for births. This practice highlights excesses and deficits by making them more prominent within the rows of information.

- more complex axial arrangements where several components are compared within a row of symbols can be found from *Die bunte Weld* (1929) onwards. In the chart 'Workers in commercial enterprises in Germany' the years 1882 and 1925 are compared.

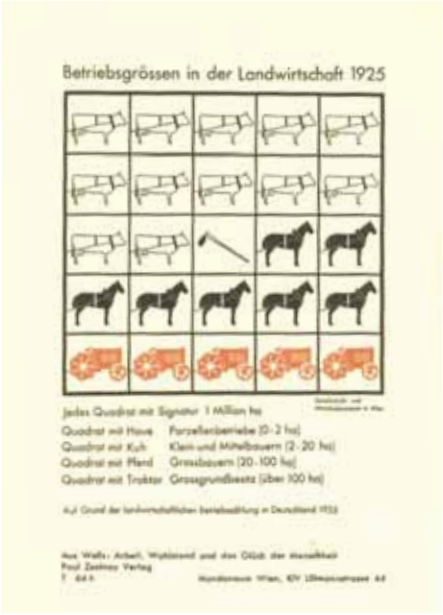


(Fig. 23)
'Die Beschaftigen im Gewerbe Deutschlands' (Workers in Commercial Enterprises in Germany) showing a complex axial arrangement, *Die bunte Welt* (1929). ISOTYPE COLLECTION

Three categories of workers are identified, separated by vertical rules. The central, more static group of workers is used as a buffer zone to range two other different sets of workers from, left and right. It is clear from this chart that although the amount of blue collar workers have stayed the same, white collar workers have doubled, and numbers of men engaged in management have more than quadrupled. **(Fig. 23)** The 1933 isometric chart 'Great War 1914-18' uses an axial arrangement slightly adapted from this configuration as it juxtaposes similar types of symbols from the two opposing groups of 'Allies' and 'Central Powers'. On first view the differences in the sizes of armies are evident. The second point to emerge is the differing proportions of active soldiers, walking wounded and dead. Finally the viewer notices the subtle differences between the uniforms of soldiers, walking wounded and even the detail of the different helmets decorating the crosses representing the dead on both sides. **(Fig. 13)**.

12. Information always shown in the most direct concrete form, abstractions such as percentages avoided

Division into percentages was seen as an abstract concept when information could be more clearly stated using the principle of repeating units. The 'chessboard' arrangement avoids percentages by representing the total amount as a series of blocks, each representing a fixed amount, which makes up the whole, into which symbols are inserted to clearly show the function of that block. A good example of the chessboard arrangement can be seen in the 1925 chart, 'Betriebsgrössen in der Landwirtschaft' (1925) which accounts for usage of the total agricultural land of Germany in a 5 x 5 unit configuration of blocks, each representing one million hectares, containing a symbol for a type of land use.[142] **(Fig. 24)**



(Fig. 24)
'Betriebsgrossen in der Landwirtschaft' (1925) is a good example of the chessboard arrangement which accounts for usage of the total agricultural land of Germany in a 5 x 5 unit configuration of blocks, each representing one million hectares. ISOTYPE COLLECTION

13. Avoidance of conventional statistical techniques

13a. Sizing circles and squares to show comparative amounts

The principle of repeating same size symbols in statistical charts also applies to simple geometric shapes. If two similar quantities are represented by circles or squares of slightly differing sizes it is difficult to make an immediate concrete comparison; using surface area as a form of comparison does not translate into accurate visual statements.[143] The Isotype method would show these differing quantities by division into standard sized units, which represent a specific quantity, and by replicating multiples of the units, the difference between the two quantities can be clearly seen.

13b. Absence of line graphs (Fever charts)

Line or fever charts never feature in Isotype. Although individual information points are accurate, the joining line which describes the curve is a false approximation of reality. Neurath

142 In 'Betriebsgrössen in der Landwirtschaft' 1925 (Size of working unit in the agricultural economy of Germany) the transformer has highlighted the smallest use of land, the small-holding, which occupies only one square, which is moved to a prominent central position. M. Neurath & Kinross, *The Transformer*, p. 89. **(Fig. 24)**.

143 Hans Rosling's 'Gapminder' (discussed in Parts two and three) does not abide by this principle.

in *International Picture Language* points out the scientific validity of Isotype, and the fact that 'no experts in mathematics or logic have come across such errors in the ISOTYPE system'.[144] However, simple pie charts were a feature of Isotype, with strong colour and reversed-out symbols.[145] The angled shapes of the individual segments form an immediate visual representation of the statement. Rows of repeated symbols generally replace bar charts.

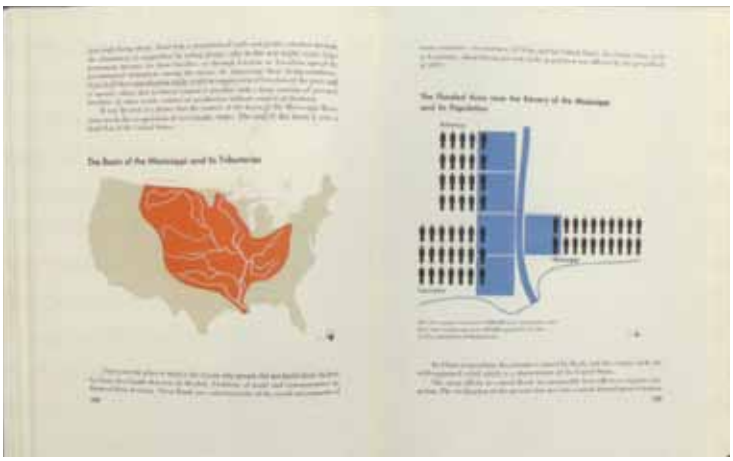
14. Integrated pictures and text

> Some of the conventions adopted by Otto Neurath were modified over the years in the light of experience, and he made it clear that they were not necessarily good for all time. The overriding consideration was to design something that worked, and the Isotype team found it necessary to modify some of the conventions that had been developed for use in Europe when they came to design material for use in the western Region of Nigeria. This is not an indication of the weakness of the Isotype system: on the contrary, it emphases that, like all effective languages, it has a basic structure which is strong enough to withstand modification.[146]

Modern Man in the Making (1939) forms a significant step in the evolution of the Isotype method. It was written by Neurath for a general audience. Text and diagrams were integrated throughout the book to be read as one combined unit. **(Fig. 25)** This demonstrated a new flexibility in the configuration of Isotype graphic language with text used to explain complex interrelated graphic arguments not necessarily reliant on quantitative outcomes. Other work produced in The Hague for the department store Die Bijenkorf 'Rondom Rembrandt' (Around Rembrandt) and 'Het Rollende Rad' (This Rolling Wheel) also showed a less quantitative, more explanatory approach to the application of the principles. Further evidence of the 'integrated picture-text' principle can also be seen in exhibition charts for the American National Tuberculosis Association (1938). **(Fig. 26)**

These projects paved the way for the series of educational books produced by M. Neurath after Neurath's death in 1945 which featured sequential explanatory diagrams, often configured in a tabular format with simple repeated step-by-step graphic language used as narrative. **(Fig. 27)** This more flexible application of the principles can be seen in the 'Visual History of Mankind', and 'Living in Early Times' series of books from 1948 onwards. Horizontal cut-through sections were also a feature of this method of working, as can be seen in *Railways under London,* **(Fig. 28)** *If you could see inside* **(Fig. 29)** and M. Neurath's work in West Africa in 1955, which again employs the step-by-step tabular arrangements of sequential images showing cut-through horizontal sections. **(Fig. 30)** This example cleverly depicts time passing as a baby grows to a man and the environment changes linking old and new ways of living. The visual rhetoric is enhanced by words which lend extra meaning to the clarity of the imagery.

144 Neurath, *International Picture Language*, p. 104.
145 Otto Neurath, *Modern Man in the Making* (New York: Alfred A. Knopf, London: Secker and Warburg, 1939), p. 116.
146 Michael Twyman, *Graphic Communication through Isotype* (University of Reading 1975), p. 11.



(Fig. 25)
Pages from *Modern Man in the Making* (New York: Knopf, 1939) showing the integration of text and image.
ISOTYPE COLLECTION

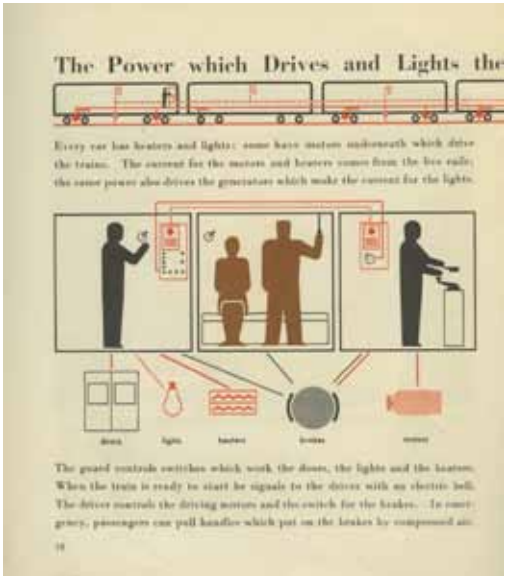




(Fig. 26)
Tuberculosis: basic facts in picture language (New York: National Tuberculosis Association, 1939).
ISOTYPE COLLECTION



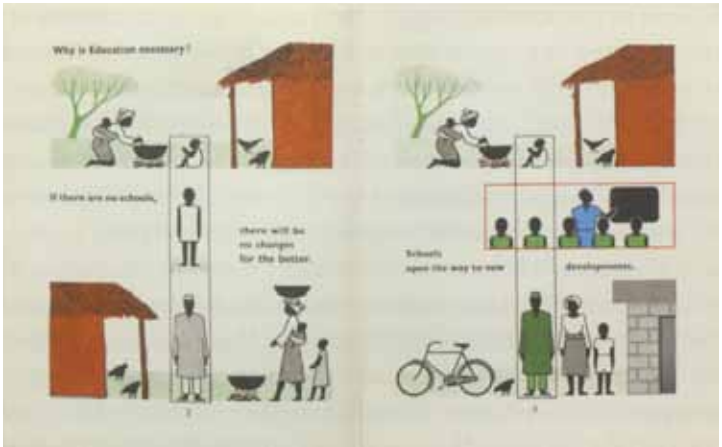
(Fig. 27)
Two Isotype 'strips' from 'A Visual History of Mankind' series, (edited by Lancelot Hogben) showing narrative sequential diagrams arranged in a tabular format with simple repeated graphic language, featured in Lancelot Hogben, *From Cave Painting to Comic Strip* (London: Max Parrish, 1949).



(Fig. 28)
Railways Under London (London: Max Parrish, 1948), showing integrated text and simple explanatory imagery.



(Fig. 29)
If You Could See Inside (London: Max Parrish, 1949) showing an example of cut through horizontal section.



(Fig. 30)
Pages from *Education for All in the Western Region*, [Ibadan]: Western Regional Government, 1955, showing repeated sequential graphic language.
ISOTYPE COLLECTION

Overview of Part one

Part one of this thesis has described and articulated the philosophical, methodological and operational principles of Isotype at a time when they were considered to have reached their maturity and the tri-partnership of Neurath, Reidemeister and Arntz were active in relatively stable working environments. When the tri-partnership broke up, and the three operated independently, individual strengths and emphases became more apparent. In 1940 the International Foundation for Visual Education in The Hague was forced to close due to impending fascist invasion and Neurath and Reidemeister made a dramatic escape to the UK. Arntz, (a German citizen) after war service and time spent as a prisoner of war, eventually (with Neurath's help) started working with the Nederlandse Stichting voor Statistiek.[147] However, the work he was producing tended to be reliant upon standardised Isotype statistical charting principles, or (in contrast) more illustrative solutions than the reductive symbols he had produced in collaboration with Neurath. When Arntz worked with Neurath and Reidemeister, through the process of transformation, each graphic solution was arrived at through knowledge, dialogue, critique and negotiation; rendered with a confident graphic aesthetic. This can be evidenced in the variety of charts which appear in *Modern Man in the Making* (1939), the last publication the tri-partnership collaborated on, along with the innovative graphic information seen in the mass-produced charts for Die Bijenkorf department store (1936) and the American National Tuberculosis Association (1938). In contrast, work produced by the Neuraths in Oxford relied on a variety of artists imitating Arntz's graphic style and recreating his symbols, rather than extending the reach of Isotype graphic language and taking it to new levels. Without Arntz, to some extent, the Neuraths lost the consistency and graphic intelligence which characterises the maturity of the principles. Finally, after the death of Neurath in 1945, the questioning, forward-thinking mind that combined elements taken from philosophy, social economy, visual education, politics, museology and internationalism – which could have propelled Isotype into new directions, was lost. M. Neurath took over as remaining director of the Isotype Institute, using her considerable visual and intellectual acuity, transformation and pedagogical skills in the educational publishing sector. She worked with a variety of graphic artists, who again took Arntz's graphic style and adapted it to form the narrative-based integrated picture-text method of educational publishing. She also continued to promote Neurath's philosophical work and disseminate the principles of Isotype in print, through books and magazine articles.

Part two of this thesis will consider the adoption and diffusion of Isotype principles in the hands of others far removed from the original work of the Isotype Institute, demonstrated by three case studies based on the three interconnected strands of transformation, graphic argument and graphic language, all taken from examples where explicit links with the principles of Isotype have been stated.

147 Netherlands Statistical Bureau.

In the case study relating to the Natural History Museum's adoption of transformation, the dissemination of the principles can be directly traced back through Michael Macdonald-Ross's work at the Open University to the Isotype Collection in Reading. Evidence of transformation can be found in the formation of the designer/scientist transformer teams and the in-house training publication the *Transformation Reader.* Edited transcripts of interviews with Michael Macdonald-Ross, Roger Miles, Ron Nash and NHM transformers can be found in Appendix 1.

Nigel Holmes has explicitly stated that he incorporates the principles of Isotype into his design work. The case study on graphic argument uses the explanatory design work of Holmes as a paradigm to assess the influence and dissemination of the principles of graphic argument within this genre. The case study will focus on a visual analysis of Holmes' work over four stages of his career to establish the validity of this claim, and assess whether there is any evidence of his adoption of the integrated picture-text principle – the last development of the principles of Isotype post World War II. Edited transcripts of interviews with Holmes and Bruce Robertson of Diagram Visual information Ltd are included in Appendix 2 to highlight links between the Isotype Institute and contemporary modes of graphic argument.

The third case study, based on international graphic language, takes as its starting point the reasons why scholars connect Isotype with Otl Aicher's Munich Olympic pictograms. It commences by documenting the legacy of the 1956–60 'Preliminary Survey for the Study of Signs and Symbols', an attempt at an international symbol dictionary to classify signs and symbols (directed by Rudolf Modley). Collaborators included Marie Neurath, Henry Dreyfuss and Martin Krampen. The case study continues by exploring the dissemination of the principles relating to graphic language through a time when international pictographic language was becoming increasingly important, ultimately revealing links between the principles of Isotype and Otl Aicher's pictograms for Munich. An edited transcript of an interview with Dr Martin Krampen can be found in Appendix 3.

Part two

CASE STUDY 1

The Natural History Museum in London

The Natural History Museum's work on what was originally known as the 'New Exhibition Scheme' (NES) is a good example of the Isotype notion of transformation.[148] The scheme began as a radical experiment in the early 1970s, and through media controversy and internal struggle, culminated in the formulation of 'Museum technology', a pragmatic body of objective knowledge that can be applied to the design of didactic exhibitions.[149] Dr Roger Miles, the chief originator,[150] cited Isotype as the 'inspiration' behind NES, which ran from 1975-91. It was originally planned to comprise ten permanent exhibitions (or phases) within the Museum, beginning with the experimental Pilot project, 'Human Biology, an Exhibition of Ourselves', which opened in 1977, swiftly followed by 'Introducing Ecology' in 1978.[151]

> We have self-consciously modelled ourselves at the BM(NH) on Otto Neurath's International System of Typographic Picture Education (Isotype), and called the selection of the exhibit content 'Transformation'[152]

148 What is now known as the Natural History Museum was formerly known as The British Museum (Natural History). For the sake of clarity it will be referred to as 'the Museum' or by the abbreviation 'NHM'. The abbreviations 'G&W' for the Gesellschafts- und Wirtschaftsmuseum, 'NES' for the New Exhibition Scheme, 'OU' for the Open University, and 'DPS' for the Department of Public Services (within the Natural History Museum) will also be used.

149 A full description of Museum technology can be found in Roger S. Miles and Alan F. Tout, 'Outline of a Technology for Effective Science Exhibits' *Special Papers in Palaeontology,* 22 (1979), 209-224.

150 Dr Roger Miles was the head of the Department of Public Services (DPS) from 1975 – 91. In NHM terms 'permanent' refers to a lifespan of approximately 7–8 years. In the majority of cases, this is much exceeded, and 'Human Biology' was still in existence (albeit in a much altered state) at the time of writing. In 1978 at the Museums Association Annual Conference, Miles and Alt stated that NES would take thirty years to implement. Roger S. Miles and Michael B. Alt, 'British Museum (Natural History): A New Approach to the Visiting Public' *Museums Journal,* 78: 4 (1979), 158-162.

151 The phases considered to be part of NES comprised: Phase 1 (Pilot exhibition) Hall of Human Biology, an Exhibition of Ourselves (1977), Phase 2 Introducing Ecology (1978), Phase 3 Dinosaurs and their Living Relatives (1979), Phase 4 The Origin of the Species (1981). Other phases which followed, though not strictly considered part of NES are: Phase 5 Ecology (1991), Phase 6 Man's Place in Evolution (1980), Phase 7 British Natural History (1983), Phase 8 Primates (1983), Phases 9 & 10 Discovering Mammals (1986), and Phase 14 Creepy Crawlies (arthropods) (1988) all produced by DPS. Taken from *NHM Annual Report 78-79* NHM Archive DF 935/29 and Giles C.S. Clarke and Roger S. Miles, 'The Natural History Museum and the Public' *Biologist* 27: 2 (1980), 81-85. Supplemented by additional current information from NHM Library and Archives.

152 Roger S. Miles, 'Museums and Public Culture: A Context for Communicating Science', The Chicago Academy of Sciences (1988), p. 162. The paper quotes M. Neurath's 1974 definition of transformation: 'It is the responsibility of the "transformer" to understand the data, to get all necessary information from the expert, to decide what is worth transmitting to the public, how to make it understandable, how to link it with general knowledge...'

The Natural History Museum's adoption of the role of the transformer during the 1970s has been recognised and documented by Isotype scholars.[153] This case study aims to explain why the methodological principles of Isotype were considered as a factor leading to the development of a new approach to museum design, and the part that transformation played in the evolution of a new way of designing educational visitor-friendly exhibitions. Transformation was originally developed for the Gesellschafts- und Wirtschaftsmuseum (G&W) in mid-1920s Vienna; as a museum, it was considerably smaller than the NHM, operating in a very different social, political and economic climate.

Museum technology, the body of objective knowledge that Miles and his team developed to solve the practical problems of envisaging the Museum's educative role will be discussed alongside the part that the principles of Isotype played within the scheme. These will be examined through the study of official documents, journals, papers and publications found within the NHM Library and Archives in South Kensington, supported by interviews with key staff and consultants linked with the Museum during the formulation of NES.[154] Other influences integrated into NES will also be examined, to evidence whether the principles of Isotype were assimilated or adapted as part of the overall system.

By surveying the factors that went into the development of NES from the early 1970s onwards, evidence of how the methodological principles of Isotype were applied will be revealed, with particular emphasis placed on the realisation of the NES Pilot project, 'Human Biology, an Exhibition of Ourselves' which opened in 1977. Reference will also be made to some of the later phases of NES. This case study will ultimately consider the contemporary legacy of the transformer in a museological context.

While this case study will primarily investigate the methodological principles of Isotype, and concentrate on the role of the transformer, teamwork and user-centred design at the NHM; in a wider context it will also search for evidence of Neurath's underlying philosophical and graphic and operational principles. Common themes which bridge the 50-year time difference are the belief in education, fidelity to audience and integrity of information.

Background: Neurath's work in museums

Otto Neurath primarily formulated the principles of Isotype (then known as the Vienna Method) for use at the G&W, which opened in 1925 forming part of the Social Democrat experiment

153 See Kinross, 'Otto Neurath's Contribution to Visual Communication 1925-1945'; Hadwig Kraeutler, 'Otto Neurath – Museum and Exhibition Work: Spaces (Designed) for Communication' (unpublished doctoral thesis, University of Leicester, 2003), Hadwig Kraeutler, *Otto Neurath: Museum and Exhibition Work Spaces (designed) for Communication* (Frankfurt: Peter Lang, 2008) and Michelle Henning, *Museums, Media and Cultural Theory* (Maidenhead: Open University Press, 2006), pp. 75-82.

154 Miles used the term 'Museum technology' to describe the body of objective knowledge gathered from the process of designing and producing NES, used by the NHM to practically solve the problem of fulfilling its educative role, and remaining progressive. Roger S. Miles, 'Information as an Experience: Exploitation of a Museum's Resources'. (Paper given at Aslib/LA Joint Conference in Sheffield, 15-19 September 1980), pp. 112-118.

to blend education, culture and politics with the aim of improving the lives of the working classes in Red Vienna. Neurath had first experimented with visual language during his time as director of the short lived Deutsches Kriegswirtschaftsmuseum zu Leipzig[155] in mid-1918. After the museum's closure and a turbulent time as a civil servant in Bavaria (culminating in his arrest for treason and banishment from Germany) Neurath resumed his museological work and established the Museum für Siedlung und Städtebau in 1923.[156] This was short-lived and in 1924 financial problems signalled the end of this museum (along with the housing co-operative movement which Neurath was also involved in). He subsequently made a proposal to Hugo Breitner (the City Councillor in charge of Finance) that he transform the Museum für Siedlung und Städtebau into a museum of sociology and economy. Breitner agreed his proposal, and it became absorbed into the G&W when it opened in 1925.

The Gesellschafts- und Wirtschaftsmuseum

Neurath's aims were to establish a museum to educate and inform the Viennese workers of their rights and provide unbiased information on the newly founded democracy to help opinion-forming on important social issues.[157] With this in mind, he petitioned the Gemeinde Wein to sponsor the founding of the G&W,[158] a museum in line with Social Democrat policies on education.[159] The G&W was conceived with the primary aim of informing the public of the results of sociological and economic research, along with enforcing matters of health, education, hygiene and social matters – a complex task when 'highly developed industry and modern administration require a certain minimum of education of all citizens'.[160] A simple, immediate method of presentation was therefore needed to present this information, so 'even passers-by [...] can acquaint themselves with the latest sociological and economical facts at a glance'.[161] **(Fig. 31)**

The G&W was designed to promote clear thinking and easy recall, enabling visitors to make comparisons and correlations between economic, geographic, historical and sociological subjects. Apart from the standard-sized wooden framed charts (produced using the Vienna

155 The German Museum of War Economy, Leipzig sponsored only one exhibition during its short existence (1917–1918), 'World Blockade and War Economy'. The museum closed due to the collapse of Germany post World War I. Their mission was not about the display of exhibits, but largely concerned the use of visual education, (statistical tables and models) to clearly show how a peace economy could benefit from ideas taken from war economy. Neurath, as director, appointed Wolfgang Schumann as his general secretary. Schumann was an enthusiastic follower of Neurath's ideas on war economy and recognised their potential as a theoretical foundation for a future socialist society. It was Schumann who persuaded Neurath to join the Social Democratic party in 1918.

156 The Museum of Settlement and Town Planning.

157 Gruber, *Red Vienna*, p. 84.

158 In October 1924 Neurath set out by taxi (accompanied by architect Grete Schütte-Lihotzky) to collect signatures to form the society which was to run the G&W. The signatories included Major Karl Seitz and Dr. Julius Deutch. By the end of the year the Vienna City Council had granted the society (headed by Neurath) a subsidy of 20 schillings to found the Museum.

159 The Social Democrats believed that education should bring citizens closer to the heart of party ideals. Neurath's ideas for educating the public came from a more socially aware, apolitical position, with the aim of helping citizens improve the quality of their lives and understand the choices available.

160 Neurath (1933), in *Otto Neurath Philosophy Between Science and Politics*, p. 65.

161 *Ibid.,* p. 65.



(Fig. 31)
The Gesellschafts- und Wirtschaftsmuseum, Neue Rathaus, Vienna, (1925–1934).
ISOTYPE COLLECTION

Method), information was disseminated using photography and cartography with unusual projections (to highlight the underlying point), often with magnetic attachments for ease of updating. Large wooden models and three dimensional ground plans of buildings were also featured, some made using transparent materials.

The first employees of the G&W were Marie Reidemeister and Josef Jodlbauer (others, including architect Rosl Weiser, were employed on an hourly basis). The success of the G&W and the Vienna Method attracted many home and overseas visitors,[162] eager to find new ways to present visual information.[163] Rudolf Modley, an intern at the G&W during the late 1920s commented on the large number of Americans who visited between 1927 and 1934, and described the Viennese museum as a 'classroom in social science for thousands of residents and visitors.'[164] American visitors included representatives from the new Chicago Museum of Science and Industry, keen to use charts produced using the Vienna Method in their new museum.

The G&W was originally divided into three departments consisting of 'Labour and Organisation', 'Culture and Life' and 'Housing and Urban Development', with the later addition of 'Living Standards and Culture' and 'Public Health'.[165] At the start it continued to rent offices from the housing co-operative movement (where Neurath was still employed). The many thousands of local visitors enjoyed the convivial atmosphere, late opening hours, informative

[162] Visitors from America included Waldemar Kaempffert (a relative of Neurath's), the science writer for the *New York Times*, and first director of the Museum of Science and Industry in Chicago; Ann Reed Brenner of Survey Associates (publisher of *Survey* and *Survey Graphic*); Mary van Kleek, (director of the Department of Industrial Studies at the Russell Sage Foundation and Henry E. Kleinschmidt (director of the National Tuberculosis Association).

[163] Nader Vossoughian suggests that Neurath could not have developed his ideas on museums without knowledge of the World Exhibitions of the 19th century, the outdoor hygiene and science exhibitions of the early 20th century, the Paris Universal Exhibition of 1867 (which exhibited displays of human culture specifically aimed at the lay person) and the Musée Social, which presented ideas on the welfare state in turn-of-the-century France. Vossoughian, *Otto Neurath The Language of the Global Polis*, p. 49.

[164] Rudolf Modley, & Dyno Lowenstein, *Pictographs and Graphs. How to Make and Use Them* (New York: Harper & Brothers, 1952), p. 6.

[165] Displays commissioned as travelling exhibits were returned to the G&W and added to the permanent displays of the museum.

entertaining charts and simple interactive self-testing devices to empower and build up competencies. Charts were arranged in bays to allow small groups to informally discuss content and form opinions based on the visual arguments presented. The G&W had branch off-shoots in accessible places to make it easy for all workers to visit during leisure time, in the evenings and at weekends.[166]

The G&W itself formed a constantly changing platform to showcase the work of the Gemeinde Wein, where the audience was treated as an equal partner, rather than as an uneducated underclass. Neurath used the museum to communicate ideas on housing, hygiene, health and social and economic developments. He was against the amassing of collections, and used artefacts only to support statements, never as objets d'art. Audience opinion was monitored, in some of the first visitor evaluation and testing procedures to take place, and charts amended in response to visitor feedback.[167] The G&W was at the height of its popularity from the late 1920s to the early 1930s, employing twenty-five staff in a prime central Vienna location – the Neue Rathaus (New Town Hall), with 500 square metres of exhibition space.[168] Social Democrat policies extended to improving the education system through the collaboration of schools and museums,[169]and school tours were a frequent occurrence at the G&W; Reidemeister's training as a teacher proved useful in facilitating this association.

Defining transformation

According to Marie Neurath, the task of the transformer was:

> To understand the data, to get all necessary information from the expert, to decide what is worth transmitting to the public, how to make it understandable, how to link it with general knowledge or with information already given in other charts. He has to remember the rules and keep to them, adding new variations where advisable, at the same time avoiding unnecessary deviations which would only confuse.[170]

This was cited by Miles and Alt in their explanation of what constituted 'Design for Communication' (along with educational technology and evaluation), one of the three main

166 *Empiricism and Sociology*, pp. 214-233 describes in detail how the G&W was configured.

167 Neurath and his team at the G&W were among the first museologists to monitor feedback in this way. See M. Neurath & Kinross, *The Transformer,* pp. 25-26.

168 Compare this to the NHM with 14,000 square metres of exhibition space – The Hall of Human Biology alone occupied an area of 1,100 square metres. Roger S. Miles, Elizabeth Nemeth and Friedrich Stadler, (eds.), 'Otto Neurath and the Modern Public Museum: The Case of The Natural History Museum (London)' *Encyclopedia and Utopia* (The Netherlands: Kluwer Academic Publishers, 1996), pp. 183-190.

169 Die Pädagogische Weltbedeutung der Bildstatistik nach Wiener Method *Die Quelle*, (1933) H.3, 1-4 Vienna and *Bildstatistik nach Wiener Methode in der Schule* (Wien-Leipzig Deutcher Verlag für Jungend und Volk). These publications served to show how teachers and young students could produce their own charts using cut paper and scissors, just as Neurath and his team had done in the early days of the G&W. IC 7.1.

170 See Marie Neurath, 'Isotype' *Instructional Science,* 3 (1974), 127-150. This is reproduced in *Transformation Reader* (Second Edition, Internal publication, British Museum (Natural History) Department of Public Services, 1979).

contributing factors that went into the formulation of NES.[171] Transformation was adopted to attempt to communicate effectively with a largely undefined general audience and enhance a more visitor-friendly approach in the design of new exhibitions. Michael Macdonald-Ross played a key role in introducing the notion of transformation to the NHM[172] (and to the OU, which used transformation as an aid to designing course units and literature).[173]

In a museological context, the transformer's role was to make complex scientific facts and ideas come to life in an entertaining and educative way for a wide audience, often with scant pre-requisite knowledge. In simple terms, to turn the form of information chosen by the expert into a form that most suited the learner, creating a translation of knowledge through the mutual efforts of designer and subject-matter researcher, curator or scientist. Miles reflected on the theory behind the role of transformation at the NHM during the 1980s, and the need for it. His surprise in finding that such a logical, commonplace process was not being used in museums before 1975 seems strange in contemporary terms. His thoughts on transformation had their roots in Neurath's definition of the transformer:

> The transformer is someone who is working on behalf of the audience and intermediary, someone who mediates between the experts and the lay audience you're trying to communicate with. It seems strange, you would think haven't museums always been doing that? And I think manifestly not when you look at the work that had been done. Often, exhibitions, mounted by subject specialists, not only missed museum planners' work, but were for a specialist to show other specialists that they were fully up-to-date with their subject. No thought was given to the audience at all.[174]

171 See Roger S. Miles and Michael B. Alt, 'British Museum (Natural History): A New Approach to the Visiting Public' *Museums Journal,* 78: 4 (1979), 158-162. See also Miles, 'Museums and Public Culture: A Context for Communicating Science', 162.

172 Macdonald-Ross played a significant role in developing distance learning techniques at the Open University (OU) during the early 1970s and was responsible for introducing Miles to transformation. Macdonald-Ross had heard about Isotype from Michael Twyman at University of Reading whilst on a fact finding mission for the OU to investigate new ways to manage distance learning and devise new ways to deliver university level teaching (which did not rely on attending lectures). He considers that his main achievement at the OU was to put the teams into place to create course units, which he suggests was inspired by Neurath's transformer. The teams comprised academics, a BBC producer, an editor and an educational technologist (design was produced in a separate unit). Frank Claringbull, Director of the NHM, had contacted the Institute of Educational Technology at the OU in relation to ideas on distance learning during the early 1970s. Miles and Macdonald-Ross tell slightly different accounts of how exactly this happened. See edited transcripts in Appendix 1, pp. 265 & 289. Macdonald-Ross discussed the idea of the Isotype transformer with the NHM at a seminar during the early 1970s; he was only interested in the methodological principles of Isotype – transformation and how it could be used in the setting up of course teams. He considered that transformation would be of particular use to the NHM due to his experiences with OU course teams and his knowledge of Neurath's work at the G&W. The connection between the OU and the NHM is covered in more detail in Part three.

173 In 1976, Macdonald-Ross and Waller, from the Institute of Educational Technology at the OU, wrote a paper 'The Transformer' for the *Penrose Annual*, 69 (1976), 141-52, in which they examined the nature of the role, a concept they considered had lain dormant for nearly half a century. The paper took the form of a call-to-arms for the graphic designer to be informed by other disciplines. (Updated M. Macdonald-Ross & R.H. Waller, 'The Transformer Revisited', *Information Design Journal*, 9: 2 & 3 (2000), 177-193). This, along with Waller's *Notes on Transforming 1-7*, (Milton Keynes: Open University, 1977), a series of papers written for the OU Textual Communications Group, show how Neurath's ideas have been updated and why they were still deemed appropriate in a 1970s museum context.

174 From an edited transcript of a formal interview with Miles. See Appendix 1, p. 266.

For Neurath, essential facts were extracted from data, transformed and presented using the graphic and operational principles of Isotype. For Miles, the process was similar but the outcome was not governed by any visual systems and was produced by a team equipped with far greater technological resources. Neurath's 'trustee of the public' was responsible for understanding the data, acquiring all necessary data from the subject expert and having enough general knowledge and visual skills to realise the form of the chart and place it in context with the rest of charts within the exhibition sequence:

> The first step from the statements of science to pictures has a special name: 'transformation'. For transformation as for designing – the writing of the picture language – it is necessary to have not only a knowledge of the rules but training intheir use. That is why it was only possible to make a start with such a picture language when an organization had been formed in which a group of persons of different education had been working together for years. The Government of Vienna gave birth to such an organization in the form of the "Gesellschafts- und Wirtschaftsmuseum in Wein" in the year 1925.[175]

In practical terms Neurath's transformer translated textual information into rough visuals of the charts and made decisions on all major details such as the visual form of the main argument, layout, titling, typography, number and colour of symbols and captions. This would be handed on to the graphic 'artist' who produced final artwork. For the transformers within the NHM, the process began with the equal partnership of scientist and designer who attempted to achieve the best synthesis of science and communication and translate it into intelligible, educative and visually attractive concepts suitable for a general audience. It was initially the scientist's job to make the designer understand the science so they could use their communications skills to make it accessible. The resulting visual was then passed to graphic designers, illustrators and model makers to produce artwork for the final exhibits.[176]

Anticipating the need for the role of the transformer within museums

This section places Miles' aims for NES within the context of British museum culture from the late 1960s onwards. *Museums Journal* during this time paints a lively picture of museum bodies struggling to come to terms with the problem of making displays more accessible to the visiting public. In the 1950s very few museums in the UK employed full-time designers. The numbers had not significantly changed by the end of the 1960s, but swelled during the mid 1970s as museums recognised the need for designers, used not as display technicians, but as equal team

[175] Neurath, *International Picture Language*, pp. 8-9.

[176] Miles was critical of the quality of some of the exhibition graphics in email correspondence (21 May 2011) regarding why three-dimensional designers were considered the best candidates for designer transformers. See footnotes 655 & 656). This could be a symptom of employing 3D designers to produce work better suited to a graphic designer. It is a case of the need for the 'skilled professional communicator' who works across 2D and 3D boundaries. The graphic design teams at the NHM during the 1970s and 1980s were housed in South Ruislip, West London, 15 miles from the designer/scientist transformation partnerships at the NHM.

members used in an expanding, more challenging role. According to *Museums Journal*, by the end of the 1970s, the employment of 'communicators' was being considered as the way forward for museum design.[177]

Two divided camps

The traditional way to deliver museum exhibits was for the curator (or scientist) to supply the facts, select relevant exhibits, write text and titles, and then hand everything over to the graphic designer. It was the function of the graphic designer to make everything look tidy and attractive, specify the typography for the labels and headings, produce or commission the illustrations, and fit it all into the case – a role described as 'window-dressing' by museum commentators of the time. As more museums gradually began to employ in-house designers, two divided camps emerged. The designer was employed to service the graphic needs of the curator, and not necessarily seen as a valued part of the process of formulating exhibits. It was apparent that the museum curator and the museum designer often had very little in common, and approached their work from very different perspectives.

Two conferences held in 1970 and 1972[178] (both chaired by Michael Belcher, then head of the Exhibition Section at the Museum) discussed the role of the designer in museums from varying viewpoints. Delegates summarised situations that could impede communication and led to poorly functioning educational exhibits:

- dominance of designer *or* curator
- curators who employed designers as extensions of themselves
- scholarship seen as a barrier to communication
- failed dialogue between curator and designer

The need for a mediator between curator and designer was discussed, envisioned in the role of scriptwriter, content editor, interpreter, or communicator to be incorporated into the design process. Delegates discussed how to structure information into easily accessible sections, and who should be responsible for communicating it to the audience. This is a problem that Alma Wittlin referred to in her 1970 book *Museums: In Search of a Usable Future,*[179] in which she

177 During the Museums Association Annual Conference in 1970, discussion took place not so much as *whether* to employ designers in museums, but *how* to use them. 'The Role of the Designer in the Museum', *Museums Journal*, 70: 2 (1970), 63-66.

178 Museums Association Annual Conferences 1970 (held in City Museum Bristol) reported in 'The Role of the Designer in the Museum', 63-66, and 1972 (held in Guildhall Museum, London), 'Second Design Conference', *Museums Journal*, 72: 2 (1972), 58-62.

179 Alma S. Wittlin (1899-1990), Viennese art historian and museum scholar, would very probably have visited the G&W, given her interest in museums. She refers to the G&W in *Museums: In Search of a Usable Future* (Cambridge MA and London: MIT Press, 1970), p. 159 '"Relationships," in form of comparison or of evolution, were the keynotes in the presentation of information in the Museum of Social Science (Gesellschafts- und Wirtschaftsmuseum), Vienna'. Wittlin is obviously familiar with Neurath's work as she refers to *International Picture Language* and *Bildhafte Pädagogik im Gesellschafts- und Wirtschaftsmuseum* in the footnotes of *Museums: In Search of a Usable Future*, p. 278. Wittlin's article 'Hazards of Communication by Exhibits' features in British Museum (Natural History), Department of Public Services, *Transformation Reade*r Second Edition, (1979) the handbook given to new recruits at the NHM from the late 1970s to the mid 1980s which will be discussed in more detail later in this section.

highlighted the fact that curators did not necessarily possess pedagogical skills, and a wider team was needed to effectively engage with the audience, in particular a communicator:

> Subject-matter specialists have an inherited brief in many museums to judge what is to go into an exhibit case, even if some of them may prefer to be exempted from the task and to limit themselves to an advisory role. The diffusion of knowledge among lay-men is as a rule outside their interests and competence, but their voices should be heard for the sake of offering to the public authenticated information. They should be members of a team composed of scholars of specific disciplines, of communicators with thorough knowledge of the psychology of human communication, and of designers; a consensus among the three is necessary. At present, communicators have not yet entered the realm of museums, and a condition of imbalance exists due to the dominance of either curator or designer.[180]

In 1971 Wittlin also described the reasons why exhibits failed to communicate in her 1971 paper 'Hazards of Communication by Exhibits,'[181] warning against intellectual overload and sensory monotony, and its antithesis, intellectual deficit and sensory overstimulation. She discussed how an excess of text and an absence of three-dimensional objects could led to triviality and the exhibit becoming 'submerged in design and visual noise'. She went on to describe the 'hazards':

> • under-interpretive exhibits – containing little or no added information (when the viewer is familiar with the collection and needs no extra interpretation – a source of frustration when the public began to be admitted to collections during the Age of Enlightenment[182]
>
> • unclear displays – misinterpretation of the exhibit due to the assembly of semi-intelligible items and deviations from the intended story line, leading to 'creative extensions of a message or distortions'
>
> • compromise exhibits – interpretive displays for laymen mixed with a 'scholar's library of objects'; the layman will find the scholar's library under-interpretive, and the scholar will find a serious display of sober objects ruined by a condescending adjunct. (Wittlin suggests that there are places for both types of display within the same exhibition but they should always be separated within a coherent sequence)
>
> • misinterpretive exhibits – conflict of interest between subject expert and layman, or 'teacher and trader'; the trader (designer) imposing an overly persuasive method of getting the message across, adding extra layers of unnecessary meaning and

180 Wittlin, *Museums: In Search of a Usable Future*, p. 210.
181 Alma S Wittlin, 'Hazards of Communication by Exhibits' *Curator* XIV (1971) 138-150.
182 A cultural movement of intellectuals in 18th century Europe and the American colonies. Its purpose was to reform society using reason (rather than tradition) and advance knowledge through science. It promoted science and intellectual interchange and opposed superstition.

> 'packaging the display' (Wittlin points out that the main focus of the exhibits should be the content, not the 'containing design', a point echoed by Robin Wade).[183]

Robin Wade, a well-known independent museum designer during the 1960s suggested that designer and curator should have equal responsibilities for the display of the exhibit. He pointed out that neither designer nor curator was wholly qualified to communicate effectively with the visiting public, also calling for the need for a professional interpreter, possibly in the guise of an editor with a journalistic background. Wade went on to describe the 'special nature' of museum design and how museum professionals should embrace the discipline of communication, rather than adhere strictly to more traditional roles. He also discussed the intellectual nature of museum design, as opposed to more conventional graphic design in which the designer is more interested in style than content:

> The designer is often over-concerned with visual considerations; if the visiting public fails to understand what the museum is displaying, then all the visual and intellectual acrobatics are to no avail and the design fails. Both design and curatorial professions, however, have occupational hazards. The designer must overthrow the tendency to design for beautifully composed glossy magazines, and must not neglect the intellectual content of display. The curator, for his part, seems often to be obsessed with scholarship. But neither curator nor designer is necessarily the best person to interpret the collections to the public – maybe an editor with a journalistic background is required.[184]

In 1975, Sir John Wyndham Pope-Hennessy CBE FBA FSA, (then Director of the British Museum) also referred to the problem of curators with an intimate knowledge of their collection, being unable to take an overview. 'And if he is a hidden pedant, then practically anything is liable to occur. No-one should underrate how obstinate substantial scholars are.'[185] According to Miles, it was fair to say that before NES, the needs of the audience were not being considered by either curators, (who preferred to focus on their scholarly reputation) or designers, who were guilty of preferring to 'package' exhibits, rather than considering the ultimate outcome of providing accessible communication. Miles also refers to the frustration of the educator within museums, as they tried to make 'academic' museum displays accessible to school parties, when in reality they were only of interest to other curators and the educated public.[186]

183 Wittlin's comment on the misuse of graphic design may well be a factor in why Miles chose three-dimensional designers above graphic designers as designer/transformer partners in NES.

184 Robin Wade (delegate) freelance consultant designer, Museums Journal Conference 1972, 'Second Design Conference', *Museums Journal*, 72: 2 (1972), 61.

185 Pope-Hennessy, 'Design in Museums' *Journal of the Royal Society of Arts,* 123 (1975), 717-727 as quoted in Roger Miles 'Information as an Experience: Exploitation of a Museum's Resources' *The Library Association* (1981) (Aslib IIS LA Joint Conference Proceedings, 15-19 September 1980, Sheffield).

186 'Often, exhibitions, mounted by subject specialists, not only missed museum planners' work, but were for a specialist to show other specialists that they were fully up-to-date with their subject. No thought was given to the audience at all.' [...] 'The Education Section was essential if these exhibits were to mean anything to anyone, they needed interpreting after that, because they had been done by experts for experts.' See edited transcript by Miles Appendix 1, p. 266.

In summary, what was needed was a role to 'bridge the gap' between display staff and academic staff. Margaret Hall, from the British Museum in 1972 describes how this position could work:

> Someone else is perhaps needed to interpret the information, to process and edit it, and present it to the public. He would be a useful addition to the design team and also most useful in an educational role; perhaps academic curators should be the source of information and should not present it directly to the public.[187]

To illustrate how exhibitions were designed at the NHM before 1975, David Gosling, (an exhibition designer at the NHM from 1975–1984)[188] suggested that the activities of an NHM designer at this time amounted to 'sugaring the academic pill', and exhibitions were 'organised along the lines of textbooks suitable for graduate students, largely ignoring the interests, level of learning and abilities of the Museum's visitors, most of whom lacked any special knowledge of biology'[189] (a factor which Wittlin also highlighted in 'Hazards of Communication by Exhibits' in 1971). Gosling considered that a designer's brief was rarely formulated and exhibits were often developed in an ad hoc way, with texts and specimens presented to the designer by the specialist for arrangement in cases. The following quotation from Miles sums up the balance of professional input that he considered was required to take ideas for a visitor-centred approach to museum design forward. It is essentially a description of the transformation partnerships that Miles introduced to the NHM in 1975:

> If the specialist is concerned to *communicate* his knowledge and expertise, and if the designer is concerned with *design for communication*, then they share substantial common ground. This is also the ground of the educationalist, so all three are engaged in the same pursuit. The problem now becomes getting all three together, so no one is over-shadowed.[190]

What effect did these ideas have on the NHM?

NHM trustees considered that the Museum was losing its way during the 1960s and failing to live up to the 1753 Act that brought about its existence.[191] The original founding mandate stated that 'The said museum or collection shall be preserved and maintained not only for the inspection and entertainment of the learned and curious, but for the general use and benefit of the public'.[192] Until 1968, the heads of Zoology, Geology and Botany had independent control over their own areas of the Museum, which appeared to have lost any coherence as a

187 Margaret Hall, (delegate) Exhibition Officer, British Museum, Museums Association Annual Conference 1972. 'Second Design Conference', *Museums Journal*, 72: 2, 62.
188 Gosling's questionnaire responses can be found in Appendix 1, p. 299.
189 David Gosling, 'Man's place in Evolution: A New Exhibition at the British Museum (Natural History)' *Museums Journal*, 80: 2 (1980), 66-69.
190 Miles, 'Information as an Experience', 116.
191 The British Museum Act of 1963 officially split the collections of the British Museum from those of the (British Museum) Natural History.
192 Giles S. Clarke and Roger S. Miles, 'The Natural History Museum and the Public', *Biologist*, 27: 2 (1980), 81-85.

unified body. The Trustees recognised that the galleries and public areas of the Museum were perceived as dull, overly technical and badly in need of updating and requested the Director, Dr Frank Claringbull, make recommendations for their redevelopment. A number of different elements were coming into play, as factors to be considered alongside the display of specimens in museum design – television, universal education and the development of mass media was changing the world, and the public had more leisure time to make use of it all – but museum workers were slow to recognize the developing social importance of museums as a place of entertainment and learning. Concurrently, there was a huge growth in scientific knowledge, and a more experimental approach to the treatment of biology, which challenged the Museum to explore interconnections and relationships amongst exhibits, rather than simply placing them in cases with taxonomic details.[193]

Historically, the NHM had always tried to keep its displays current, but by failing to move with the times, their educative founding mandate was at risk. It was acknowledged that the old style of exhibitions was failing because they were conceptually static, overly subject-focused, and inconsiderate of the needs of the lay visitor. It was also recognised that the intrinsic role of the museum was changing from being simply a storehouse of curious objects to a more questioning study of the world; the NHM needed to exploit its physical, scholarly and pedagogic resources and combine them with a more social role of communicating with a non-specialist audience in an entertaining manner. The visiting public could see TV programmes on natural history, so the Museum had to work much harder to attract audiences. E.V. Gatacre's paper 'The Limits of Professional Design', read at the Museums Association Annual Conference on 8 July 1976, summed up the changing museum audience when he discussed how Sir John Pope Hennessy described his public as 'bespectacled and T-shirted' and having 'responses determined by the television screen, unaccustomed to looking intently at static images and with an uncritical colour sense'.[194]

The idea of a museum not based solely around exhibits but making use of interactive media to show scientific concepts was not new.[195] As early as 1928 El Lizzitzky used a theatrical setting with blown up photographs and typography in the design of the Soviet Pavilion at the International Press Exhibition in Cologne (Pressa)[196] which according to Henning saw the beginning of the disappearance of the artefact in museums. In 1925 the Deutsches Museum in Munich opened, featuring interactive exhibits. Around the corner from the NHM in 1931, the Science Museum opened its interactive Children's Gallery, and in 1937 the Palais de la

193 According to Wittlin, *Museums*, pp. 174-5, museums in the USA in the 1960s were 'progressing in great strides' in terms of the founding of new museums and visitor attendance. Several main trends were emerging: an increasing interest in ecology in museums of natural history, the fostering of links between museums and schools, a new emphasis on research and a desire to make museum environments reflect the content of the exhibits. It is not unlikely that a national museum like the NHM would have been aware of these international trends in its desire to bring displays up-to-date.

194 E.V. Gatacre, 'The Limits of Professional Design', *Museums Journal*, 76: 3 (1976), 93-99.

195 See Henning, *Museums, Media and Cultural Theory*, p. 65, and pp. 70-98.

196 See Jeremy Aynsley, 'Press Cologne, 1928 Exhibitions and Publications Design in the Weimar Period', *Design Issues,* 10: 3 (1984), 52-76.

Découverte (an interactive science museum) opened in Paris. The Deutsches Museum was a direct inspiration for the use of interactive exhibits in the Chicago Museum of Science and Industry, which also featured Vienna Method charts and employed Rudolf Modley (who had interned at the G&W). However, according to Miles, it was Frank Oppenheimer's Exploratorium in San Francisco which opened in 1969 which formed one of the three main influences behind the formulation of the New Exhibition Scheme (NES).

The development of the New Exhibition Scheme (NES)

In December 1968, in response to the changing times and (in part) due to the availability of Government funding for science and education projects, Frank Claringbull on behalf of the Museum Trustees, took the radical first step in the updating of the galleries. He began by removing control from the heads of the Science Departments, and taking sole responsibility for the galleries. This was the first initiative towards the formation of a unified exhibition policy that was to become known as the 'New Exhibition Scheme' (NES).[197]

Work began in earnest planning NES, through an exhibition panel chaired by twelve members of the Scientific staff and the Education officer. In February 1972, the Museum Trustees approved the paper 'A Proposal for a New Approach to the Visiting Public',[198] and a unified policy for exhibition development was formally activated in May of that year. The primary concern was to consider the status of the Museum as a 'social institution', and develop 'an organised body of knowledge in the form of a Museum Technology' expressly for this purpose. The failings of the current exhibition policy were clearly described in this 1972 proposal:

> The present exhibition fails because it is primarily concerned with the diversity of nature, and omits three-quarters of its rightful subject matter. It is piecemeal and conceptually static, neglectful of natural processes and interactions, and reflects to its loss the division of the Museum into five separate departments.[199]

Claringbull set up small working parties to investigate four themes, which had emerged from the original Exhibition Panel (which had proved too unwieldy to manage as a single project):

1. Man
2. Ecology
3. Life Processes and Behaviour
4. Evolution and Diversity [200]

[197] Taken from an unpublished paper by R.S. Miles, 'Origins of the New Exhibition Scheme and its Pilot exhibition ('Human Biology')', 22 August 2008. See Appendix 1, pp 301-303.
[198] 'British Museum (Natural History): A Proposal for a New Approach to the Visiting Public' NHM Archive, NES DR41.
[199] Miles and Alt, 'British Museum (Natural History): A New Approach to the Visiting Public', 158-162.
[200] Trustees' Paper 72/9, 'New Exhibition Scheme' 27 November 1972. NHM Archive DF933/1012.

Initial considerations for planning the new scheme involved dealing with the whole of modern life sciences and their interrelationships through thematic exhibitions. Exhibits had to be accessible to visitors unfamiliar with biology, so educationalists were seen as an integral part of the process to equip visitors with adequate theoretical frameworks to enable them to make sense of displays. To achieve this, a clear structure was required so that visitors could be introduced to what could sometimes be perceived as abstract ideas.

In 1973, after several unwieldy unsuccessful attempts, the working parties (with the help of about forty scientific staff) produced outline proposals for exhibitions based around the four themes. Later on that year, the decision was made to mount a Pilot project to test out the Museum's ability to carry the programme forward. The 'New Exhibition Scheme' (NES) was officially launched with an exhibition based on the life history of man. At this point Miles was seconded from the Palaeontology department to the Museum directorate, and a ten page content outline was produced in July 1973. Outside subject experts were consulted to assess the outline brief and advise on subject matter and the organisation of information.[201]

The next stage involved developing the exhibition brief, which culminated in a 104 page document forming the basis of Trustees' Paper 74/3 in early 1974 entitled 'New Exhibition Scheme: Aspects of Human Development', which secured authorisation for the Pilot project to go ahead.[202] The paper dealt with the study of man on several different levels. A diagram showing how the exhibition would be structured, lists elements explaining how man perceives and responds to his surroundings at different stages of growth on a horizontal axis, correlated with changing physical and mental traits based on aging on a vertical axis.[203] This holistic structuring of information bears some similarity to how Neurath constructed his thematic narratives within the G&W:

> When a Viennese citizen enters this museum, he finds reflected there his problems, his past, his future – himself.[204]

Neurath presented his conceptual vision for a museum of natural history in 1933, in the form of an interrelated display based around all aspects of what a whale means to mankind in biological, social and economic terms:[205]

201 Professors J.Z. Young, J. M. Tanner, Dr A.R. Jonckheere and Dr W.K. Taylor of University College London, Dr J. Versey and Miss A. Hobsbaum of the Institute of Education, Dr A.J. Duggan of the Wellcome Museum of Medical Science, Prof R.L. Gregory of Bristol University and M. Macdonald-Ross of the Open University, NHM Archive, DPS 42, DIR41.

202 NHM Archive DPS 40.

203 Miles later developed a multi-level exhibition structure for 'Human Biology'; 'Treatment should be at two, possibly three or more levels, with the components organized around a central spine of concepts corresponding to treatment at the minimum level of resolution. This will result in an exhibition with a 'backbone' and a series of 'side chains'. Miles, 'Lessons in Human Biology': Testing a Theory of Exhibition Design', 229. See also Miles' list of eleven early assumptions on the way forward for NES, 228-230.

204 Neurath, *Empiricism and Sociology* p. 221.

205 An extract relating to Neurath's conceptual vision for a museum of natural history appears in the *Transformation Reader,* a booklet given to new transformer recruits from the late 1970s onwards. This will be discussed in detail later in this section.

> A huge whale hangs in the middle of the hall; but we do not learn how the 'beard' is transformed into old-fashioned corsets, how the skin is transformed into shoes, or the fat into soap that finds it way to the dressing room of a beautiful woman. Nor do we learn how many whales are caught per annum, or how much whale-bone, fat and leather are produced by this means. And yet many people surely would be interested to know what countries are predominantly engaged in whaling. And some may want to know what this means for the balance of trade, how it relates to economic crisis, and so on. Human fortunes are connected with this exhibit – starving seamen, hungry families of fishermen in the north of Norway. And so on, everything leds to men and society.[206]

The audience for NES was identified as the 'interested layman',[207] and the working title 'Being and Becoming' was announced for the pilot exhibition. Plans were issued for staff to be seconded from Museum science departments to allow planning to commence forthwith. The outline proposal discussed how the NHM should present a modern view of natural history, dealing with biological ideas and processes (which gave NES one of its distinguishing traits), and how the subject had changed from 'collecting and cataloguing curiosities for cabinets of leisured men to a discipline which affects us all, the study of the world in which we live.'[208]

During 1974 development work on NES progressed and the brief was redeveloped and revised to form a new 195-page document in August of 1974. According to Miles, the original brief contained too much material for the available space, and the subject matter had been worked up in too much detail. New solutions were sought to remedy this overly detailed approach, and take the Pilot project forward using educational technology, a technique favoured by the OU to enhance distance learning for students studying away from the traditional university campus environments.[209] Miles described educational technology as a tool that has grown out of programmed learning, which provided a 'systematic, problem-solving approach to education'. He considered it particularly useful when dealing with mixed-ability teaching and the self-paced learning required by museums with their undefined audience. He stated that programmed learning had alerted him to the need to establish a clearly defined purpose, aims, objectives, structure, story line and a starting point which matched the visitor's existing knowledge. Content was divided into small chunks to avoid over saturation of material and promote the

206 Neurath,'Museums of the Future,' *Survey Graphic (Magazine of Social Interpretation)*, September 1933, 458-463 and 'Museums of the Future' (1933) [Bibl. Nr. 213], in Neurath, *Empiricism and Sociology*, pp. 218-223.

207 Before visitor surveys were taken, the Museum had no real idea of who their audience were, and assumed that they were either academics or research students. Plans for a visitor poll were already in place when Macdonald-Ross suggested the NHM carry out a survey similar to the type he had instigated to define the identity of students applying to the OU.

208 Natural History Museum Archive, NES Early Development Policy, DPS 23.

209 Michael Macdonald-Ross, (Dept of Educational Technology at the Open University during the 1970s), explained in detail how educational technology was used to develop distance 'active learning' at the OU, in the edited transcript in Appendix 1, p. 279. He also discussed how the human organisation of learning formed the basis of educational technology, and how it had evolved from programmed learning techniques used in World War II to train troops of mixed abilities.

active participation of the visitor.[210]

In practical terms, educational technology was used to design the production system needed to develop and implement NES and to structure scientific information by breaking it down into smaller more manageable sections. According to Miles, Claringbull had originally contacted the Institute of Educational Technology at the OU, and Beryl Crooks (a resident biologist), responded by giving a talk to the Museum's trustees on how educational technology was being used to plan courses at the OU.[211] Crooks was subsequently seconded for six months in March 1974 to facilitate the re-writing of a new outline for 'Being and Becoming'.[212]

However, it became clear that the implementation of the techniques of educational technology alone were not helping to clarify the new outline and turn it into a workable scheme that would fit into a museum environment;[213] there was still far too much information which needed to be communicated to the audience. A more condensed overview of biology, and a simplification of the material presented was required to make the museum audience engage with the science. Crooks and the Museum teams had used the technique of identifying behavioural objectives for each individual exhibit to determine exactly what the audience should know before progressing through the exhibition. Unfortunately preliminary work on the content and treatment of the new outline brief had identified 45 overall behavioural objectives and 573 specific behavioural objectives for the visitor to assimilate – a situation far too immersive for the average museum visitor to digest in one visit.[214] The over-complexity made the scheme unworkable – a symptom of being overly subject-focused, and not visitor-focused. Neurath was well aware of this dilemma, as he stated in his article *Museums of the Future* in 1933, in which he discussed the pedagogic role within museums:

210 Miles does not connect this with behaviourist roots (the theory that human and animal behaviour can be explained through conditioning) but connects them with the more ancient 'everyday practice of communication' which he also identifies within Isotype. See Roger S. Miles, 'Otto Neurath and the Modern Public Museum: The Case of the Natural History Museum (London)' *Museums Journal,* 79: 1 (1996), 23-26. Also in Elizabeth Nemeth and Friedrich Stadler, (eds), *Encyclopedia and Utopia: The Work of Otto Neurath (1882-1945)*, The Netherlands: Kluwer Academic Publishers, (1996), pp. 183-181.

211 British Museum (Natural History) New Exhibition Scheme 'The Educational Technology Approach', 1 April 1974 NHM Archive DPS NES Early Development Policy, DPS 23.

212 Both Miles and Macdonald-Ross concur with their comments on Crooks' input into NES in their edited transcripts See Appendix 1, pp. 265 & 272 However, Macdonald-Ross suggests that Crooks contacted the NHM independently, p. 289.

213 The document 'Evaluation of the Pilot Scheme' shows this confusion. It would appear that the criteria for defining a successful exhibition could not be decided upon, as this Memorandum for a proposed meeting on 2 May 1974 (dated April 1974) illustrates: 'The attached paper will form the basis of our discussions. The aim of this meeting is to determine success criteria for the exhibition. It is hoped to make it a "brain-storming" session. I can only make recommendations on how to measure the success of the exhibition after you have decided what constitutes success'. Beryl Crooks. A response to the meeting signed 'G' says 'It was very difficult to decide whether we were discussing if these were the correct objectives or how many of them Beryl could devise evaluation schemes for. So the meeting was a little confused'. NHM Archive NES PP.

214 Miles' definition of a behavioural objective is that 'the visitor will know X and will be able to correctly answer 8 out of 10 questions in a multiple choice examination'. From an edited transcript of a formal interview with Miles, See Appendix 1, p. 272.The huge amount of behavioural objectives identified by Crooks and the Museum team highlighted the difficulty of using this method as a theoretical basis for designing educational exhibits. 'Lessons in Human Biology': Testing a Theory of Exhibition Design' *International Journal of Museum Management and Curatorship*, 5 (1986), 228.

> Of course, as in everything educational, success in this field is secured by giving up something else; in order to create pictures that can easily be remembered one has to omit many details. But that only proves the maxim that he who knows best what to omit is the best teacher, and one who can omit nothing from his demonstrations should not be a teacher at all.[215]

The new outline appeared complex and confused; little clarification had been achieved (Crooks secondment ended in September 1974). But Miles still believed that the techniques of educational technology presented a viable approach; but basing an exhibition on so many behavioural objectives was not. The Museum was still struggling to identify a visitor-centred approach for the design of its galleries. Michael Macdonald-Ross (of the Institute of Educational Technology at the OU), like Miles, had also been dismayed by the unwieldy document presented by Crooks, and had written to the Director informing him that he was faced with 'logistical and management problems that the Museum had never faced before',[216] if the Pilot project was to succinctly represent the way forward for the redesign of the galleries within a relatively short time frame. The last permanent exhibition to be installed at the NHM, 'Fossil Mammals' was roughly the same size as NES (1000 sq metres) and had taken eleven years to complete; it was designed by an external designer appointed to work with the Palaeontology department.

The breakthrough

> Because NES was a pilot scheme it had to be done quickly, and we were just starting off. Our first exhibition was 1100 square metres – an enormous exhibition […] Before the Department of Public Services [DPS] was formed, there was a traditional exhibition section, and the curators would produce the specimens and the text. They would go in standard cases, and it was the designer's job essentially to make it look nice. There can't have been much more to it than that. We needed to gear ourselves up for this major project to communicate with an audience. It's a long story how we came from starting to plan the 'New Exhibition Scheme' and concentrating purely on the subject matter, to realising it was more about communication than it was about biology. The key was shifting from being subject-matter orientated to visitor-orientated, and asking what do we need to do to function as transformers in the museum? Neurath gets the information from the specialist and then tells people what to do, but in a national museum, particularly where the curators are the power brokers – you could not work such a system, there are too many other factors to take care of. So our key thought was in transformation. We are going to give equal weight to the science and the design; and transformation should be carried out by a partnership of equals, a scientist and a three-dimensional designer.[217]

215 Extract from Otto Neurath,'Museums of the Future,' *Survey Graphic (Magazine of Social Interpretation)*, September 1933, 458-463. See also 'Museums of the Future' (1933) [Bibl. Nr. 213], in Neurath, *Empiricism and Sociology*, pp. 218-223.

216 From an edited transcript of a formal interview with Miles. See Appendix 1, p. 267.

217 From an edited transcript of a formal interview with Miles. See Appendix 1, p. 266.

According to Miles, (in late 1973 or early 1974) Macdonald-Ross[218] was persuaded to give a lecture to the Museum's Scientific Office Association[219] about Isotype. Miles recollects that he was clutching a paperback edition of *Empiricism and Sociology* as he spoke.[220] Miles' initial impression of Isotype related to its immediacy to communicate and visual clarity. He subsequently learnt about transformation, which was to become one of the key elements taken forward in the realisation of NES. Macdonald-Ross initially suggested the use of Isotype to develop NES due to his knowledge of Neurath's work in museums.[221] During the early 1970s, Macdonald-Ross[222] had been employed by the OU to research methods of communication to enhance distance learning techniques[223] and the design of the new course literature. As part of his research he had visited various universities and colleges, one of which was University of Reading, Department of Typography and Graphic Communication where he met Michael Twyman, who introduced him to Isotype.[224] Through Twyman, Macdonald-Ross met M. Neurath, and at one point suggested that she should teach transformation to a group of illustrators at the OU.[225]

On Macdonald-Ross's recommendation in November 1974, educational technologist Alan Tout was contracted by the Museum, and in his first working paper *The Project Network* (dated 21 November 1974), praised the good work that had gone before, and set out a project network system to realise NES, taking forward the planning work produced to date. A small team (including Miles) drew up a brief for the Pilot project, suitable for the available space and the visitor's stamina. This brief gave rise to a schedule for exhibit development, and a new team structure. Macdonald-Ross considered that Tout could adapt the system he had designed at the

218 Macdonald-Ross had reputedly been contacted before the secondment of Crook, but had been unable to take up the appointment due to a six-month engagement in the US.

219 An in-house group who organised guest lectures every two weeks.

220 *Empiricism and Sociology* was first published in 1973.

221 Macdonald-Ross confirms this fact. From an edited transcript of a formal interview with Macdonald-Ross, Appendix 1, p. 289.

222 Macdonald-Ross (educational technologist), Alan Tout (operations research scientist) and Michael Neal (management consultant) formed a consultancy in the early 1970s working on projects that involved innovation in education and industrial training. Their involvement with the OU started when Vice Chancellor Dr Walter Perry commissioned them to investigate ideas on how to organise teaching from a distance, which corresponded to the area labelled 'Educational technology' in the 1968 Planning Report, (published as a Green Paper). From an edited transcript of a formal interview with Macdonald-Ross, Appendix 1, p. 277.

223 Miles states that the NHM were initially interested in how the OU were approaching distance learning, thinking it would be appropriate for engaging with their audiences. The Museum's Education section had been using face-to-face teaching techniques with school parties, but Miles thought this inappropriate for school parties in an exhibition context, Appendix 1, pp. 265-266.

224 From an edited transcript of a formal interview with Macdonald-Ross, Appendix 1, p. 277.

225 On 3 July 1973, Marie Neurath wrote to Michael Twyman expressing disappointment that a two year research grant of £3,000-£5,000 from the Social Science Research Council (to produce a descriptive catalogue of the Isotype Collection in the Library at University of Reading) had not been granted. She continued by disclosing correspondence from Macdonald-Ross:

'If it strikes a few sparks amongst our [OU] illustrators then it may be worth your visiting us. I'd like to get a small group of our artists Isotype-trained; at present they have no sense of 'system'.

She continued by reporting her reaction to Macdonald-Ross's request to Twyman:

Such news sheet[s] and a number of visits can hardly help: they can only give a superficial knowledge; it all looks so easy, and that makes it even more misleading. I wonder whether we could work out together a training course, based on the Isotype Collection? At least if anything develops at the Open University. What do you think?' IC 7.1b.

OU for the NHM's production of exhibitions. He also suggested the NHM carry out a polling exercise (as they had undertaken at the OU) to establish who their audience were. Historically the NHM had catered for either experts or research students – but never the general public; exhibits were simply accompanied by a small taxonomic label. Macdonald-Ross suggested looking at exhibits from an holistic viewpoint and attempting to remove the tag of the museum as simply a repository for objects and specimens. He based his ideas on the fact that objects don't form the whole of the science, but science is made up of a complex mixture of interwoven objects, experiments and conceptual information.[226]

On 1 January 1975 Miles was appointed head of the newly formed Department of Public Services (DPS) responsible for all the Museum's biological galleries, with the main task of bringing NES to fruition through the Pilot project,' Being and Becoming'. DPS was formed by merging the existing Museum Exhibition Section, with newly employed science, editorial and design staff (from which the transformation partnerships would be formed). The existing Education Section joined DPS later in 1975 and scientists were seconded from their respective departments within the Museum.[227] Miles held internal seminars and sought advice from external subject experts. This invitation to staff shows Miles' misgivings for the future – clearly he was struggling to identify a radical way forward that was deliverable within a short time frame:

> New Exhibition Scheme Seminar
> Training Room, 10.00 Thursday 6 February 1975
> *'The exhibits should be exciting learning experiences not simply passive factual records'*
> This statement is an article of faith for the NES. We have not yet worked out what it means in practice. Our uncertainty is a major obstacle for the design and production of exhibits for the pilot scheme. Exhibits of the right sort will sharply separate the NES from the existing exhibitions [...] There are no ready-made answers to this problem. We need to combine our thoughts, and generate and test new ideas. This meeting will be an opportunity to air points of view. R.S. Miles 28.1.75[228]

A thirty-page brief and exhibition schedule emerged in March 1975, followed by Tout's project control system. 'Being and Becoming' was renamed 'The Hall of Human Biology' and a DPS open day planned for April 1976.[229] Interest in Neurath's museum work led to Miles arranging for twenty-eight members of DPS to visit the exhibition 'Graphic Communication through

226 This can be directly compared to Neurath's interconnected ideas for a natural history museum, but it also led to the NHM being accused of adopting a dumbing-down process.
227 W.R. Hamiliton, T.I. Molleson and B.D. Rosen from Palaeontology, R. Vain-Wright and R. Lane from Entomology.
228 Memo inviting staff to participate in a meeting to discuss the future of NES. NHM Archive NES PP 1973-75.
229 'An Exhibition on the NES Pilot project'. R.S. Miles 26 November 1975. NHM Archive NES DIR 41 1972-76.

Isotype'[230] in Reading on 24 June 1975, followed by a seminar given by Michael Twyman.[231]

Factors that went into the final realisation of NES

Miles cites three main factors that went into the final realisation of NES: Otto Neurath and Isotype, educational technology and Karl Popper's 'trial and error' approach to the philosophy of science (as seen in Frank Oppenheimer's San Francisco Exploratorium, and the Lawrence Hall of Science, University of California, Berkeley).[232] These provided the **inspirational, pragmatic,** and **theoretical** elements that helped form Museum technology, Miles' new objective body of knowledge for the design of educational exhibits that he considered paralleled Harris Shettel's research[233] in USA during the 1960s.[234]

Isotype provided the **inspirational** influence to NES, and gave the NHM a set of rules to design exhibits that clearly communicated with their audience. Miles cites the notion of transformation as being responsible for forming the team structure in DPS, centred around the process of mediation between subject specialist and designer. In 1933, Otto Neurath wrote about formulating a system of rules in the G&W in 'Museums of the Future' in *Survey Graphic* magazine, where he rigorously described how he would implement his principles in a museological context:

> The important point is that there must be a system of rules that can be applied without exceptions, a sort of grammar of picture language; that, and a dictionary of symbols. The problem is not how to invent ever-new symbols but how to get accepted the best that can be found anywhere. With this aim the Social and Economic Museum of Vienna is engaging in creating standard symbols and standard rules.[235]

230 The exhibition, staged in University of Reading Library ran from May to October 1975, and marked the fiftieth anniversary of the G&W, and fifty years since M. Neurath, the longest working member of the Isotype team began work there. The exhibition travelled to Vienna in 1977.

231 From an edited transcript of a formal interview with Ron Nash, Appendix 1, p. 275. Miles states that he found the exhibition colour-coded hand-outs and the facsimile reprint of *International Picture Language* useful as aide-memoires. From an edited transcript of a formal interview with Miles, Appendix 1, p. 266.

232 Courtesy Roger Miles 22.8.08, from a document describing the main Influences in setting up NES.

233 In 1968, Shettel set up a small-scale study based on the criteria used by museum professionals to develop, produce and teach using exhibits. His results were inconclusive, but showed that more objective criteria were needed before better exhibits could be developed systematically. Later experiments led to the realisation that some aspects of educational technology could be applied to exhibition design (Screven 1969; Shettel 1973; Lakota and Kantner 1976; Their and Linn 1976) which, when coupled with observational work on museum visitors (Melton 1935; Lakota 1975; Lakota and Kantner 1976), led to the emergence of Miles' term 'Museum technology'. See Roger S. Miles and Alan F. Tout, 'Outline of a Technology for Effective Science Exhibits', 213-214.

234 Roger S. Miles, 'Lessons in Human Biology' Testing a Theory of Exhibition Design', *The International Journal of Museum Management and Curatorship*, 5 (1986), 227-240. In an earlier paper Miles and Alt discuss the three areas they used to assemble knowledge for NES as educational technology, design for communication (transformation) and evaluation studies of museum exhibits. Miles and Alt, 'British Museum (Natural History): A New Approach to the Visiting Public', *Museums Journal*, 78: 4 (1978), 158-162.

235 Extract from Neurath, 'Museums of the Future', 463, IC.8.1.

Miles saw the application of Neurath's 'system of rules' in a much broader context than simply constructing charts, and associates transformation with analogy and problem solving:

> In developing the Exhibition Scheme we are attempting to apply the concept of transformation in wider fields than Isotype charts and diagrams, including three-dimensional design, but still with its basic meaning. We particularly associate it with the construction of analogies or conceptual bridges, whether in the form of graphics models or interactive devices.[236]

Miles and Alt cite a particular exhibit that describes the composition of the cerebral cortex as being a good example of the NHM's use of transformation. **(Fig. 32)** The composition of the brain is illustrated by a crumpled sheet of paper, an analogy, and a method used in educational technology rather than the principles of Isotype.[237] Using analogous concepts, to succinctly tell a story forms a much broader interpretation of Neurath's principles, and is a far more economical aid to comprehension than attempting to address the huge amount of behavioural objectives identified by Crooks and the teams during the early stages of the scheme. Miles considered that the visitor would gain more from fewer well-designed exhibits than filling the space with mediocre ones.[238] This concurs with Neurath's ideas on a good teacher's ability to edit information, and leave out the rest.[239] Miles also agrees with Neurath's ideas on problem-solving, and the role of intuition within this process.[240] In an early report on NES, he reproduces the following quotation from *International Picture Language* – the visitor to the NHM is confronted with exactly the same static vista as Neurath's theoretical natural history museum visitor; and intuition is needed to find a way through the maze of information, and achieve a satisfactory conclusion. This quotation also supports Miles ideas of visitor-centric design:

> Everything which is put on view in a museum has to be given a teaching purpose. At present, experts in special sciences put things together for a museum – everybody has been into a natural history museum and seen the thousands and thousands of birds and other animals which are there grouped under one roof. Every expert is pleased to have a great number of examples and details. But museums are not for experts, they are for the public. At present there are no representatives of the general public to take care of the interests of the men who come to see and to get some knowledge. ISOTYPE rules are the rules for respecting the interests of the public (in a picture, in a museum, or in all museums together).[241]

236 Miles and Alt, 'British Museum (Natural History): A New Approach to the Visiting Public', 161.

237 Educational technologist Brian Lewis states the five ways that a motivated visitor would be guided towards getting to know subject matter: Method of Definition, Method of Demonstration, Method of Interaction, Method of Enactment and Method of Analogy, Brian Lewis, 'The Museum as an Educational Facility', *Museums Journal*, 80: 3 (1980), 151-155.

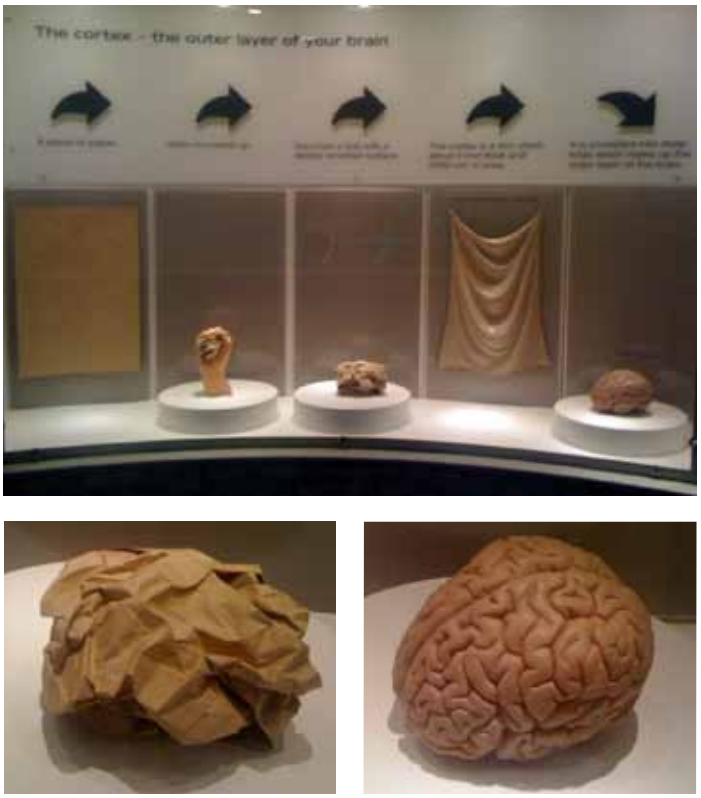
238 British Museum (Natural History) New Exhibition Scheme (April 1975), report by R.S. Miles. NHM Archive DR41. The report from December 1973 'British Museum (Natural History) Outline for a New Exhibition on Human Development Being and Becoming' was far more complex. NHM Archive DPS 40.

239 Neurath, *International Picture Language*, p. 27.

240 Miles and Alt analyse this problem-solving process as proceeding from context and problem to solution and evaluation. 'British Museum (Natural History): A New Approach to the Visiting Public', 159.

241 *Ibid.*, Miles is quoting from *International Picture Language* pp. 67-68.

Educational technology provided the **pragmatic** influence to drive NES forward. Macdonald-Ross introduced Alan Tout[242] to the Museum. Tout became one of the key players responsible for the delivery of NES.[243] Using tools found in educational technology he set up a project control system to practically establish the rules of communication and guiding principles for the design and production of NES. Tout started work with the NHM in November 1974, and wrote a series of working papers about the future of NES. According to Miles, the first six were critical to the development of NES and discuss the establishment of the 'development' or 'transformer'



(Fig. 32)
'The Cortex', demonstrating the use of analogy in the Hall of 'Human Biology' – the brain is compared with a sheet of crumpled paper.
PHOTOGRAPHS BY THE AUTHOR

partnerships.[244] Tout had visited the 1975 Isotype exhibition with the DPS group and was familiar with the underlying principles. His considerable input into NES initially involved learning about the content and the structure of the biology and identifying units which would form the basis of a scheduling system. He then reviewed available resources for implementation. Part of the task in hand concerned establishing who was going to design the exhibits and how they were going to be realised – this is where the 'inspirational' idea of the transformer fitted into the overall scheme, culminating in the creation of the designer/scientist transformer partnerships.

242 Alan Tout was working as an occupational researcher for Plessey's consultancy department when Macdonald-Ross recommended him to work for the NHM. Earlier in his career, Tout devised a project control system for the OU. See edited transcript from a formal interview with Miles in Appendix 1, p. 267.

243 See 'British Museum (Natural History): A New Approach to the Visiting Public' for a list of aspects of educational technology that were of particular relevance to NES, 159.

244 This is an example of the assimilation of the principles of Isotype into ideas used in educational technology.

Miles states that the adoption of ideas on transformation were not being used immediately after Macdonald-Ross introduced them to the Museum, but with Tout's help, the system evolved to accommodate them. Miles and Tout were the key decision-makers and architects of NES, but Tout also enlisted Brian Lewis, Professor of Instructional Science at the OU to help with the practical implementation of NES.[245] Some of the ideas that Lewis put forward in the guise of the part that educational technology took in the formation of NES concurred with the principles of Isotype and Neurath's thinking on museums – in particular, the problem of over-saturation of information ('less is more'). Lewis stated that 'If museums took their educational remit more seriously, they would exercise a self-denying ordinance on the selection of exhibits.'[246] Lewis, like Miles also believed that analogy underpinned all other methods of communication, referring the visitor to a known idea, to enable them to understand more alien concepts.

Ideas taken from Karl Popper, the Viennese philosopher of science,[247] were responsible for helping to formulate the **theoretical** 'trial and error' approach to NES, taking small steps at a time and emphasizing the importance of evaluation. Popper believed that no amount of positive responses to a question could prove that something was right, but a single negative response could prove that it was wrong. Popper's theories provided the methodological framework for setting up the evaluation section within DPS.[248] However, due to relatively untried methods for designing educational exhibits in NES, it was unlikely that everything would be right at the first attempt. NES was an experimental exhibition, leaving little time for formative evaluation, except in the case of a few mock-ups. In consequence, final exhibits were put on display and then amended if necessary through summative evaluation.[249]

245 Lewis' input into NES can best be explained from a passage found in the *Transformation Reader,* taken from Brian Lewis, 'The Museum as an Educational Facility,' *Museums Journal*, 80: 3 (1980), 154. 'The teaching points must be fully explained. Misleading statements and irrelevant scholastic displays must be eliminated. There must be no mistakes, non-sequiters [sic], gaps or other defects in the argument. All written materials need in fact to be well-structured and self-explanatory and pitched at the right level of difficulty. Even this may not be enough. Unfortunately, it is all too easy to be clear and accurate with respect to subjects that most visitors regard as being irrelevant and unimportant. Some effort must therefore be made to arouse in the visitor a sense of excitement and purpose. In the very act of imparting knowledge, the instructional materials must explain why the knowledge is worth having and how it fits into the broader scheme of things.'

246 *Ibid.*, 154.

247 Karl Popper (1902-1994), the Viennese philosopher, founded the Department of Philosophy, Logic and Scientific Method at the London School of Economics in 1946, and like Neurath was very influential in the field of the Philosophy of Science.

248 Popper believed that no amount of positive outcomes of experimental testing could confirm a scientific theory. But a single counter-example is logically decisive, and shows the theory from which the implication is derived to be false. Popper tried to characterise falsification logically as a strict method, but admitted it couldn't be done precisely, and that it was ultimately difficult to portray science as a system of clean statements and unambiguous deductions. In practical terms at the NHM in the 1970s, for evaluation purposes, the criticism-based schema of Popper uses a three-tier process, identifying the initial problem, proposing a tentative theory for solving the problem and evaluating its performance against previously fixed standards, finally eliminating errors to led to a more refined solution and a deeper understanding of the original problem. Popper advocated refinement through continual evaluative testing, but in practical 1970s museum terms this is uneconomic and unworkable. Miles and Alt, 'Outline of a Technology for Effective Science Exhibits', 210.

249 The NHM fitted closed-circuit television to allow the visitors to be observed as they went around 'Human Biology', Miles, 'Lessons in Human Biology', 234.

A continuous survey programme to evaluate DPS was incorporated,[250] with results published in *Museums Journal* every four years.[251] Miles believed that the NHM was unique in its adoption of evaluation techniques during the mid 1970s, and the programmes instigated there led to the Museum becoming known as a pioneer of evaluation.[252]

But evaluation was not new in American museums. Miles had visited several science centres and museums in North America and Australia in 1976.[253] The Exploratorium in San Francisco[254] **(Fig. 33)** and the Lawrence Hall of Science in Berkeley were of particular interest due to their slightly differing approaches to Popper's 'trial and error' approach to evaluation. The Exploratorium evaluated their exhibits by placing roughly-finished interactive prototypes in the exhibition spaces, accompanied by museum staff called 'Explainers' to question the public on the effectiveness of the exhibits; through constant evaluation, exhibits could be adapted and improved. The Lawrence Hall of Science used graphics based mock-ups and more formal evaluation procedures housed in a special evaluation space. Final exhibits would be built in response to the results of the evaluation. Miles favoured the Lawrence Hall of Science model – as the Pilot project was an experimental exhibition and had to be completed within a set time frame. During this fact-finding trip Miles was also first introduced to the evaluative work of Harris Shettel and his strategies for determining exhibit effectiveness.



(Fig. 33)
The Exploratorium, San Francisco, during the 1970s.

250 See example of survey form from 1982 in Appendix 1, pp. 304-305.

251 Michael B. Alt, 'Four Years of Visitor Surveys at the British Museum (Natural History) 1976-79', *Museums Journal*, 80: 1 (1980), 10-19.

252 Evaluative techniques to determine the relative success of exhibition charts was first practised by Neurath and his team at the G&W in Vienna from the late 1920s to 1934. M. Neurath & Kinross, *The Transformer*, p. 25.

253 Apart from the Exploratorium's effective use of evaluation, Miles was impressed by their use of interactive exhibits, the participatory attitude towards the visiting public, and the emphasis placed on contemporary physical and biological science, technology and industry rather than on objects from the past; all of which he incorporated into NES. (See Preliminary Report on a Visit to 18 Museums in North America and Australia, January and February 1976. (Generalised observations by Roger Miles, 25 February 1976 NES PP 1976). Miles visited museums in Washington, New York, Cleveland, Chicago, Milwaukee, San Francisco and Oakland, Toronto and Perth. *Annual Report 1976-77* (1976) DF 935/28, NHM Archive.

254 The Exploratorium in San Francisco opened its doors in 1969 and was described as an interactive museum of art, science and human perception, based on the philosophy that science should be fun and accessible for people of all ages. The Director was Frank Oppenheimer, a physicist and a socialist with sound pedagogical ideas. The Exploratorium had strong links with schools and educational establishments. Its aim was to transform museums into living institutions to shape the future of mankind and reflect the world's technological past and present. It is not difficult to see many of the ideas behind science centres reflected in the work of NES. See Victor J. Danilov, 'America's Contemporary Science Museums' *Museums Journal*, 75: 4, (1975), 145-148. The Exploratorium was seen as the 'Mecca' for museum designers and scientists during the mid-1970s. See questionnaire response from Dierdre Janson-Smith in Appendix 1, p. 294.

The reception of the NES Pilot project 'Human Biology'

After a low key open day staged within the Museum for staff to show the way forward for NES (24 May 1977) the Pilot project, by then renamed 'Human Biology, an Exhibition of Ourselves'[255] was opened by Shirley Williams (then Secretary of State for Education). At the opening, the Director pronounced it 'Stunning, a foretaste of a revolution'.[256] It was introduced as an experiment to test out 'Museum technology', Miles' new approach to the design of educational exhibits. 'Human Biology' was widely acclaimed by the public, who flocked to see it, leaving other NHM galleries virtually empty. Visitor levels continued to rise, reaching over three million in 1977. Visitor surveys indicated that it was the most popular permanent exhibition that the NHM had ever produced. The Museum felt that it had justifiably begun to realise its aims and objectives for NES, in the creation of an enjoyable, visitor-centred approach. **(Fig. 34)**

Professional acclaim centred on the fact that the exhibition was considered to be a new, adventurous departure from the traditional method of designing exhibitions; which, as an exercise in museum design made fascinating viewing for curators. The exhibition covered new ground in dealing with 'Human Biology' on such a large scale, through biological ideas and processes, rather than collections of objects, which gave 'Human Biology' one of its most distinguishing traits. It was constructed as a stand-alone, interactive environment within the NHM, with all references to its Gothic interior removed. The exhibition had a strong narrative basis, broken down into 'mind-sized chapters' of tightly structured groups of largely interactive exhibits, forming separate but interconnected episodes. As can be seen from visitor surveys,[257] the content was memorable and succeeded in both educating and enthralling visitors. The visitor was no longer the passive onlooker, but a participant in a journey based on accessible language and analogous concepts. Content was pitched at two levels, the majority suitable for a fifteen year old, with secondary levels accessed through raised island exhibits known as 'Enrichment Assemblies'.[258] A book on the exhibition was available in the Museum shop. The structure of the learning hierarchy was based around a rational arrangement of ideas, to help the visitor explore and be motivated to find out more.

255 Latterly referred to as 'Human Biology'. See Appendix 1, pp. 306-310 for isometric plan and working drawings.

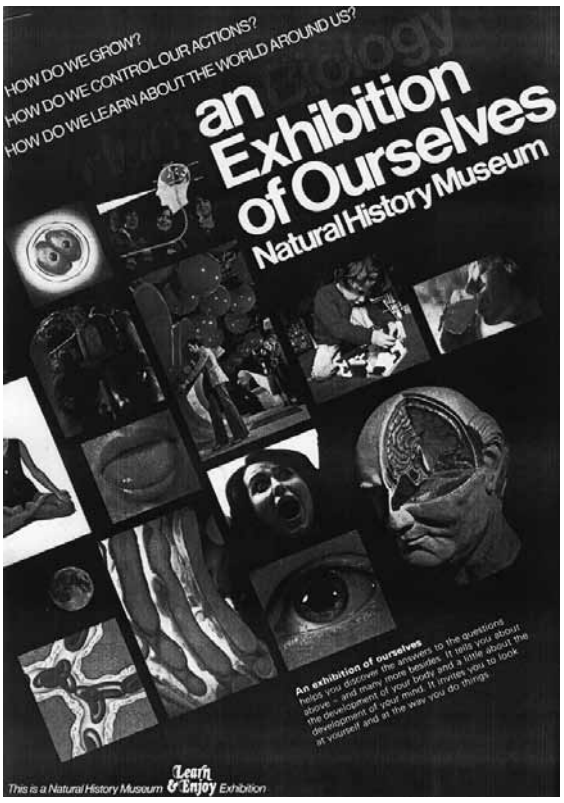
256 Miles, 'Lessons in Human Biology', 231.

257 Michael B. Alt, 'Four Years of Visitor Surveys at the British Museum (Natural History) 1976-79', *Museums Journal*, 80: 1 (1980), 10-19.

258 These 'side chains' of higher-level material were subsequently scrapped, as they failed to signal a more elevated intellectual status. They were also inaccessible to disabled users and posed a safety hazard. Content from these Enrichment Assemblies was subsequently (through evaluation) incorporated into the general displays. 'It is better to concentrate on communicating some basic ideas than to fail to get anything over at all, and we feel it is better to concentrate on succeeding at one level than to risk failure at two or more. Our efforts at multi-level treatment are the least successful aspect of 'Human Biology'; this remains the biggest unsolved problem of exhibition design. Supplementary booklets on Hormones, Movement and Living cells are our only success in this area, and these are small beer in comparison with the exhibition'. Miles, 'Lessons in Human Biology', 238-239.







(Fig. 34)
'Hormones', 'Chemical Control' and publicity material from The Hall of 'Human Biology', An Exhibition of Ourselves, 1977.
NHM LIBRARY AND ARCHIVES

But there was also widespread criticism of 'Human Biology', much of it centred around the huge budget spent on something which was considered to be 'an experiment'. Museum critics' responses were also perhaps tinged with jealousy that Miles had been given such a free hand to produce this new approach to exhibition design, coupled with the fear that they might be forced to produce similar exhibitions, restructure their own museums and lose their curatorial power base. Perhaps Miles' ideas were also seen as homage to fashionable 1970s liberalism, offending more conservative attitudes to the design and display of exhibits in national

museums. This certainly appears to be the case when reviews and letters from *Museums Journal* are taken into account.

Tony Duggan, a museum critic during the mid 1970s was critical of many of the technical imperfections and some difficult concepts in 'Human Biology'. He felt that its location in such an important architectural setting was money spent badly when it could have been used 'keeping up with the Museum's long tradition of academic excellence'. However, although he had reservations, he did see the exhibition as the physical realisation of what museologists had been talking about for the last ten years.

> From the professional point of view, the Hall is mandatory viewing for all curators. The role of the educationalist in museums has been one of the great debating points over the last ten years. This Hall, with so many unusual exhibits presented with the philosophy which differs radically from that of traditional curatorship, reveals something of what the educationalists have been trying to tell us (and sell us) for a long time.[259]

Alison Whyman of the Hunterian Museum, praised Miles for his visitor-centred approach and stated that 'Human Biology' 'represented the first time that a museum in Britain has designed an exhibition in a scientific manner, attempting to define the essential characteristics of its audience and aiming to fulfil a specific purpose, i.e. the communication of various biological ideas.'[260] Museum commentators praised Miles for his application of current research in psychology and education, the designer/scientist transformer partnerships, the visitor participation and the development of Museum technology which Miles had formulated by combining the many theoretical, inspirational and practical influences that went into NES, including the principles of Isotype. Some museum commentators, initially critical of 'Human Biology', had a change of heart after seeing the exhibition for themselves:

> I have followed the growth of the new exhibition policy at the British Museum (Natural History) with much interest, knowing it would have implications for our own programme of exhibit renewal. Initially, on reading the policy for the new exhibition scheme I was instinctively opposed to the whole policy, since the display was too conceptual, and not specimen based. After spending over one whole day in the Hall of 'Human Biology', however, and observing the way in which the public is fascinated by this new approach, I suffered conversion, and came away convinced that the new methodology of the scheme was of profound importance for all museums wishing to educate as well as entertain.[261]

Opinion was heavily divided. 'Human Biology' was a much-debated hot topic in *Museums*

259 Tony Duggan,' The Shapes of Things to Come' *Museums Journal*, 78: 1, (1978), 5-6. Early on in the development of NES, Miles had consulted Duggan of the Wellcome Museum of Medical Science for advice on how to progress the scheme.

260 Alison Whyman, Hunterian Museum, University of Glasgow, 'Letters to the Editor', *Museums Journal*, 79: 1 (1979), 36-37.

261 W.D. Ian Rolfe, Assistant Keeper in Geology, Hunterian Museum, University of Glasgow 'Letters to the Editor', *Museums Journal*, 78: 4 (1978), 194.

Journal during 1978. Museum commentators were critical of it on many levels; it was likened to a 'cheap disco' and a 'hideous portent of modernisation yet to come',[262] others berated the lack of actual exhibits in what was traditionally an exhibit-rich institution.[263] P.S. Doughty famously described the exhibition as 'a kind of lewd offal-shop nightmare' [that] 'escaped curatorial control and fell into the hands of pure, tasteless communicators'.[264] In contrast, A.M. Tynan, curator of the Hancock Museum in Newcastle, was more in favour of the scheme: 'Roger Miles puts the cats amongst the pigeons with his plastics, effigies and press-buttons and I must confess to a barely stifled grin at Philip Doughty's 'lewd offal shop'.[265] Richard Fifield criticised 'Human Biology' for inconsistencies in its use of terminology which hampered visitor comprehension and considered the exhibition 'tainted', likening the new display conduits to a fairground 'tunnel of love'.[266] Miles' defence lay in the fact that 'Human Biology' could only be regarded as an experiment to show the way forward. It was not perfect.

'Human Biology' and 'Introducing Ecology', (which swiftly followed in 1978) were also criticised by Frank Greenaway; he was concerned that a national museum was propagating what he considered to be 'elementary instruction' – dumbing down. 'We should all give some degree of assent to this until faced with a museum gallery which resembles a modern popular science text, all graphics and VDUs with museum objects incorporated, not as items in a traditional collection but just as illustrations to the product of a 'script-writer'.[267]

In July 1978 Miles gave a lecture on 'Human Biology' at the Museum Association's Annual Conference in Edinburgh, and 'very strong views'[268] were expressed in response to his visitor-centred approach. It was criticised for being wasteful of massive budgets and overly lavish in what had become a time of more stringent financial constraints. Delegates considered the experimentation healthy, but agreed that too much had been spent too soon, when a smaller pilot exhibition would have sufficed to introduce this new style of working.

262 Miles, 'Lessons in Human Biology', 227-240.

263 Miles' response to this was that 'Human Biology' was an experimental exhibition. Further exhibitions in NES (i.e. 'Introducing Ecology') did make extensive use of the collections within the Museum.

264 Philip S. Doughty, 'Britain Before Man – A Review', *Museums Journal*, 78: 3 (1978), 54-56. This exhibition was located in what was the Geological Museum (now part of the Natural History Museum), designed by James Gardner. Doughty (then of Ulster Museum, Belfast) was General Secretary of the Geological Curators' Group (circa 1979).

265 A.M. Tynan, Curator, Hancock Museum, 'Letters to the Editor', *Museums Journal*, 78: 4, (1978), 37.

266 Richard Fifield, 'Heritage Displaymanship' *New Scientist*, 3 February 1977, 293. Fifield was museum critic for *New Scientist*.

267 Frank Greenaway, 'National Museums' *Museums Journal*, 83:1 (1983), 7-12. Greenaway (born 1917) was Keeper of Science at the London Science Museum, and played a major role in the development of chemistry galleries there, during the 1960s and 70s, placing chemistry within a broad historic, social and scientific context, and raising its profile throughout the museum. He is a leading historian of science.

268 Michael Densley, 'Specialist Session: Report of the Group of Designers/Interpreters in Museums' (held at Museums Association Annual Conference Edinburgh, July 1978), *Museums Journal*, 78: 3 (1978), 131.

Some of the most scathing comments came from Patrick Boylan in 1979;[269] he criticised the display policy, the fact that Miles had not made early working papers more accessible, the philosophical approach on which NES was founded, the misuse of public funding and the misguided attitude to academic research. Boylan objected to the fact the NHM, as one of the foremost international institutes for research, was allowing its scientists to be taken away from their academic activities to partner designers constructing exhibitions, producing exhibitions outside their traditional areas of expertise. Boylan did not consider Miles' visitor-centred approach to be new. He also disagreed with the fact that the Museum was one of the first to be designed in a scientific manner or that the visual style was original. He considered 'Human Biology' to be self-consciously 'modern tasteful' in style – 'pure Middle Class Habitat' and that Miles was overly concerned with educational psychology and learning theories. Boylan remarked that the NHM was reinforcing 'fashionable, mildly liberal, educational and social theory and practice'.

Boylan's approach was based on the 'old style' of designing museums, which the NHM was trying to break away from in the creation of a new didactic approach to the design of educational exhibits. He was critical of scientists being taken away from core research to communicate science to the public (through the transformation partnerships) and was concerned about the diminishing of the ultimate power of the scientist in the museum environment. It cannot be denied that the Geological Museum's[270] spectacular permanent exhibition 'The Story of the Earth' (1972) had broken the mould in the UK for creating spectacular immersive scientific exhibitions and that the US Science Centres had paved the way for exhibitions which featured interactive devices in warehouse type environments. But Boylan was failing to understand the underlying philosophy of NES (Popper's trial and error approach to evaluation), educational technology used as a planning tool, and the adoption of transformation to communicate science to a diverse audience, which all worked together to controversially draw in huge audiences. However, it could be said that Boylan may also have been expressing the fears that many museums shared at that time – that they would be forced to adopt similar potentially expensive and radical techniques in their own institutions.

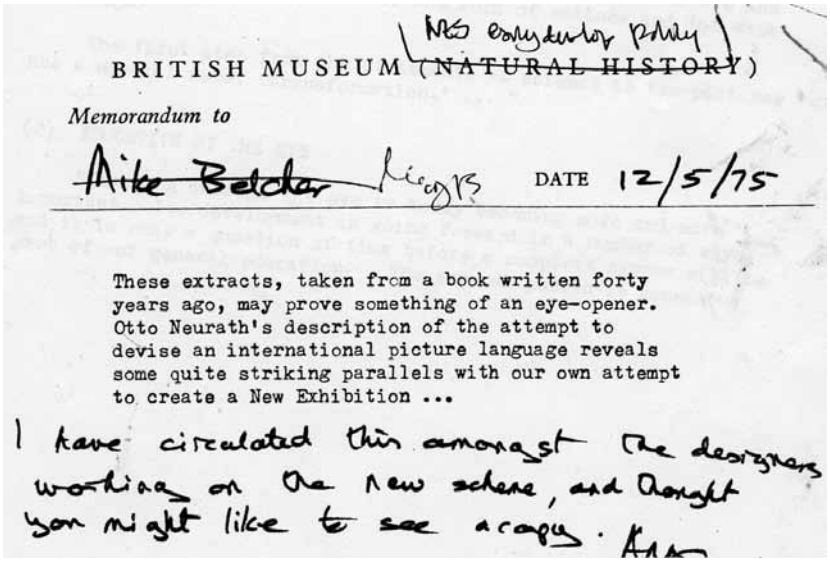
Evidence of the 'inspirational' influence of Isotype in NES

The influence of the principles of Isotype manifested themselves in many layers of the Museum's working practices, especially during the early phases of NES. This section substantiates this evidence. The memo from Anne Bedser (Editor) to Mike Belcher (Exhibitions) of 7 March 1975 illustrates the fact that DPS staff were drawing parallels between their work

[269] Patrick J. Boylan, 'The New Exhibition Policy and Programme at the British Museum (Natural History): A Contribution to a Debate, St Andrews, September 1979'. NHM Archive, NES Correspondence and History, 1968-1984. Boylan has written widely on museums since the 1970s, and is Professor Emeritus (retired) Heritage Policy and Management at City University, London.

[270] The Geological Museum was absorbed into the NHM in 1988 and became known as the Earth Galleries.

and the principles of Isotype **(Fig. 35)**. It is worth considering that the NHM was in a period of flux at this time, with the formation of DPS and the consequent restructuring required in the formation of a new museum department. It was a time of job instability for existing exhibition staff, as new staff were being recruited for (amongst other things) the transformation partnerships.[271]


NES exhibition policy
BRITISH MUSEUM (~~NATURAL HISTORY~~)
Memorandum to
~~Mike Belcher~~ Meggs DATE 12/5/75
These extracts, taken from a book written forty years ago, may prove something of an eye-opener. Otto Neurath's description of the attempt to devise an international picture language reveals some quite striking parallels with our own attempt to create a New Exhibition ...
I have circulated this amongst the designers working on the new scheme, and thought you might like to see a copy.

(Fig. 35)
Archival evidence of Isotype at the NHM. NES Early Development Policy, DPS 23.
NHM LIBRARY AND ARCHIVES

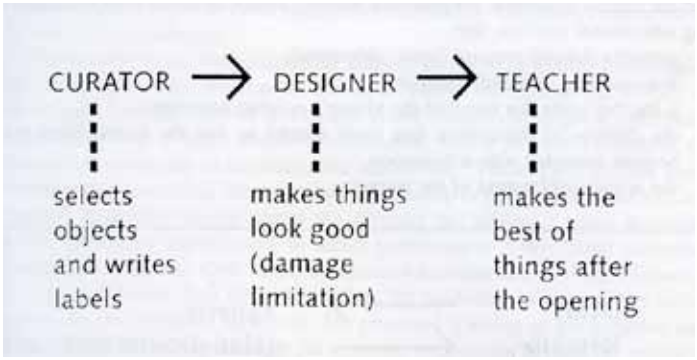
The designer/scientist transformer partnerships

It is clear, from the following diagrams which Miles presented in the 1993 paper 'Too Many cooks Boil the Wroth – Exhibits, Teams, Evaluation' that a model adapted from the one originated by Neurath at the G&W was used to develop NES. **(Figs. 36, 37 & 38)**

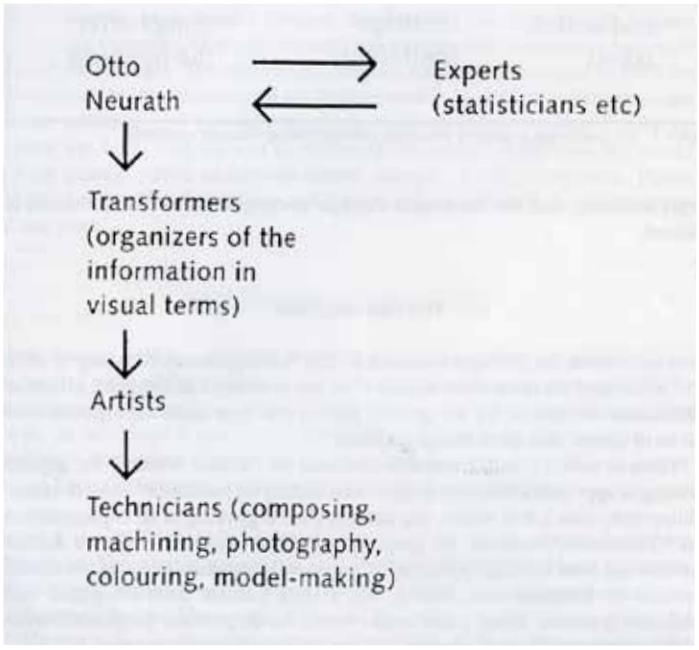
(Fig. 36) shows the traditional curator/designer approach used at the NHM before NES was introduced in 1975. The 'expert' or curator is ultimately responsible for the exhibit. Miles' definitions of the roles of curator: 'selects objects and writes labels'; designer: 'makes things look good' and teacher: 'makes the best of things after the opening' could be considered as being rather tongue-in-cheek, but are in line with common museum practice of the time. The introduction of Neurath's 1925 team model **(Fig. 37)** looks all the more radical when compared with this traditional approach to designing museum exhibits. Miles' 1975 team model **(Fig. 38)** physically links the exhibit researchers and exhibit designers to parallel the role of the transformers – the 'organisers of the information in visual terms'. Both team models have 'experts' at the top of the table, and both make use of transformers, MacDonald-Ross and Waller's 'skilled professional communicators',[272] to bridge the gap between subject expert and the general public, working in a 1:1 partnership. The subject expert is not solely responsible

[271] There are many advertisements for 'communication experts' jobs within the NHM archive – but the term transformer is never used in the job description – 'communication expert', 'educational technologist' and 'experimental psychologist' were used instead. The NHM had great difficulty in finding the right person to answer these job descriptions, and had many well-qualified applicants coming forward from a wide range of professional backgrounds. NHM Archive D/36/26/042, DF 100 7/882 Recruitment of Educational technologist NES.

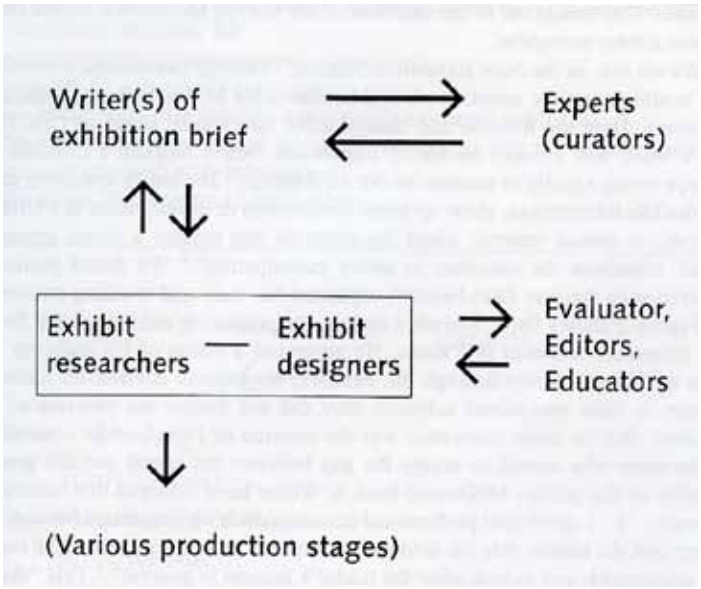
[272] Macdonald-Ross & Waller, 'The Transformer', 141-52.



(Fig. 36)
The traditional curator/designer approach at the NHM, pre 1975. Miles, 'Too Many Cooks Boil the Wroth – Exhibits, Teams, Evaluation' (1993).



(Fig. 37)
Neurath's model showing transformation at the G&W 1925-34. Miles, 'Too Many Cooks Boil the Wroth – Exhibits, Teams, Evaluation' (1993).

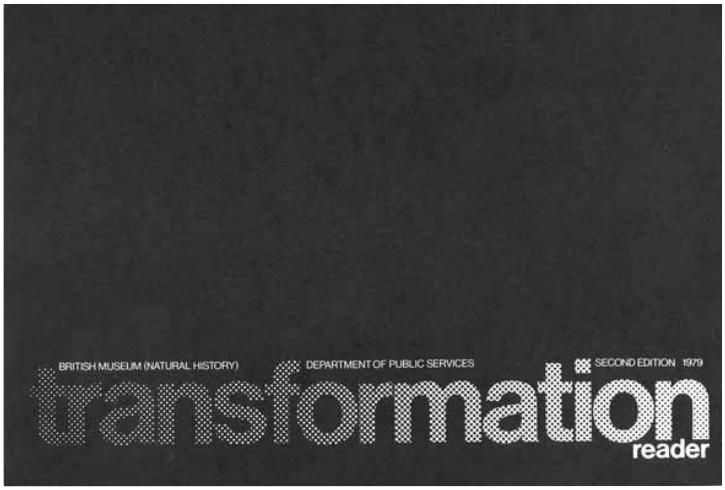


(Fig. 38)
Miles' adapted team model for NES, 1975-1991. Miles, 'Too Many Cooks Boil the Wroth – Exhibits, Teams, Evaluation' (1993).

for the exhibit. There are differences in the structure of both team models, mostly due to the fact that there are many more processes involved in Miles' model (evaluators, editors and educators), but it is obvious that they both rely heavily on the meeting of academic and designer minds in the transformation process.

Miles saw the introduction of transformers as being of prime importance within the Museum, and began to employ designers and scientists with the right academic backgrounds for the designer/scientist partnerships. The majority of the designers came from three-dimensional backgrounds, but not all; Richard Meakin was previously a medical illustrator and designer of statistical diagrams. Dierdre Janson-Smith (recruited in 1979 as part of the second wave of transformer partnerships) answered an advertisement for a 'content developer with a science background'. The title 'transformer' does not appear within job advertisements of the time, but appears frequently within documents found in the archives. Janson-Smith recollects that Miles had considered bringing in NHM curators who were more interested in communication than research, but was forced to look outside the Museum for the right staff with 'no museum agenda and open malleable minds'.[273]

The *Transformation Reader*[274]



(Fig. 39)
The *Transformation Reader* was given to new DPS recruits as part of their induction process.
KINDLY SUPPLIED BY MARK MAGIDSON

New recruits to DPS contracted circa 1975–80 attended an intensive two week-training session where they were introduced to the principles of Isotype through the *Transformation Reader,* **(Fig. 39)** a booklet consisting of a collection of papers and extracts which set out Miles' vision for NES and provided 'a framework from which communicative exhibits are created'.[275] The booklet forms a key piece of evidence which links the principles of Isotype with the NHM, and

[273] From a series of responses to questionnaires and telephone conversations with transformers from 1975–91, Dierdre Janson-Smith, Alan Ward, Susan Jones, David Gosling, Richard Meakin and Mark Magidson. See Appendix 1, p. 293.
[274] Various facsimile pages from the *Transformation Reader* can be found in Appendix 1, pp. 311-317.
[275] *Transformation Reader*, 1979, (Second Edition) (Introduction). A copy can be found in the Isotype Collection.

an academic insight into what Miles meant by the 'inspirational, theoretical and pragmatic' factors that formed NES and showcased his approach to the design of educational exhibits. In the introduction Miles defines transformation as 'that process by which relevant knowledge, usually of a specialist nature and known only to a minority, is made available to a wider audience by using forms capable of being comprehended by non-specialists.' The following section summarises the contents of the booklet.

The *Transformation Reader* (second edition) consisted of an A4, 28-page comb-bound document produced in-house and compiled by Miles and his assistant Rodney Eastwood. It featured a collection of writings on aspects of exhibition design, learning theory, educational technology, planning and communication by authors prominent in these areas.[276] It began with a short philosophical passage by C.H. Waddington from *Tools for Thought;* followed by Alma S. Wittlin the 'Hazards of Communication by Exhibits'; Marie Neurath 'Isotype' from *Instructional*

Science 3 and Michael Twyman from *Graphic Communication by Isotype*; Otto Neurath 'The First Rules of Isotype' from *International Picture Language*; Michael MacDonald-Ross and Rob Waller 'Criticism, Alternatives and Tests: A Conceptual Framework for Improving Typography'; Brian Magee of BBC Publications *Men of Ideas*; Derek Rowntree 'Objectives' from *Educational Technology in Curriculum Development*; Robert M. Gagné *The Conditions of Learning*; Brian Lewis 'Planning and Scheduling' from *Course Production at the Open University* and finally a short conclusion by Harris Shettel from 'An Evaluation of Existing Criteria for Judging the Quality of Science Exhibits'.

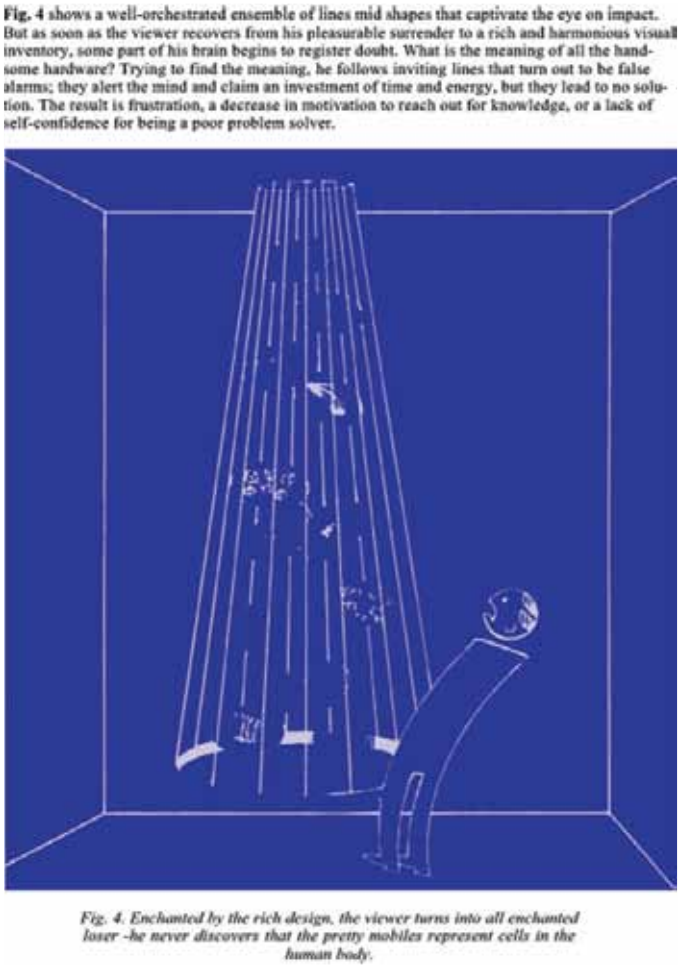
The booklet begins with 'Philosophy', an excerpt from C.H. Waddington's 'Tools for Thought' which reflects Miles' aspirations for NES; the acceptance of alternative ways of thinking and the discarding of traditional approaches to exhibit design – factors which Miles battled to implement during the development of NES. In Alma Wittlin's paper 'Hazards of Communication by Exhibits', factors leading to communication failure in exhibits are discussed.[277] Transformers from that time still quote 'The Enchanted Loser' **(Fig. 40)** as a guide for what to avoid[278] – exhibits which are so visually rich that the underlying educational concept is hidden. Wittlin also included 'Tools for many a purpose' as an example which emulated transformation, using Miles' wider definition of the term to include analogy. **(Fig. 41)**. Wittlin doesn't use the word transformation to describe the process involved, but was familiar with Neurath's work at the G&W.[279] She warns against intellectual overload and sensory monotony; and its antithesis, intellectual deficit and sensory overstimulation. She also warns against over designing exhibits

[276] The first edition of the *Transformation Reader* did not contain Otto Neurath's extract from *International Picture Language,* the foreword from *Men of Ideas* by Bryan Magee or the paper by Macdonald-Ross and Waller.

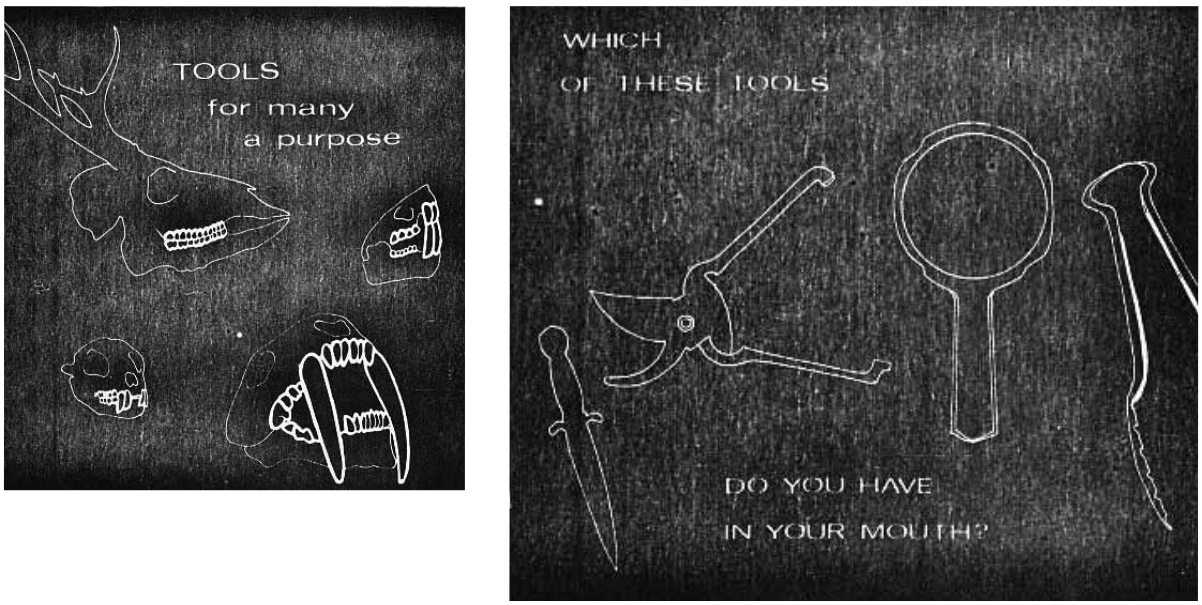
[277] *Transformation Reader*, pp. 4-9, Alma S. Wittlin', 'Hazards of Communication by Exhibits', *Curator*, 14 (1971), 138-150.

[278] Appendix 1, p. 294. Responses from NHM transformers Dierdre Janson-Smith and Alan Ward can be found in Appendix 1, pp. 293-298.

[279] Wittlin, *Museums In Search of a Usable Future*, p. 159.



(Fig. 40)
Alma S. Wittlin's 'The Enchanted Loser' from the *Transformation Reader.*
The model is still quoted by ex-NHM transformers nearly thirty years after the booklet was published.



(Fig. 41)
Alma S. Wittlin's 'Tools for Many a Purpose' demonstrating use of analogy from the *Transformation Reader.*

so that they appear like school text books,[280] relating how an excess of text and absence of three-dimensional objects can led to triviality and exhibits being 'submerged in design and visual noise'. Wittlin's extract also describes 'Cultural Hazards' which can led to a failure to communicate, and the importance of achieving the correct tone of voice, allowing the audience to comfortably add to their pre-existing knowledge with 'moderate' novelty. She considers that 'stark' novelty can confuse, unless comparison with a known factor is made, and information is clearly sequenced. Wittlin's ideas in general have much in common with educational technology; she believes that it is far easier to get a point across if it is stated simply and far better to use fewer examples rather than more – 'less is more', which also corresponds with the principles of Isotype.

Miles highlights the connection between Wittlin's pragmatic advice and education technology by reproducing a paragraph from Brian Lewis:

> The main teaching points must be fully explained. Misleading statements and irrelevant scholastic displays must be eliminated, there must be no mistakes, non-sequiters [sic], gaps or other defects in the argument. All written materials need in fact to be well structured and self-explanatory and pitched at the right level of difficulty. Even this may not be enough. Unfortunately, it is all too easy to be clear and accurate with respect to subjects that most visitors regard as being irrelevant and unimportant. Some effort must therefore be made to arouse in the visitor a sense of excitement and purpose. In the very act of imparting knowledge, the instructional materials must explain why the knowledge is worth having and how it fits into the broader scheme of things.

The *Transformation Reader* continued with an extract from 'Isotype' by M. Neurath from *Instructional Science*, in which she described transformation in very practical terms, emphasising its importance in the process of designing educational exhibits. It sat very comfortably next to the more contemporary writing of Wittlin and Lewis:

> The rules … are the concern of that step in the total process of production which we called "transformation". From the data which are given in words and figures a way has to be found to extract the essential facts and put them into picture form. It is the responsibility of the "transformer" to understand the data, to get all necessary information from the expert, to decide what is worth transmitting to the public, how to make it understandable, how to link it with general knowledge or with information already given in other charts. In this sense, the transformer is the trustee of the public. He has to remember the rules and keep to them, adding new variations where advisable, at the same time avoiding unnecessary deviations that would only confuse. He has to produce a rough of the chart in which many details have been decided: title, arrangement, type, number and colour of symbols, captions etc. It is a blueprint

[280] David Gosling states that before NES, many exhibits in the NHM resembled school text books, Gosling, D., 'Man's Place in Evolution: A New Exhibition at the British Museum (Natural History)' *Museums Journal*, 80: 2 (1980), 66-69.

> from which the artist works. The aim is to present some worthwhile information, show up some relationship or development in a striking manner, to arouse interest, direct the attention and present a visual argument which stimulates the onlooker to active participation.[281]

M. Neurath discussed the flexibility of the principles of Isotype and shows visual examples where the rules can be broken: 'A rule should not be broken unless there is a good reason for it, and of course, often there is a good reason'. In this extract, she presents three alternative statistical charts showing 'Men getting married in Germany' (from *International Picture Language*) highlighting the clarity of the Isotype approach to graphic argument. In this article, Michael Twyman also discusses the significance of Isotype, focusing on the consistency of the principles, and how this can help the audience understand meaning and familiarise themselves with the structure of the message. Twyman also highlighted the flexibility of Isotype using M. Neurath's work in Western Nigeria to demonstrate the fact that the system was strong enough to withstand adaptation and still retain its robustness.[282]

'The First Rules of Isotype' comprised a series of extracts taken from *International Picture Language* (1936) – by far the oldest extract featuring in the *Transformation Reader.* It briefly described the general aim of Neurath's book, with sections entitled 'Education by the Eye', 'The Chief Points of the Isotype System' and 'Grouping Pictures with Other Things'. The piece also discussed Neurath's theoretical natural history museum with its interrelationship of themes, lack of reliance on uniqueness and the importance of a pedagogic approach. Again Neurath's words sit comfortably with the more contemporary writing, and his vision for a natural history museum still appeared radical when compared to the NHM before NES:

> Even from the outside the ISOTYPE museums will be different from the museums of yesterday. They will be nothing but a simple cover for a simple teaching-material. Not only has the order of rooms to be in harmony with the order of things on view, but it has to be readily changed on the addition of new groups of things; for this reason it is important to make adjustments of the building possible, having floors, and walls which may be moved, space for new rooms, etc. The designing of an ISOTYPE museum will be special work needing a house designer and an ISOTYPE expert.[283]

Extracts from *International Picture Language* provided clear guidelines illustrating how to design Isotype statistical diagrams with horizontal arrangements of same-sized units, but also showed exceptions to the rule.[284]

The *Transformation Reader* continued with a paper from *Programmed Learning* 12 (1975) by Macdonald-Ross and Waller: 'Criticism, Alternatives and Tests: a Conceptual Framework for

281 Marie Neurath, 'Isotype' *Instructional Science*, 3 (1974), 136. IC 8.1a, and *Transformation Reader,* p. 13.
282 The Isotype integrated picture-text principle is discussed in Part one and in the following case study.
283 *Transformation Reader* p. A3 and *International Picture Language,* p. 70.
284 Various facsimile pages from the *Transformation Reader* can be found in Appendix 1, pp. 311-317.

Improving Typography' which urged new DPS recruits to consider a conceptual framework which would 'unite typographers and researchers for mutual advantage'. The paper suggested that in 1975 no available research existed on the process of designing scientific literature where text and diagrams interact. The paper discussed Macdonald-Ross and Waller's experimental work in the Textual Communication Research Unit at the OU which emphasised the constant need for formulating alternative solutions and testing. They put forward a three-tier model 'to act as a conceptual framework' for designers and typographers working on instructional materials, illustrating their research through pages from OU course literature showing how subtle differences in the design of the grid could radically affect the reader's comprehension.[285]

In a footnote printed with the preface of Brian Magee's book 'Men of Ideas'[286] (1979) Miles stated that the foreword was included to warn exhibition designers against using gimmickry and clever display techniques for their own sake and to appreciate the fact that sometimes simple methods could be more effective. Bryan Magee was known for making philosophy accessible to the layman. In this article he emphasises the importance of the designer understanding the subject matter before trying to communicate with the public. From the perspective of a TV producer, Magee described how visual aids and sensational devices could cloud the clarity of the message. Writing in 1979, he suggested that TV was treading a fine line between over-sensationalising events and presenting them in the form of 'visual radio' with 'talking heads'. Magee was concerned that as TV was regarded as a media for 'entertainment', the portrayal of serious issues could drive viewers away.[287]

285 Evaluation was taken seriously at the NHM, as has been discussed in earlier sections, but there is no specific evidence to suggest that the type of testing put forward by Macdonald-Ross and Waller (implemented at the OU) was taken forward in NES.

286 Bryan Magee was a friend (and biographer) of Karl Popper, a Labour (and later Social Democrat) MP, writer and broadcaster. He is best known for making philosophy accessible to the layman through radio and TV broadcasts. In 1978 he presented a series for BBC Television of dialogues with fifteen noted philosophers 'Men of Ideas'.

287 Both Bruce Robertson and Michael Macdonald-Ross comment on why Isotype has not been used to any great extent on television. Robertson stated that he would have enjoyed the prospect of Isotype being used to show contemporary comparative facts (such as comparing audiences for rock concerts), see Appendix 2, p. 331. Macdonald-Ross considered that Isotype was unsuitable for subjects which were orientated towards females, see Appendix 1, p. 280. However, the concept of a skilled professional communicator (or transformer) working in television is seen through personalities such as David Attenborough and John Snow and the many young academics who currently present programmes on the arts and sciences. During the 1920s and 1930s, Neurath always considered that the museum formed the best way to formulate arguments and promote debate rather than time-based media. However, the Isotype Institute did work on diagrammatic inserts for films by Paul Rotha during the 1940s and made many educational film strips.

Educational technology at the OU was covered by Derek Rowntree's 'Objectives' from *Educational Technology in Curriculum Development.*[288] This extract discussed the importance of the accurate identification of aims and objectives and the use of the correct terminology to provide a succinct guide for content developers on brief writing and the identification of learning objectives. It described the benefits of 'spelling out one's educational intent in the form of behavioural objectives' through communication, content and structure, teaching and learning methods, evaluation and assessment.

The extract from Robert M. Gagné *The Conditions of Learning* provided an introduction to Gagné's ideas on how our learning is largely dependent on events in our environment and how human beings interact with it. Early phases of NES consisted of the creation of self-contained new exhibition environments, so it was of great importance for transformers to understand the conditions required for learning to take place. The extract discussed what was meant by prerequisite knowledge, how to plan learning structures and how to order the composite elements. This can all be seen in the development of 'Human Biology' through the separate modules which form each section, and comprise the exhibition as a whole. Miles also added a section from the Royal Ontario Museum Manual to the end of this extract which was probably brought to his attention on his fact finding trip to Canada and Australia in 1976).

Brian Lewis' 1971 extract 'Planning and Scheduling' is taken from 'Course Production at the Open University'.[289] Lewis, (a professor in the Institute of Educational Technology at the OU) was instrumental in providing the main educational technology element for NES, and wrote several papers on the role of educational technology in the formulation of exhibitions at the NHM. This article described how academics achieved the continuity needed to get a 'production line of units' going at the OU.[290] Lewis discussed the planning and organisational issues involved in the design of course units, along with the importance of team work and time management in the production system.

The booklet ends with a quotation from Harris Shettel, which summed up Miles' ideas:

> It is probably true that prescriptions for effective exhibit design will never be reduced to a set of specifications that can be looked up in a handbook. It is equally true, though, that until those responsible for the preparation of scientific and technical exhibits become more analytic and more concerned with objectives and evaluation, little real advance in the field will be made. No sensible person would want to take the art out of exhibit design; no sensible person should resist injecting more systematic knowledge into exhibit design. Ad hoc solutions to those problems are not only a bad risk, they are

[288] Derek Rowntree *Educational Technology in Curriculum Development, (*Harper and Row: UK, 1974), pp. 19-58. Rowntree (Professor of Educational Development at the OU) has authored many books on distance learning, assessment, developing courses and curriculum and educational technology.

[289] 'Planning and Scheduling' is taken from 'Course Production at the Open University' I, II and III, *British Journal of Educational Technology* 2, 1971, 4-13, 111-112 & 189-204.

[290] Macdonald-Ross discussed this issue in his edited transcript see Appendix 1, p. 278.

becoming increasingly more expensive.[291]

Miles' choice of extracts reflects his reasoned approach to the design of educational exhibits (as does the 1979 book *The Design of Educational Exhibits*). It echoes and blends his descriptions of the theoretical, inspirational and pragmatic influences which went to make up NES. The amount of extracts which derive from the OU suggests how closely Miles was considering their ideas on distance learning and Educational technology to find a way forward for NES. The practical advice offered by Wittlin, highlighted by 'The Enchanted loser' model was much quoted by transformers of the time. Writing by the Neuraths gives the booklet an historical context, which sits comfortably next to more contemporary writing by Wittlin and Lewis. Authors of the papers and extracts are familiar names in Miles' descriptions of how NES was formed, and feature in many papers referenced throughout this case study. Miles was not unlike Neurath in the way he took ideas and assembled them to form his own model. In Miles' case the model was Museum technology – a set of ideas taken from many interrelated disciplines assembled into a flexible framework allowing for both creativity and pragmatism.

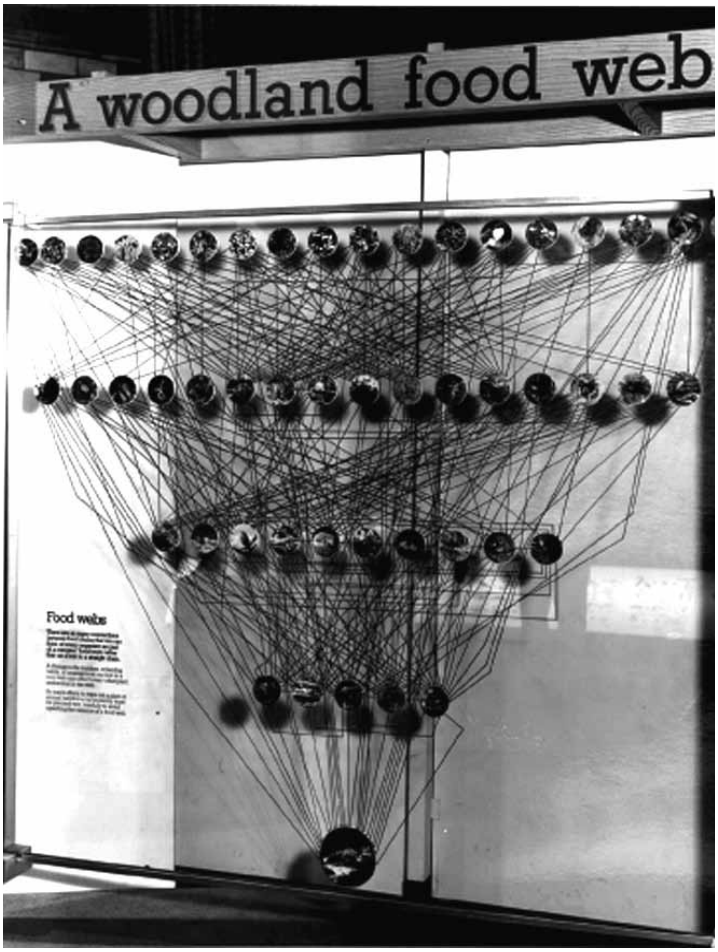
Evidence of the principles of graphic language and graphic argument in NES

Interviews with NHM transformers from the 1970s and 1980s reinforce the fact that the use of Isotype principles was at least considered as a starting point (if the subject matter was thought appropriate) but transformers found it difficult to relate Neurath's principles to themes of a non statistical nature. Richard Meakin, (a designer transformer) recalls that only certain types of comparative information proved suitable for the strict application of Isotype graphic language, but that the principles of clarity, simplicity and elimination of unnecessary detail were kept in mind. However some visual evidence exists to suggest that on occasions the principles were taken forward with innovative results. This section will evidence some of these examples.

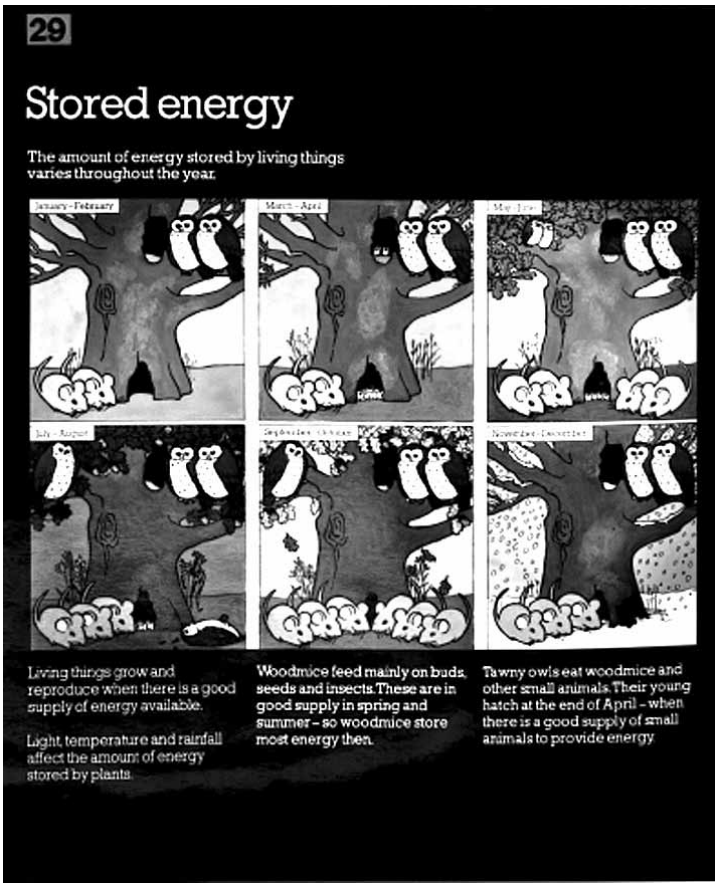


(Fig. 42)
An explicit use of Isotype inspired graphic language and graphic argument. 'Discovering Mammals' Phases 9 & 10 (1986).
PHOTOGRAPH COURTESY ALAN WARD

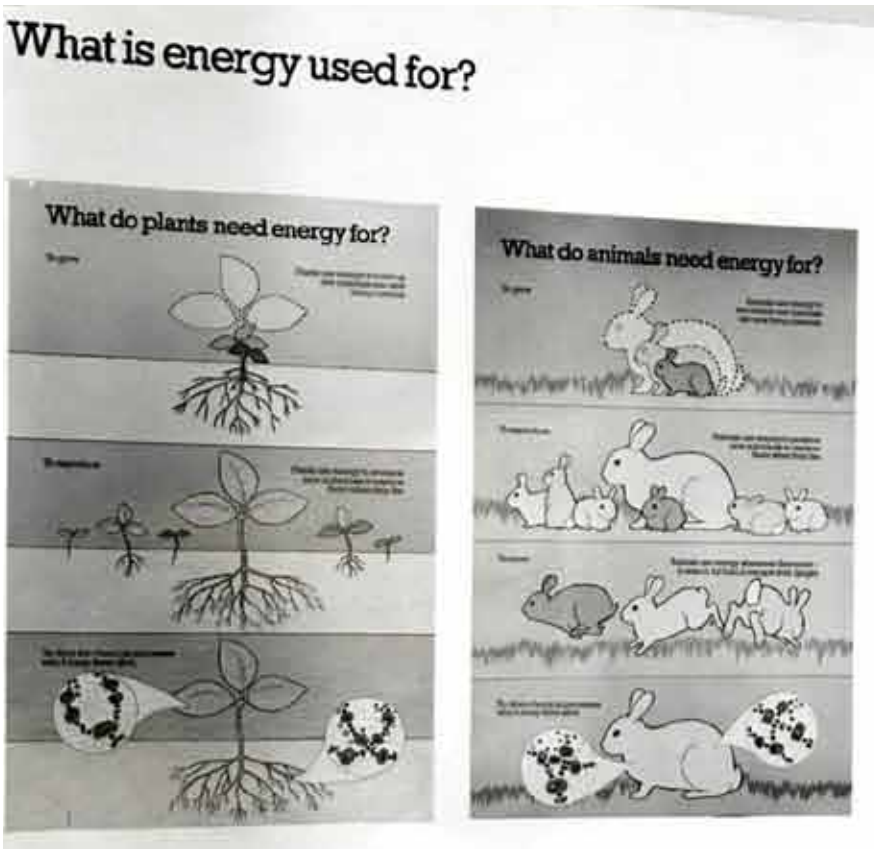
[291] Harris H. Shettel, 'An Evaluation of Existing Criteria for Judging the Quality of Science Exhibits', *Curator* XI (1968), 137-153.



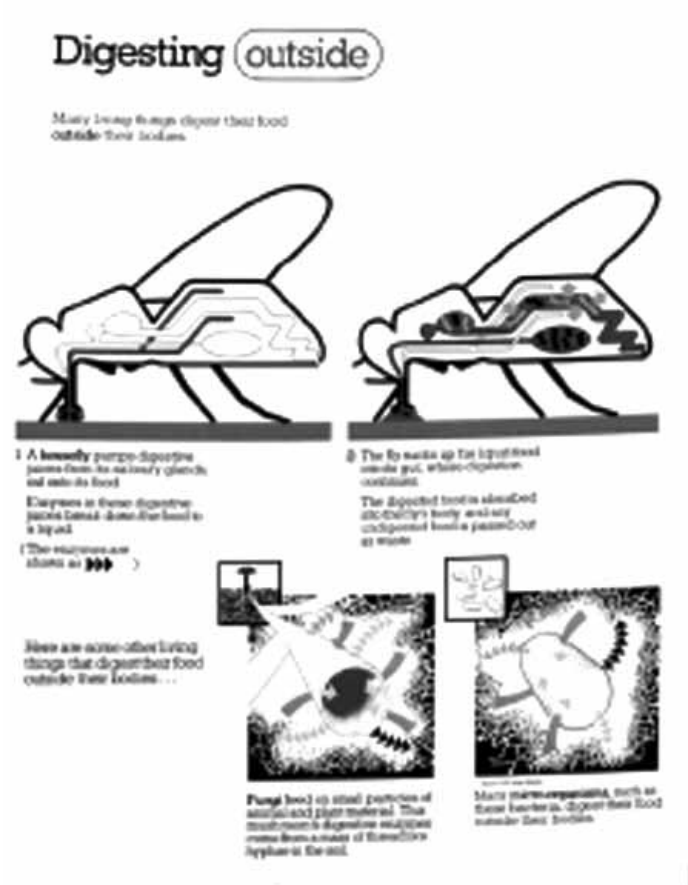
(Fig. 43)
'A Woodland Food Web' 'Introducing Ecology' Phase 2 (1978) utilises graphic symbols, arranged from the base up.
NHM LIBRARY AND ARCHIVES



(Fig. 44)
'Stored Energy', 'Introducing Ecology' Phase 2 (1978) describes how the amount of energy stored by living things varies throughout the year. NHM LIBRARY AND ARCHIVES



(Fig. 45)
The graphic look of 'What is Energy Used for?' from Phase 2 'Introducing Ecology' (1978) can be compared to charts from the G&W (Fig. 48).
NHM LIBRARY AND ARCHIVES



(Fig. 46
The graphic look of 'Digesting Outside' Phase 2 'Introducing Ecology' (1978) can be compared to Isotype children's books from the 1950s and 1960s (Fig. 47).
NHM LIBRARY AND ARCHIVES



(Fig. 47)
Marie Neurath *The Wonder World of Insects*, (Canticleer: New York, 1953)



(Fig. 48)
Museum display from the G&W (1925–34). ISOTYPE COLLECTION

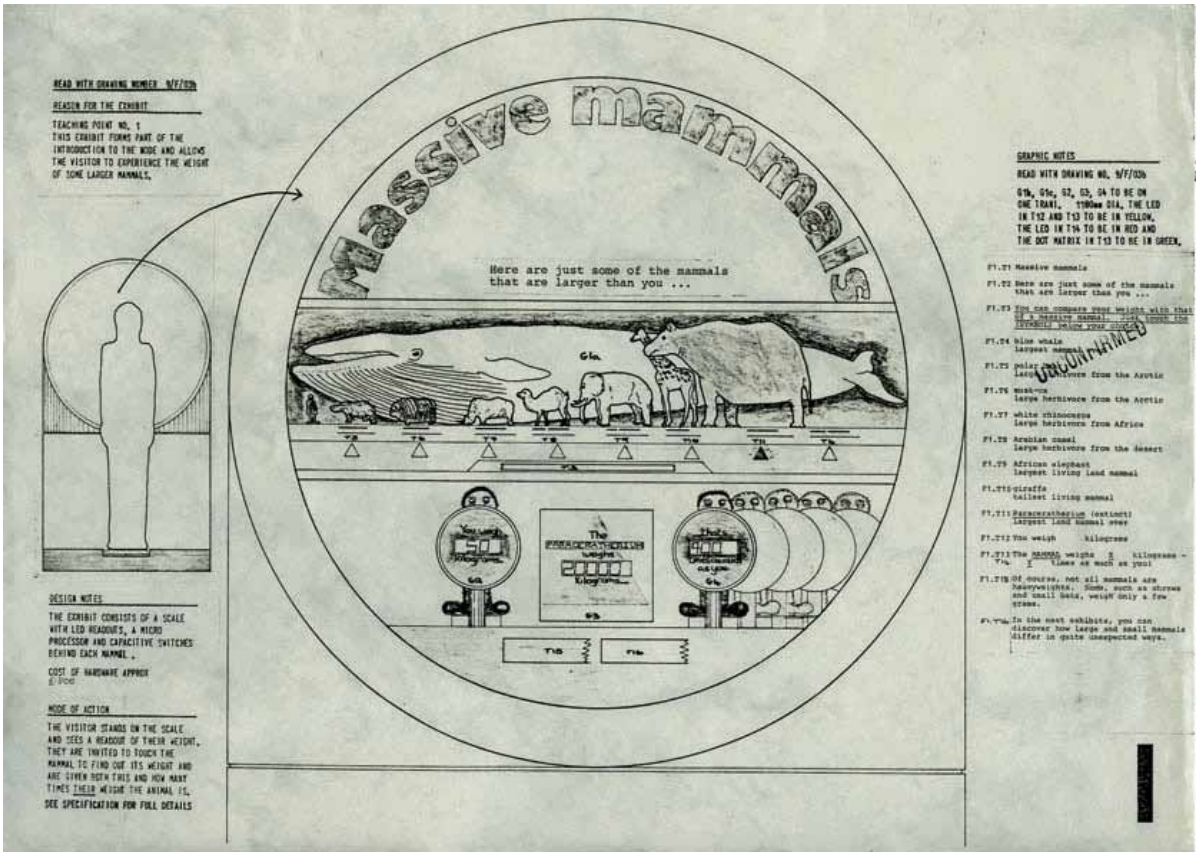
A straightforward example of Isotype inspired graphic argument and graphic language can be seen in 'Discovering Mammals' (NES Phases 9 & 10, 1986) **(Fig. 42)**. It conformed to the standard horizontal arrangement of same sized repeated units to show comparative information. Earlier on, in 'Introducing Ecology', the second Phase of NES (1978), there was a less obvious example in the exhibit 'A Woodland Food Web' **(Fig. 43)**, which utilised graphic symbols, this time arranged from the base up, a more logical way to present this information. Other examples of adapted graphic language can also be seen in 'Introducing Ecology'; 'Stored Energy' **(Fig. 44)** which featured an exhibit designed for young children describing how the amount of energy stored by living things varied throughout the year. This exhibit could have been configured in the form of an Isotype chart with dates running vertically, and symbols of mice and owls running horizontally to show the correlation of predators and their food, with weather depicted by *Führungsbild* running alongside or above the lines of symbols. Instead the designers used a more cartoonlike approach, more suited to 1970's children.

Further examples of Isotype inspired graphic language found in 'Introducing Ecology', whilst not strictly adhering to Isotype principles (as illustrated in the *Transformation Reader*), do share visual similarities with the charts designed for the G&W from 1925–34, and more specifically



(Fig. 49)
'Massive Mammals' showing an innovative use of technology in the transformation process.
PHOTOGRAPH COURTESY MARK MAGIDSON

(Fig. 50)
below Massive Mammals' showing an innovative use of technology in the transformation process.
BLUEPRINT COURTESY MARK MAGIDSON



M. Neurath's children's books from the late 1940s to the late 1960s, where the same clarity, lack of extraneous detail and simplicity of form can be seen. **(Figs. 45, 46, 47 & 48)** By far the most innovative example of transformation using new technology can be seen in 'Massive Mammals' from 'Discovering Mammals' Phases 8 & 9 (1986) **(Figs. 49 & 50)**. The visitor was asked to select mammal, and stand on a scale to be weighed. A computer then calculated exactly how many units of the visitor it would take to make up the weight of the chosen mammal. Instead of seeing a row of horizontal symbols, the visitor could compare how many units of themselves it took to make up the weight of a blue whale, an elephant or a camel.

Evidence from the transformation partnerships

From evidence gleaned from interviews with transformers (Richard Meakin, Dierdre Janson-Smith, Susan Jones, Mark Magidson and Alan Ward), combined with examples of exhibit design found within the NHM Library and Archives, it is apparent that the transformation partnerships were broadly encouraged to use some of the methodological principles of Isotype as a starting point. The use of repeated units to indicate magnitude can be seen, but as a whole, evidence of the principles is mostly based around ordered information to allow its significance to become visually evident and in the use of comparison (extending to analogy). In general, the graphic language and the mode of graphic argument used by NHM transformers does not comply with the principles of Isotype and the main use of the principles can be seen in the adoption of the transformation process and the team structure in NES.

The following quotations clearly show the effect that transformation had on the designer/scientist transformer partnerships. The term 'transformer' is used freely, but the word Isotype does not feature heavily. 'The Enchanted Loser' is still quoted by ex-Museum transformers over thirty years since the *Transformation Reader* was published.

> So our key thought […] was in transformation. We are going to have to give equal weight to the science and the design, and that the transformation should be carried out by a partnership of equals, one a scientist and one a three-dimensional designer […] 'Transformation' was much more the buzzword and philosophy for me. I found it very exciting, to be asked to think hard how to 'transform' information into something that a non-scientist could understand. The approach was, I can now see, extremely didactic – what we were taught was grounded firmly in learning theory, and the aim was very much to get across what you needed to get across […] With a lot of feedback from our in-house educational technology/visitor survey team, we were taught that we needed to develop exhibits that attracted and held visitors for long enough for them to absorb what we wanted them to learn. Transformation was about hooking and holding them, starting where they were. Our concept of engaging with the visitor was a lot less sophisticated – we were in a way being taught long-distance learning techniques (and there was an OU link, I think) […] We were introduced to 'The Enchanted Loser' – one of the images in the book (*Transformation Reader*) that I remember very well – the basic message being that less is more, that crowded displays with loads of objects and labels actively hindered communication. I am sure this must be a key influence of Isotype.[292]

> For my part the unique flavour of the NHM interpretation schemes in the 70s and 80s, could be summed up [...] The design partnerships (Designer and Exhibition Scientist – NOT the curator – this in itself was unique at the time), were striving to convey

[292] Responses to a questionnaire from Dierdre Janson-Smith, (scientist), transformer partnership. Ex-NHM transformers were asked questions on the relevancy of Isotype and the transformer to their work at the Museum. Responses from Dierdre Janson-Smith, Alan Ward and David Gosling can be found in Appendix 1, pp. 293-300.

> scientific information in as clean and as direct a way as all that a good Isotype chart should do and avoid the fripperies of what was encapsulated in the type of exhibit that could be called 'The Enchanted Loser'.[293]

This section has presented sound evidence of the implementation of transformation along with other examples of the implementation of methodological and graphic and operational principles of Isotype at the NHM from 1975 onwards. The principles have been seen in team structures, the training manual, documentation from the Museum Archives, through commentary from NES transformers and to a lesser, but nevertheless still noteworthy extent, in actual exhibits.

How faithfully did the NHM adopt Neurath's original principles?

This section will review evidence of the principles of Isotype at the NHM, and any adaptations to Neurath's original system. It will also look for similarities between NES and the G&W. Primarily, it should be remembered that Miles, like Neurath, could not have implemented such a radical departure from traditional methods of exhibit design without the extensive funding, infrastructure and staffing that a national museum could offer. It must also be noted how different the two museums were in terms of scale; the G&W comprised 500 square metres of exhibition space, and the NHM during the mid 1970s comprised 14,000 square metres of exhibition space, with 'Human Biology' originally taking up 1,100 square metres of this total area. The difference in the management structures required to implement the schemes must also be considered.

The designer/scientist transformer partnerships form the most obvious evidence of the application of the methodological principles of Isotype in NES, which Miles re-interpreted for 1970's audiences using new technology and a wider team structure. Miles' wider interpretation of transformation related to the use of analogy, which evidences how he adapted the principles of Isotype to include principles found in educational technology. The second most obvious principle borrowed from Isotype lies in the fact that subject matter was viewed from an audience perspective, rather than the subject expert's perspective,[294] and fidelity to material and viewer was respected above all; thus allowing the NHM to fulfil it's founding mandate to be 'for the general use and benefit of the public'.

In terms of compliance with the philosophical principles of Isotype, NES was designed to be socially inclusive (it was displayed in English, and set at the level that a fifteen-year-old could understand); it was apolitical, educational and non-commercial. The primary purpose of NES was not about the dissemination of social knowledge, but it did recognise the fact that

[293] Mark Magidson, (designer), transformer partnership.
[294] Alan Ward (designer), transformer partnership verifies this fact, see Appendix 1, p. 298.

education should be enjoyable and take place in a convivial setting. NES was designed as a series of visual arguments laid out clearly in words and pictures, building in complexity as the audience moved through the gallery. Empirical experiences formed through participating in interactive tasks, considering questions posed and facts presented, led the audience to a more informed position.[295] This situation can be compared favourably with the G&W where Neurath translated facts into visual strategies by building up concise visual linear statements composed of simplified pictorial units, that in combination depicted a statistically verifiable story. NES was also by its very nature 'education by the eye'. Neurath considered that the use of Isotype principles could change teaching methods; by introducing students to general concepts through clear pictures (without excess detail) curiosity could be generated and the audience motivated to find out more for themselves. NES was designed with these principles in mind. There is evidence of the graphic and operational principles of Isotype in some of the phases of NES (as in the innovative 'Massive Mammals') but in general, the use of graphic language and method of graphic argument found in Isotype was seen by NHM transformers as rigid and unsuitable for anything but statistical information. Miles also states that he was not keen to use the graphic and operational principles of Isotype within NES.[296]

The flexibility of the principles of Isotype as seen in the hands of others

To support this wider discussion on how the NHM applied the principles of Isotype to NES, this section will draw from writing by Robin Kinross and M. Neurath on transformation. In the early 1980s, Kinross worked with M. Neurath on an essay to revisit the role of the transformer.[297] Kinross described transformation as being the 'chief legacy of Isotype for designers and all those concerned with graphic presentation of information', and that in his opinion both the NHM and the Amsterdam Historisch Museum[298] had a real understanding of the historic principles behind Isotype and were able to produce new bodies of work applying the principles in new surroundings, under very different circumstances.

The essay 'The Transformer' was written in 1986 whilst NES was in full progress. M. Neurath considered that Isotype was a flexible system in the right hands and could be adapted to solve whatever communication problem was required of it. She stated that Neurath had wanted to keep tight control of the principles, to retain the integrity and strength of the system in view

295 Visitor testing revealed that 'Human Biology' audiences retained many more facts than audiences of other more traditional object based exhibitions at the NHM. See Mick B. Alt, 'Four Years of Visitor Surveys at the British Museum (Natural History) 1976-79', *Museums Journal*, 80: 1 (1980), 10-19.

296 See Miles' edited transcript in Appendix 1, p. 273.

297 *Isotype: The Work of the Transformer, Translated and with Interventions by Marie Neurath* IC. 7.1b General Correspondence 1976-87. See also M. Neurath & Kinross, *The Transformer*, which incorporates some of this original script.

298 Kinross, 'On the Influence of Isotype', *Information Design Journal*, 2: 2, 128. On Inspection, there is some evidence of the use of pictograms in the Amsterdams Historisch Museum today, and a very robust use of interpretation, but there is no direct evidence to support the fact that this is directly derived from a knowledge of the principles of Isotype.

of the many organisations during the 1930s and 1940s[299] who were misguidedly plundering Isotype without any real understanding of the underlying principles. But Neurath too, understood the need for flexibility.

> Even if certain rules can be established, beyond this there still remains an area of freedom in the way in which the rules are applied. It is here that educational art is tested – and the capability of the artist.[300]

The graphic and operational realisation of the work of the transformer partnerships at the NHM fitted into this far less rigid approach. Audiences and tastes change, but as Kinross suggests, if the principles are understood historically, and not rendered ineffective by plagiarism they can effectively be taken forward to construct a new system. It is clear that the NHM did understand and utilise the methodological principles of Isotype, but found the graphic and operational principles restrictive and for the most part unsuitable for either the subject matter or the aspirations of a more sophisticated 1970's 'TV age' audience.

In 'On the Influence of Isotype'[301] Kinross talks about the larger informing principles of Isotype. He states that he has no intention of devising a set of rules by which given material can automatically be translated into visual form: 'ISOTYPE does not give rules for translating automatically words or figures into pictures. It is not sufficient to make boring sequences of symbols instead of boring sequences of figures'. It is preferable that the material is open to questioning, true to the underlying information and makes a succinct visual statement. Isotype was designed as an evolving system that needed to be carefully managed, and, as Macdonald-Ross and Waller suggested, depends considerably on tacit skills.[302] In 1981 Kinross suggested the principle of development be included as a principle of Isotype, to maintain its continued effectiveness as a system in new environments and help perpetuate its legacy:

> The principles of Isotype should also include the principle of development: the need to adapt its system (however slightly) to every new task. This should be borne in mind by anyone seeking to apply the principles of Isotype now in contemporary practice.[303]

The principles were adapted through times of political upheaval, forced moves and staff changes. Isotype had to be flexible to accommodate such a variety of factors and ultimately survive for the NHM and the OU to consider adopting elements of it. Kinross concludes that the principles cannot be ultimately defined, and they need to be adapted to whatever problems need to be solved. The rules must be flexible if they are to be used by other parties:

> But however much may be found out about this work, the principles of transformation still cannot be stated with any absolute finality. This is not simply due to the difficulty

299 The Pictorial Charts Service of London and Leicester, and Research Services, London, amongst others, IC 10.2 **(Fig. 96)**.
300 Otto Neurath from his unpublished memoirs circa 1945, IC 3.2/88.
301 Robin Kinross, 'On the Influence of Isotype', *Information Design Journal*, 2: 2 (1981), 122-30.
302 Macdonald-Ross & Waller, 'The Transformer Revisited', p. 181.
303 Kinross, 'On the Influence of Isotype'.

> that a historian (or outsider) may have in understanding and explaining. The deeper reason is that it is in the nature of this, as of all design work, that however articulate the design and however clearly reasons and motives for past work can be stated by the designer when any new design task is started, then all the hard-won principles and elements of method are again called into question.[304]

The legacy of Isotype at the NHM

Janson-Smith considers that through the process of transformation, the designer was able to take an equal part in the communication process rather than being an accessory to it and the most important aspect of the legacy of Isotype was to give the designer a critical role in the design of educational exhibits.[305] As the scientist in a transformer partnership (she used the term 'content developer' to describe her role), Janson-Smith had to first explain the scientific content to her designer partner so they could understand it and find a way to coherently explain it to the audience. Alan Ward, a designer in a transformation partnership considered that Isotype brought an 'information-based' approach to the design of educational exhibits, addressing the interpretation of subject matter, and turning it into a form that was accessible to the museum visitor. He also stated that the introduction of the transformer partnerships brought designers and scientists into a close working relationship, and required them to view the information from a lay-persons perspective, rather than from the perspective of the expert (or taxonomist). The adoption of the methodological principles of Isotype helped take ultimate control away from the curator, through the transformation partnerships. Knowledge became visitor-orientated and not subject-orientated. The Museum lost its 'window dressers' and gained professional communicators.

In his article in *Museums Journal* on the design of NES Phase 6, 'Man's Place in Evolution', David Gosling illustrated the practical effect of the principles on the NHM. He considered that the integration of biologists and designers (the transformer partnerships) into a full-time exhibition development team was the first step in rectifying gaps in visitors' knowledge. The combination of the two disciplines of design and science engendered a mutual respect amongst the partners, and they in turn provided a change in emphasis from the needs of the teacher to those of the learner.

[304] Robin Kinross, translated and with interventions by Marie Neurath, Isotype: 'The Work of the Transformer' IC 7.1b.

[305] Dierdre Janson-Smith and Alan Ward's responses to questionnaires can be found in Appendix 1, pp. 293-298. Their work as NHM transformers is also discussed earlier in this chapter.

Conclusion

Miles remained as head of DPS from 1975 to 1991, during which time ten permanent exhibitions (or phases) were produced. NES became the 'Exhibition Scheme' and the visual appearance of the exhibitions became more traditional, as artefacts and specimens were integrated into the original experimental specimen-light concepts. The designer/scientist transformation partnerships continued to form the backbone of DPS, and Miles' notion of Museum technology became more firmly established within the NHM and was widely discussed in papers, conferences and journals. The book *The Design of Educational Exhibits* written by Miles in collaboration with Alt, Gosling, Lewis, and Tout was published in 1982, offering practical guidelines on how to set about designing educational exhibits based on pragmatic ideas developed during the formulation of the early phases of NES.

By 1981 the once enthusiastic transformer partnerships appeared to have run out of steam. Fuelled by controversy, stringent budgetary constraints and internal power struggles they were not seen to be producing the innovative exhibitions characterised by the early phases of NES. The scientists had always been wary of their loss of power within the Museum, never fully appreciating the distraction of being taken away from their research.[306] DPS needed revitalisation, but in a Civil Service work environment it was difficult economically to inject fresh talent. Miles was forced to admit that the relative security found in a government post was not conducive to sustaining creativity over long periods of time.[307]

In 1989, the new Conservative government under Margaret Thatcher brought in museum admission charges. The NHM had to concentrate on marketing itself to find sponsorship from major corporations rather than relying on public funding. Funds were diverted away from exhibitions and staff re-structuring took place with a raft of redundancies, including the majority of the transformation partnerships that had previously formed the backbone to NES.

306 Patrick Boylan articulated the position of the NHM scientists very aptly in his 1979 critique of NES. He stated that before NES the NHM public galleries had been 'regarded as a closely integrated adjunct of the curatorial and research programme of the Museum [...] funded out of the annual Research Council's parliamentary vote'. He consequently suggested that NES should be funded by the Inner London Education Authority (ILEA) and outer London Education Committees, and not be a party to this funding which the research scientists had previously enjoyed. See 'The New Exhibition Policy and Programme at the British Museum (Natural History: A Contribution to a Debate, St. Andrews, September 1979', p. 8. Miles also makes the point that the new way of constructing exhibitions that NES characterised was based on scientists fitting in to the framework of exhibition design, not, as was previously the case, taking overall responsibility for it. Miles, 'Museums and Public Culture: A Context for Communicating Science' The Chicago Academy of Sciences (1987), p. 183. Also, by looking at extensive paperwork discussing and debating ways to formulate NES, it was apparent that the previously powerful position of the scientist/curator within the new regime was severely downgraded, from being in control of the team to an equal team member. Similarly, trained scientists who were specialists in their field would hardly have been content to relinquish their research activities for a more general educational role within a content development team even if it was a fixed secondment. This again made more of a case for the introduction of Miles' idea of a skilled professional communicator with a malleable mind – as Dierdre Janson-Smith describes in her questionnaire response, Appendix 1, p. 293.

307 See Roger Miles, 'A Natural History Museum in Transition: Reflections on Visitor Studies in Practice,' *Visitor Studies*, 10: 2 (2007), 129-135, and Miles 'Otto Neurath and the Modern Public Museum: The Case of the Natural History Museum (London)', 189.

Transformation has been shown to be a large contributing factor in shaping new ways of designing educational exhibits at the NHM; but its effects are more far reaching, and ideas that were thought of as radical during the 1970s (as they were in the 1920s), now appear logical and commonplace to today's museum designers, as Miles reinforces in a recent interview.[308] Many of the methodological principles of Isotype are echoed in elements of educational technology, and it must not be forgotten that Neurath pioneered evaluation at the G&W. Miles and his team took elements from Isotype, educational technology, operational research, evaluative studies, philosophy, education and cybernetics along with many other factors to construct Museum technology, just as Neurath had taken elements from philosophy, sociology, pedagogy, 'education by the eye' and a whole host of other disciplines to construct Isotype. This would follow the sentiment of Macdonald-Ross; he stated that all systems of communication, from Isotype to operational research and educational technology stemmed from very basic communication strategies that he described as 'the human organisation of learning' which has been in existence for centuries.[309] Both Neurath and Miles assembled their own versions of this, the former creating the basis for the latter to build on.

It could be said that through the application of Museum technology, Miles' experimental new museum philosophy based around sound pedagogical issues and a visitor-centred approach, the Museum succeeded in re-interpreting its original mandate as a social institution to educate the public. It could also be said that the principles of Isotype, in particular transformation, maintained a key role in making this happen. The influence of the methodological principles of Isotype helped to raise the profile of designers within museums from 'window dressers' in the 1960s, to transformers of complex information during the 1970s and 1980s, and gave the inquiring designer a far more important role in the development and design of educational exhibits.

Isotype-trained designers and scientists from NES, like Janson-Smith, Magidson, Ward, Jones and Meakin now function as independent design consultants and interpreters working with large museums and visitor attractions in the UK and further afield. They admit to taking the visitor-centred, Isotype-inspired approach they gained from NES with them. The NHM currently employs staff engaged in the planning and formulation of exhibitions, including 'Audience advocates' a non-design role which ensures that exhibitions remain visitor-centred, but currently no NHM employee bears the job title 'transformer' and designers employed by the NHM currently take on a more traditional graphic design role.

Since 1991 (when NES came to a close) all new major permanent exhibitions have been competitively outsourced, some going to design groups whose staff include original NES transformers.

308 From an edited transcript of a formal interview with Miles, Appendix 1, p. 266.
309 From an edited transcript of a formal interview with Macdonald-Ross, Appendix 1, p. 279.

CASE STUDY 2

Graphic argument

The influence and dissemination of the Isotype principles of graphic argument seen through the work of information designer Nigel Holmes.

Nigel Holmes (b. 1942) has stated that he incorporates the principles of Isotype into his approach to graphic argument – most explicitly articulated in the 2000 paper 'Pictograms: A View From the Drawing Board, or, What I Have Learned From Otto Neurath and Gerd Arntz (and jazz)'. Using Holmes as a paradigm of a contemporary information designer whose approach concerns the integration of text and image, this case study will seek to evidence and evaluate the influence of the principles of graphic argument in his body of work. Particular emphasis will be given to the integrated picture-text principle which forms the last major development of the principles, demonstrated by Marie Neurath's children's books from 1948 onwards. Holmes' current design work for Explanation Graphics in New York outwardly shares many visual characteristics with this work.

The case study will begin by contextualising Holmes' place within the genre of explanation design.[310] This is supported by formal interviews with Holmes and Bruce Robertson (who also admits to incorporating Isotype principles of graphic argument into his work). It centres around a visual analysis of Holmes' work over a forty-year period with the aim of establishing how encounters with Isotype have impacted on his working methodology, and the extent to which he has actually assimilated the principles into his work. The dissemination of Isotype principles of graphic argument will be discussed by comparing Holmes' work with that of other key information designers who have connections with Holmes, and have developed alternative methods of graphic argument.

Nigel Holmes: reputation

For the majority of his career, Holmes has been a practising information designer specialising in the explanation of complex concepts through text and image. He has produced a prolific body of design work evolving from figurative illustration to the deceptively simple stylised graphic charts which bear some similarities to the reductive graphic language of Isotype. Since 1984 Holmes has commended Neurath and Arntz's work in authored books on design, interviews, papers and self-published booklets in connection with the theories that underpin his work. In

[310] 'Explanation design' is Holmes' term for information design.

2006 Holmes cited Neurath as being a fundamental informing factor in the design of pictorial statistics:

> Neurath is probably the biggest single influence on my work and thinking. Among other things, his work has taught me this: you can see what the subject of the chart is as soon as you look at it, before you understand anything about the numbers. He made a place for illustration, or at least pictorial elements, in otherwise 'boring' charts. He [Neurath] wanted the people of Vienna to be interested in their social conditions, housing, etc., and realized they would more likely understand these things if the information was approachable and human, not to mention artistically elegant, instead of cold and abstract.

Holmes' career spans five decades. He started as a freelance illustrator working with news magazines while still at the Royal College of Art in the mid-1960s. He designed illustrated charts for the *Sunday Times* and *Radio Times* in the UK in the 1970s before moving to New York and working for *Time* magazine for 16 years. In 1993 he left *Time* to start Explanation Graphics, where he currently combines the roles of researcher, editor and designer on projects based around the diagrammatic simplification of complex concepts. He has authored four large-format books on aspects of information design[311] and is the subject of many published interviews and articles for international design magazines.[312] Holmes regularly speaks at International conferences and seminars and has authored several self-published projects that discuss the ethos behind his work which make many references to Isotype). Since the late 1990s, Holmes has been involved in projects of a socially inclusive nature, exemplified by collaborative work with Richard Saul Wurman.[313] Holmes continues to specialise in designing projects that translate complex concepts into layman's terms using a combination of integrated text and image.[314] Steven Heller endorsed Holmes' reputation and influence in the field of information design during the 1970s:

> [Holmes] ultimately triggered a burgeoning practice of 'Information Design' in magazines, newspapers and other media in the United States and Europe. Since then, the almost limitless deluge of data in print, on TV, and the internet increased the flow of raw data, challenging designers to turn them into digestible and easily comprehensible information, often with wit and humour. Holmes became one of the leading innovators in this field.[315]

311 Most relevantly *Designer's Guide to Creating Charts & Diagrams* (New York: Watson Guptill Publications, 1984); *Designing Pictorial Symbols* (New York: Watson Guptill Publications, 1985); *Pictorial Maps History, Design, Ideas, Sources* (USA & London: The Herbert Press, 1991) & *The Best in Diagrammatic Graphics* (Mies Switzerland: Quarto Publishing, 1993).

312 See 'Nigel Holmes – SND NYC meetup' by The Society of News Design on 7 March 2009, http://vimeo.com/3650004 amongst many others.

313 Collaborative projects with Richard Saul Wurman include *Understanding USA, Diagnostic Tests for Men* and *Diagnostic Tests for Women.* Wurman's work is primarily concerned with making information accessible. He authored *Information Anxiety*, various city guidebooks, and projects on population and healthcare. Wurman founded and chaired TED conferences (Technology/Entertainment/Design) from 1984–2002, and TEDMED in 2006, a conference linking ideas between medics and healthcare professionals. www.wurman.com/rsw/.

314 Subject matter includes the economy, the airwaves, the Iraq war, 9/11, climate change, social reconstruction after Hurricane Katrina and a series of small format booklets: *The Smallest Ever Guide to Life Sciences*, *The Smallest Ever Guide to the Hydrogen Economy* and *The Smallest Ever Guide to the Internet*.

315 Steven Heller, *Nigel Holmes on Information Design* (New York: Jorge Pinto, 2006), p. xi.

To further support Holmes' place within this genre, on the reverse of the 1991 book *Pictorial Maps: History, Design, Ideas, Sources*, he was cited as being 'The father of Info graphics'[316] and in recent correspondence with Arthur Lockwood, Holmes was described as a designer who 'knows of the history of diagrammatic language but has developed a sexed-up approach […] well suited to being published in newspapers'.[317] In contrast, E.R. Tufte in *Envisioning Information* likened one of Holmes' charts for *Time* magazine to 'chart junk'.[318]

Connecting Holmes with Isotype

This section establishes Holmes' links with the explanation graphics genre and gives a background to the dissemination of the principles of Isotype. It draws heavily from Holmes' written and design work supported by formal interviews from 2009 with Holmes and Bruce Robertson,[319] (an employee of Wolfgang Foges during the 1950s and 1960s). Robin Kinross described Wolfgang Foges' business as 'a largely émigré book packaging firm'.[320] Through his book packaging business (Adprint, Rathbone Books and later Aldus Books), Foges was instrumental in promoting Isotype in the UK, initially by commissioning articles and charts for *Future* magazine and Ministry of Information publications from the mid-1940s until the late 1960s. He had many complex contractual dealings with the Isotype Institute, (not all of them convivial and straightforward).[321] After Neurath's death in 1945, Foges invited M. Neurath to work in his offices at Rathbone Place, London W1, and much of their work together was based around the design and production of children's books using the Isotype integrated picture-text principle.[322] Foges was also instrumental in facilitating M. Neurath's work in West Africa, which

316 'Info graphics' is hard to define; in the UK it can be seen as a term of abuse, but in the USA and Europe, it is regarded as simply another term for information graphics – a way to present information visually. It has become synonymous with newspaper graphics in the USA. Info graphics is also used to describe the work of a group of international designers working within the newspaper/magazine genre such as Nigel Holmes, John Grimwade, Jerome Barendse (Lust), Karin Schwandt, Atja Apituley, Harjit Kaura, Ramses Reijerman and Frédérik Ruys (author of a recent book on the subject based on a conference held in Zeist, The Netherlands, March 2009). http://infographics.eu/?p=programmaIC09. It is also associated with the American newspaper *USA Today*, which received criticism for over-simplifying news and emphasising entertainment over respect for content and data.

317 Correspondence with Arthur Lockwood, May 2009, Appendix 2, pp. 341-342.

318 'Dressing up' statistics in this way was the major source of criticism that E.R. Tufte levelled against work of this kind – known as 'chart junk' or 'data junk'. Tufte made several references to 'chart junk' in his books. See *Visual Explanations, Images and Quantities, Evidence and Narrative* (Cheshire, CT: Graphics Press, 1997), pp. 65 & 74; *The Visual Display of Quantitative Information* (Cheshire, CT: Graphics Press LLC, 2001), pp. 107-121; *Beautiful Evidence* (Cheshire, CT: Graphics Press LLC, 2006), pp. 152-153; and *Envisioning information* (Cheshire, CT: Graphics Press LLC., 1990), pp. 34-35, in which Tufte specifically criticises a chart (by Holmes, but not credited to him) for *Time* magazine. Holmes quotes 'pure science [Tufte] versus my mix of science and culture'. Holmes considers that Tufte missed the point. Heller, *Nigel Holmes*, pp. 76-78.

319 See edited transcripts in Appendix 2, pp. 318-333.

320 Robin Kinross, 'Design in Central-European London' *Typography Papers 8*, (2009), p. 109. See also David Lambert, 'Wolfgang Foges and the New Illustrated Book in Britain: Adprint, Rathbone Books, and Aldus Books' *Typography Papers 8*, (2009), pp. 113-128 and Matthew Eve, 'Isotype in Trouble, 1946-1948' *Typography Papers 8*, (2009), pp. 129-134.

321 See Eve, 'Isotype in Trouble, pp. 129-134 and Brian Mills, 'Designed and Produced by… Some Notes on the Story of Adprint' *Antiquarian Book Monthly Review,* 13 (1986), 368-373.

322 Foges championed, supported and profited from the Neuraths, and it could be said that he was responsible for giving Isotype its associations with what we now think of as austere wartime graphic design, through the charts which appeared in his publications (many for the Ministry of Information).

demonstrated the versatility of this Isotype principle seen from an international perspective.[323]

Foges employed several key designers and editors who were responsible for the secondary dissemination of the principles: Bruce Robertson (co-founder of Diagram Visual information Ltd)[324] who left to design for the *Sunday Times* (with Holmes taking up his position after he left); art director Edwin Taylor who also moved to the *Sunday Times* where he trained Holmes as a 'designer journalist' before work in the US with *Time Life* and other news publications; Arthur Lockwood author of one of the first major books on diagrams (1969), *Diagrams: A Visual Survey of Graphs, Maps, Charts and Diagrams for the Graphic Designer*[325] (which included Isotype charts) and editor David Lambert, science editor of books for children and young adults for (amongst others) Diagram Visual information Ltd and most recently the popular Dorling Kindersley illustrated encyclopaedias.[326]

The integrated picture-text principle in relation to Holmes

Modern Man in the Making (1939) **(Fig. 25)** forms a significant step in the evolution of the principles, extending the reach of Isotype work away from charts of a purely statistical nature. The integrated picture-text principle embodied a far broader, more versatile method of visual explanation so text and diagram fit seamlessly together. This principle can be seen in embryonic form in some of the early non-quantitative charts for the G&W (1925–34) **(Fig. 31)**, and the 1939 US National Tuberculosis Association travelling exhibition which featured sophisticated colour coding and emphatic use of expressive rules to show the infected, the non-infected and those incubating infection. **(Fig. 26)**

The integrated picture-text principle explained complex concepts using a combination of

323 Another of Foges' Rathbone Place offices was rented by Frame Smith, who had connections with the Ministry of Education in West Africa (after Nigeria gained its independence). Foges also had business interests in West Africa through the British Government's Commonwealth educational activities. Robertson suggests that M. Neurath's work in West Africa came about through Foges. Other publishers such as Longmans were also working in West Africa at the time. See Eric Kindel's work in this area, www.isotyperevisited.org.

324 Robertson recollects seeing M. Neurath at work in adjoining offices at Adprint through metal-framed glass partitions. He learned first-hand about the Isotype Institute's educational publishing ventures from her. According to David Lambert, Robertson's interest in diagrams and visual explanation sprang from labelling engines and vehicles in *Man Must Move: The Wonderful World of Transport* (1960), for which the Isotype Institute provided some of the original diagrams. The list of contributors to this book is impressive, Laurie Lee wrote the original copy with research by Enid Moore; designers are listed as Edward Wright and Bruce Robertson; maps and diagrams by the Isotype Institute, Malcolm Booker, Gordon Cramp and Arthur Lockwood; artists included Laszlo Acs, Alan Ball, Barry Daniels, Shirley Kitson, Bernard Myers, Perez Roman, Peter Sullivan and Edwin Taylor. Robertson set up Diagram Visual information Ltd after Foges moved office to the top of Euston Road in 1968. The company originally produced colourful diagrams for magazines published by Haymarket Press, the *Economist* and the *Sunday Times*. They are now a successful international book packaging company.

325 Arthur Lockwood, *Diagrams: A Visual Survey of Graphs, Maps, Charts and Diagrams for the Graphic Designer* (London: Studio Vista, New York: Watson-Guptill, 1969).

326 F.H.K. Henrion (art editor), Edward Wright (designer) and Peter Sullivan (illustrator) also appear in the list of collaborators on Foges' books during the 1950s and early 1960s. See Lambert,'Wolfgang Foges and the New Illustrated book', pp. 123-126.

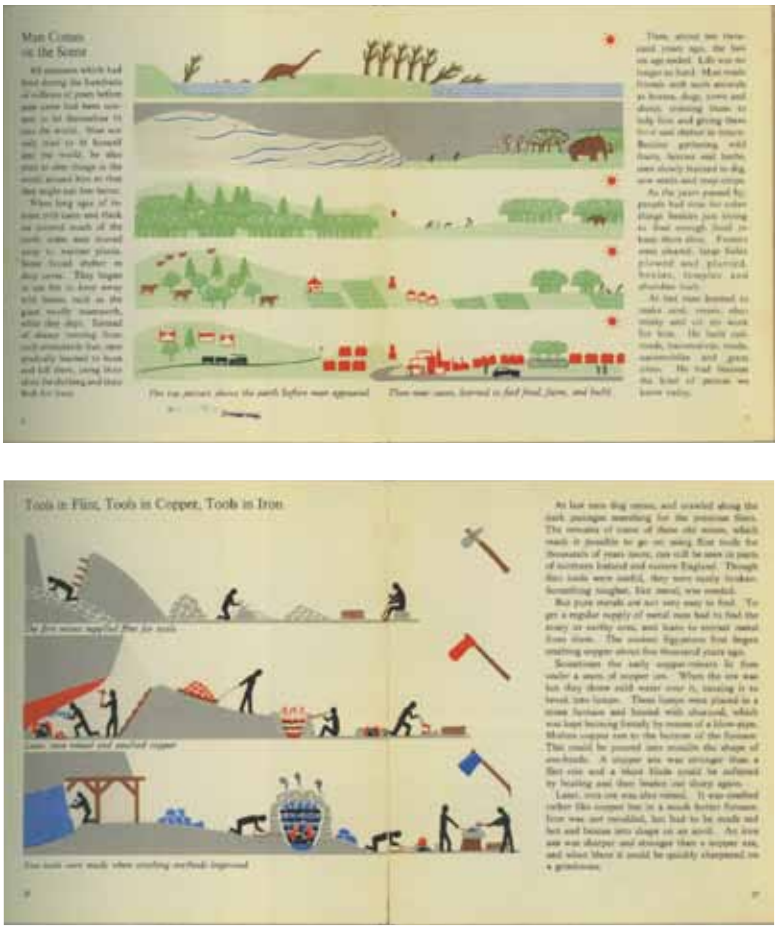
reductive sequential graphic language, often configured in a tabular format, sometimes utilising cut-through horizontal sections. The formulation of the principle combined many of the intellectual and philosophical, methodological and graphic and operational principles of Isotype, but it is primarily reliant upon simple graphic language and transformation. The notion of Isotype as a 'helping language' is no longer applicable and graphic language serves for both word and image. This later adaptation of the principles is not wholly dependent on quantitative expressions, but continues to be based on comparison, familiarising the audience with narrative concepts through use of repeated simple imagery, allowing them to comprehend and conclude. The principle of understanding the story at first glance, the detail at second glance and at the third glance, very little more, still applies, as does Neurath's maxim 'less is more'. The integrated picture-text principle utilises the majority of the simple graphic and operational principles: use of reductive imagery, silhouette, and avoidance of perspective. It is seen to its best effect in M. Neurath's earlier children's books and her work in Western Nigeria.

The Neuraths first experimented with the design of educational books for young children in 1944 with *Tips for Tots: An Isotype Book on the Seasons* but the project went no further than a handcrafted mock-up. The book introduced 'Iso' and 'Typie', two symbol-like characters who had adventures in 'an Isotype world',[327] formed from consistent graphic language, avoidance of perspective and decoration, use of silhouette and pared-down symbol-like imagery. This trial effort was followed by the three volume 'The Visual History of Mankind' series (1948) and *Railways under London* (1948) which provided visual explanations of the workings of aspects of the London Underground. *If You Could See Inside* (1949) showed children what went on inside structures such as wasps' nests, volcanos, lighthouses and caves. These books were followed by the six volume 'Visual Science' series (1950–52) and many others including the colourful 1950's 'Wonderful World' series.[328]

By describing the design process behind 'The Visual History of Mankind' series, **(Fig. 51)** it is possible to gain an insight into how the integrated picture-text principle evolved. Books such these were designed with an international market in mind, making the visual treatment of facts particularly relevant. The task entailed condensing an extensive amount of history into three concise volumes. M. Neurath found the transformation of such a large amount of diverse historical information difficult,[329] but with Neurath's help she analysed the content by searching for the facts 'that were worth noticing' from the mass of information and found ways to compare different scenarios, i.e. day or night, or different eras. By using the process of comparison (as traditionally seen in Isotype statistical charts), more complex forms of graphic explanation could be achieved. Simple repeated graphic language was used to highlight salient points and form comparisons. Narrative charts comprised sequential diagrams configured using

327 See Sue Walker's work in the area www.isotyperevisited.org.
328 A good representation of the breadth of publications produced by the Isotype Institute in collaboration with Foges can be found in Lambert, 'Wolfgang Foges and the new illustrated book in Britain: Adprint, Rathbone Books, and Aldus Books' *Typography Papers 8*, 2009, pp. 123-126.
329 See M. Neurath and Kinross, *The Transformer*, pp. 62-63.

horizontal tabular elevations, with subsidiary illustrative inserts drawn using parallel projection systems (sometimes including perspective). Neurath died in 1945, when 'The Visual History of Mankind' series was two thirds complete. In *The Transformer* M. Neurath stated how Neurath's extensive historical knowledge, vivid imagination and eye for graphic detail had been a great help. She described the way they worked together; by jointly critiquing M. Neurath's sketches, improvements could be made allowing the best solution to emerge.



(Fig. 51)
Pages from *How the First men Lived* (1948), part of 'The Visual History of Mankind' series. ISOTYPE COLLECTION

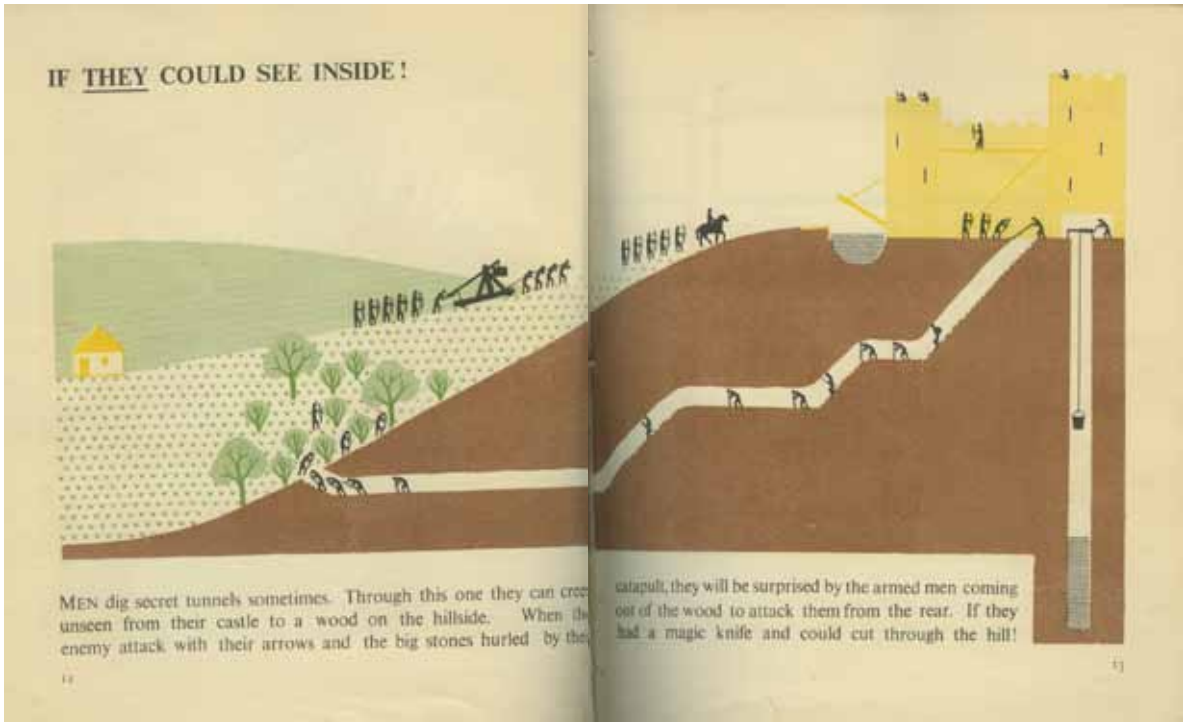
The integrated picture-text principle evolved over M. Neurath's working life. The use of starkly simplistic reductive use of Isotype graphic language and sequential diagrams became less prominent during the later 1950s and 60s. Earlier forms of the integrated picture-text principle form a potent form of visual communication which works on many levels, extending the reach of the original principles within a broader visual context and forming the final development of the principles of graphic argument. The visual feel of the books M. Neurath authored during the 1960s was distinctly different to her earlier work from the late 1940s – pictures and text were still integrated, but figurative illustration had taken the place of Isotype graphic language; and the visual identity was not immediately recognisable as Isotype Institute work.

This section will highlight characteristic features of the integrated picture-text principle in M. Neurath's children's books, which are relevant to Holmes' mode of graphic argument. Holmes never makes reference to M. Neurath's later work in any of his authored books and interviews,

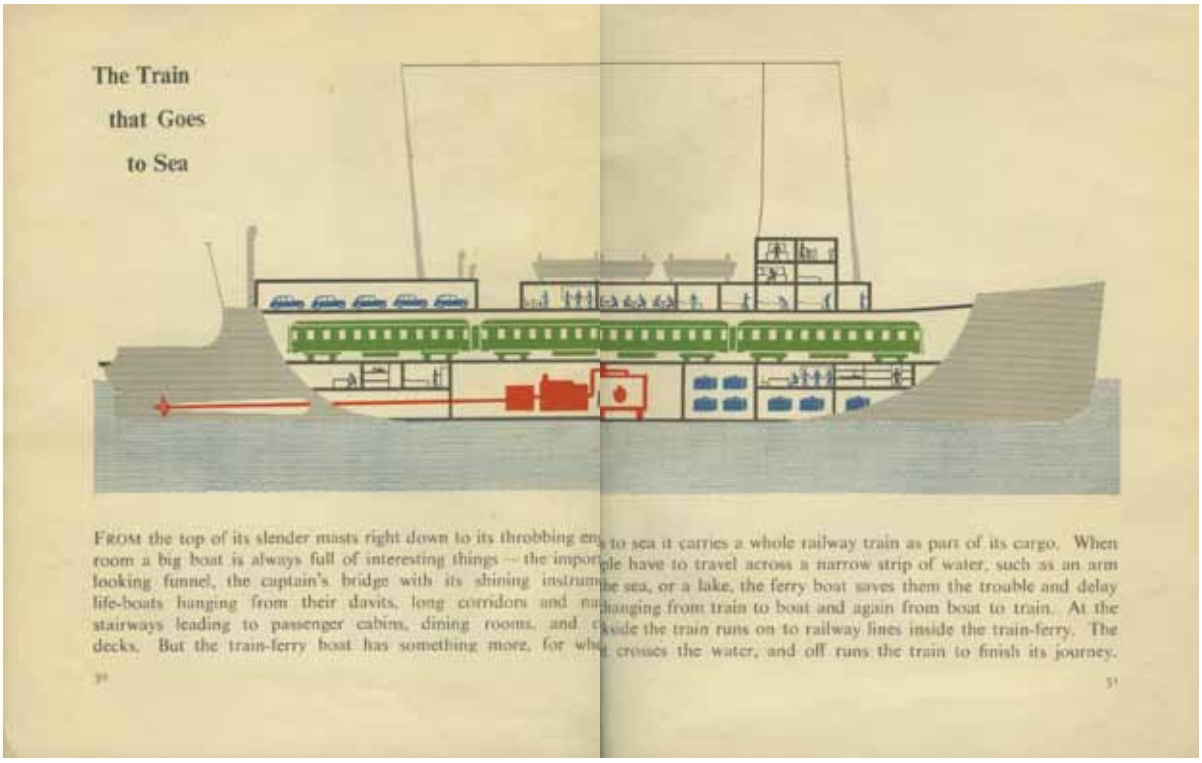
but visual similarities can be identified in his use of cut-through elevations, repeated pared down graphic language and sequential explanatory tabular sections.

If You Could See Inside

The second and final children's book concept which the Neuraths developed together was called 'Just boxes'. It was based on revealing information normally hidden from view, and the notion that boxes which were similar on the outside were very different inside. The idea evolved into *If You Could See Inside* (1949) **(Fig. 52)** and explained what hidden interiors such as a wasps' nest, a lighthouse, a cave, a ferry, a volcano, an egg and a windmill looked like on the inside. The spread on castles 'If They Could See Inside!' was designed using a cut-through elevation, combined with simple repeated graphic language for human activity and land use. Trees highlight differences in topography and colour is restricted to brown for earth, green for fields, and yellow for buildings. Water is represented by black wavy lines.



(Fig. 52)
Pages from *If You Could See Inside*
(Chantilcleer Press: New York, 1949).



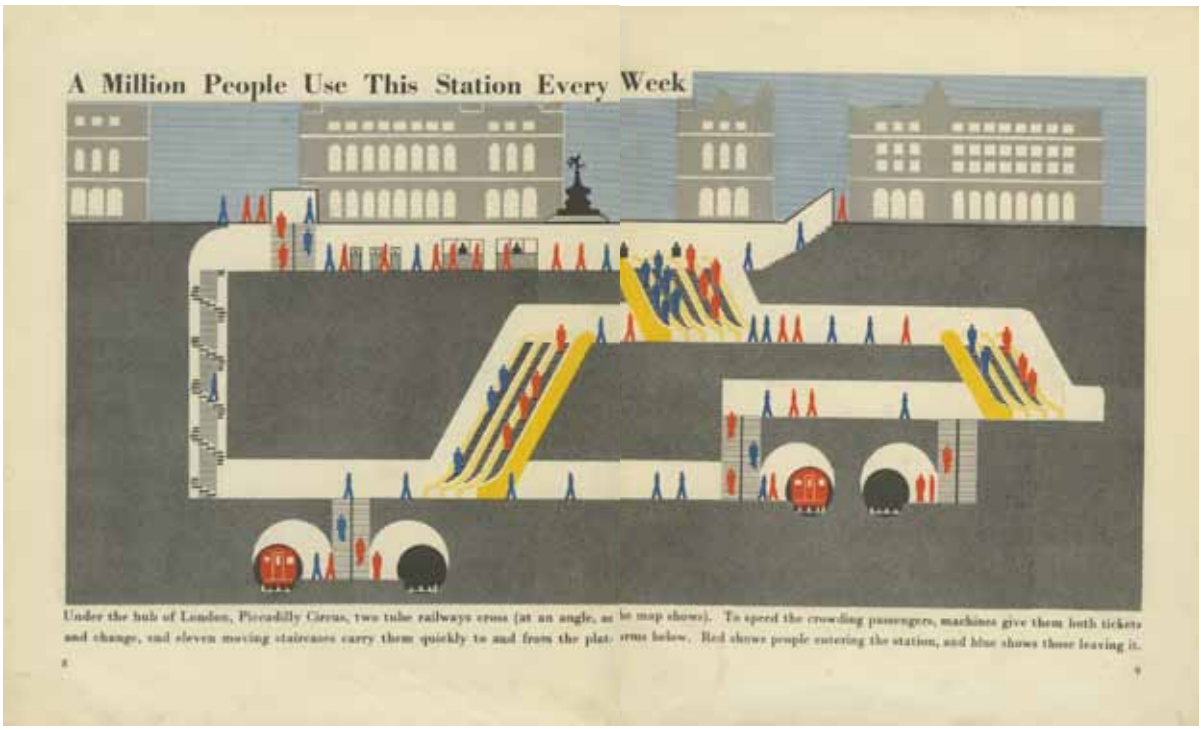
(Fig. 53)
Pages from *If You Could See Inside*
(Chantilcleer Press: New York, 1949).

A further spread from *If You Could See Inside:* 'The Train that Goes to Sea' **(Fig. 53)** again shows an example of a cut-through horizontal elevation to describe the layout and tiered structure of a train ferry using repeated graphic symbols. Use of colour differentiates between modes of transport and internal systems (red for the engine, blue for freight and cars, green for trains).

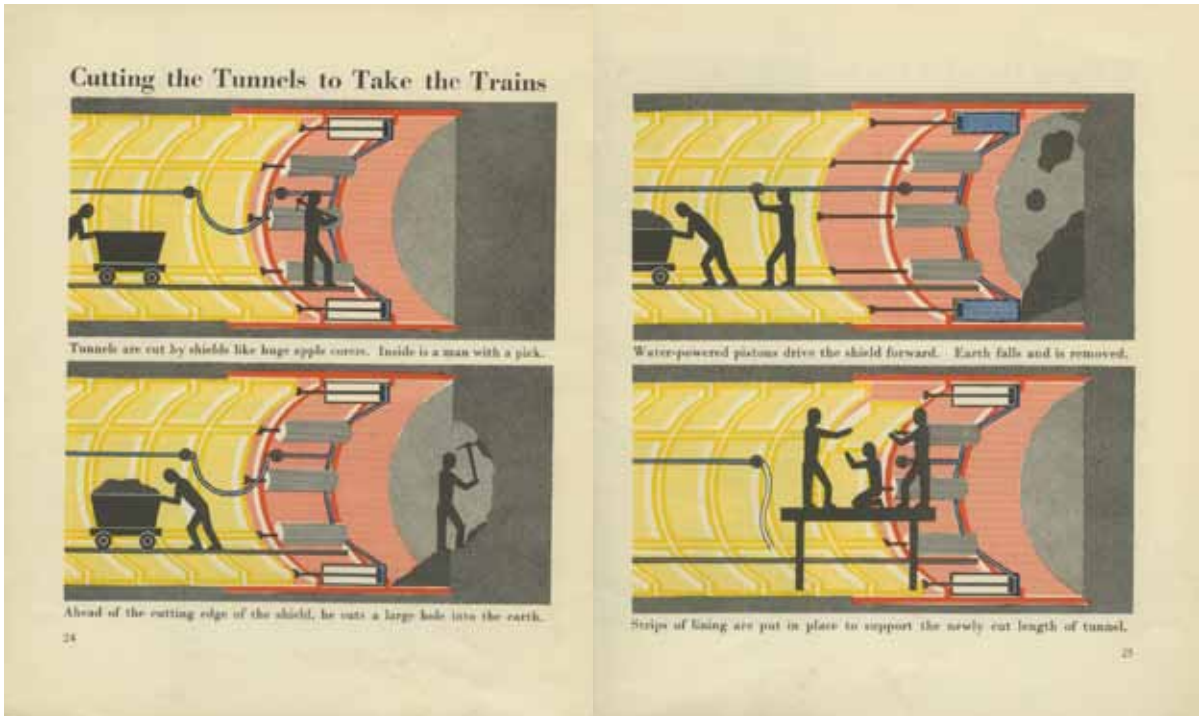
Railways under London

Railways under London (1948) was also based on the concept of explaining what lay within, this time describing the structure and workings of the London Tube network. The book forms an inspired example of the integrated picture-text principle showing how highly complex intertwined information systems work in a simple linear fashion. Complex concepts are explained using simple graphic language arranged in narrative sequences in either a left to right or top to base format. The diagrams utilise simple symbolic forms, repeated to promote familiarity throughout the book.

The diagram 'A Million People Use This Station Every Week' **(Fig. 54)** forms a sophisticated example of the clarity that can be achieved using the integrated picture-text principle. The complex network of tunnels, platforms, elevators and ticket offices is shown in relation to the street, layer by layer, making the whole system appear deceptively simple. M. Neurath reported that Max Parrish (the publisher) had wanted her to use perspective to represent how the two tube lines crossed at Piccadilly Circus tube station, but she explained that if perspective were to



(Fig. 54)
Pages from *Railways under London* (Max Parrish: London, 1948).



(Fig. 55)
Pages from *Railways under London* (Max Parrish: London, 1948).

be used the process of changing trains would be lost – reinforcing the original principles of Isotype.[330] Colour is pared down, using red, blue, yellow, brown, green and black with linear tints to show lighter colours. The tube station is depicted through a horizontal section from deep in the ground up to street level. Red figures represent people entering the station, blue those leaving it. Yellow is used to show movement on the escalators, elavators and through doors. The position and stance of the figures highlights the action of either walking along a tunnel, travelling on an escalator or ascending or descending stairs. The statue of Eros serves as a locating *Führungsbild.*

'Cutting the Tunnels to take the Trains' **(Fig. 55)** again shows the use of simple repeated graphic language, used sequentially as a set of tabular horizontal cut-through sections showing how underground tunnels were constructed. Figures are shown in silhouette, performing various activities. Yellow represents the tunnel lining, red the newly cut tunnel, black for the area to be dug out and blue wavy lines represent water pistons.

A visual analysis of Nigel Holmes' work

Nigel Holmes can be described as a contemporary designer who lived through the type of post war publishing work that Foges was involved in during the 1950s and 1960s, taking it forward through design with news magazines into a new era of graphic explanation and the blossoming of information design. Holmes' formative encounters with Isotype probably emanated from his training as a 'designer-journalist' at the *Sunday Times* with Edwin Taylor and Peter Sullivan (listed as illustrators on some of Foges' later 'Wonderful World' books during the early 1960s).

This section will discuss Holmes' documented encounters with the principles of Isotype taken from a literature review of his authored publications over five decades. From this factual information it was possible to construct a visual analysis of his design work, and identify four key periods of his career, based around a developing knowledge of the principles. This was supplemented by anecdotal evidence gained from a formal interview with Holmes in Zeist in 2009. The ultimate aim of the visual analysis was to assess the extent to which Holmes (seen as a paradigm of a contemporary designer involved in explanation design) has incorporated the principles of graphic argument into his work. It will seek to determine whether Holmes' documented high regard for the principles is simply based on an academic appreciation of Neurath's visualisation of statistics and Arntz's pared down graphic style, or whether his understanding of the principles permeates through into his approach to graphic argument.

This section will also search for evidence of the influence of the integrated picture-text principle in Holmes' work – something he fails to acknowledge in any of his books or interviews. Seen

[330] See M. Neurath and Kinross, *The Transformer*, p. 66.

through the context of Holmes' body of written and designed work, methods of graphic argument by other key designers from the explanation graphics genre emerge which are discussed in relation to Holmes' design methodology, with the express aim of assessing the extent of any further dissemination of the principles.

Criteria for analysis

Representative examples of Holmes' design work were visually analysed according to whether they complied with Isotype principles relating to graphic argument; simply defined as the mode in which graphic material is presented, relating to the intellectual process through which it was formed, how the material was configured and the graphic conventions used to present it.

The full visual analysis and checklist can be found in Appendix 2.[331] The checklist served as a tool to establish a common set of criteria for visual analysis. Principles deemed inappropriate and outdated were omitted as were those considered unrelated to graphic argument. The following key examples of Holmes' graphic argument are taken from four significant stages of his career and are considered (through contextual information built up around his body of work) representative of each time frame. They seek to identify evidence of Holmes' gradual integration of the Isotype principles of graphic argument into his work. The representative eras and examples of work are as follows:

- **1965–1977** Soyuz/Apollo launch and docking charts for *Radio Times* (1975)
- **1977–1993** Charts for *Time* magazine (1982)
- **1994–2000** Diagram for US Airways *Attaché* magazine (1998)
- **2000 onwards** 'The Citizen's Guide to the Airwaves' for the New America Foundation

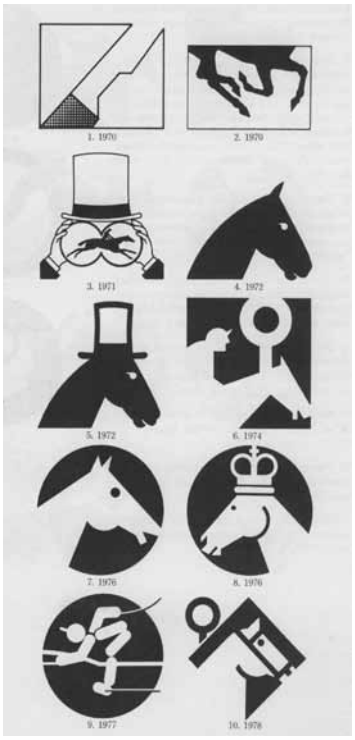
1965–77 early freelance work in the UK

Holmes left the Royal College of Art in 1966 and became a freelance designer/illustrator with newspapers and magazines in London. He worked with several influential art directors: Peter Sullivan and Edwin Taylor (who had moved from Rathbone Books to the *Sunday Times*) and Brian Haynes and David Driver of *Radio Times*. Sullivan and Taylor recognized Holmes' ability to both write and design, and trained him as a 'designer-journalist'.[332] Haynes and Driver gave Holmes editorial and creative control at *Radio Times* along with the opportunity to work directly with programme makers, allowing him the opportunity to fully grasp the subject matter and find the best way to convey it. Holmes changed his illustrative style from pen,

[331] See Appendix 2, pp. 334-340.

[332] Edwin Taylor became design director of the *Sunday Times* in the early 1970s, and along with Peter Sullivan, established a new initiative in recruiting art college graduates like Holmes and his colleague John Grimwade, and training them as 'designer-journalists'. Harold Evans, *Pictures on a Page Photo-Journalism, Graphics and Picture Editing* (London and New York: Pimlico, 1978), p. 287.

ink and wash to a simplified linear style in response to the need to meet tight deadlines,[333] in recognition of the fact that his skills as an information designer far outweighed his skills as an illustrator.

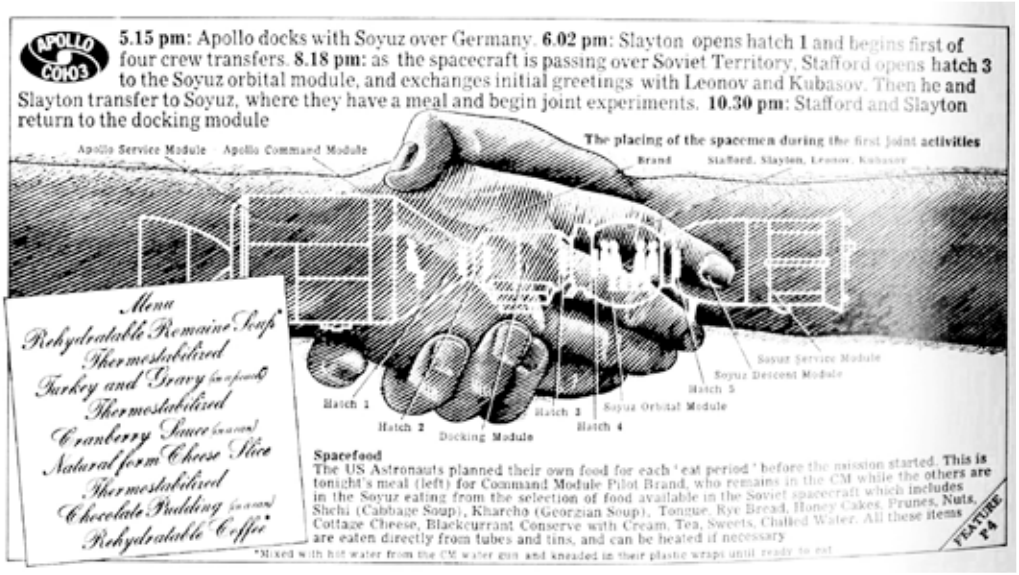




(Fig. 56)
Left Symbols for *Radio Times* (1970s).

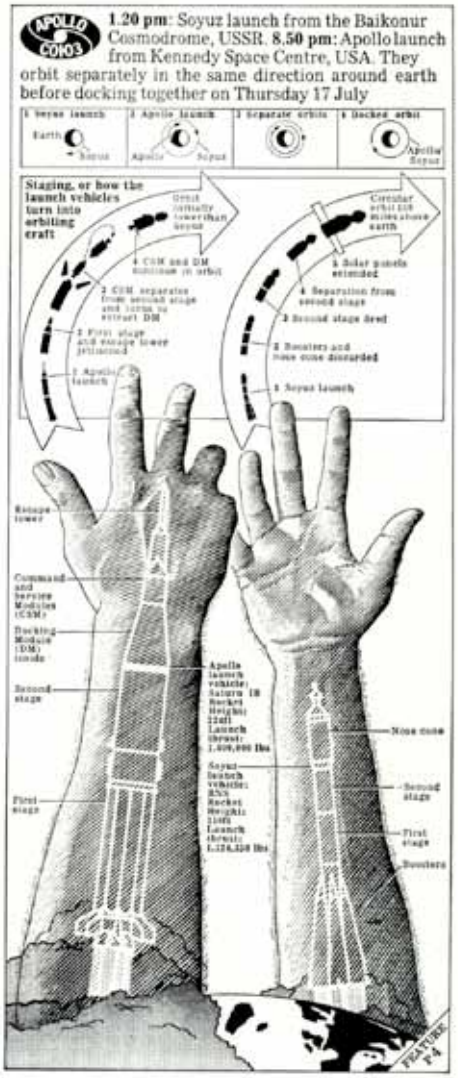
(Fig. 57)
Above 'Buckingham Palace with the Lid Off'
an early commission for *Woman's Mirror* (1960s).

Soyuz/Apollo launch and docking charts for *Radio Times* (1975) (Figs. 58 & 59)



(Fig. 58)
Soyuz/Apollo launch and docking charts for *Radio Times* (1975).

[333] Holmes thanked Charlie Riddell, art director of *New Society* for helping him to develop 'a clear "symbolic" style' in response to having to meet such short deadlines, and David Driver for commissioning two hundred black and white symbols for *Radio Times*. Holmes, *Designing Pictorial Symbols*, (acknowledgments) **(Fig. 56)**.



(Fig. 59)
Soyuz/Apollo launch and docking charts for *Radio Times* (1975).

Context

These diagrams for *Radio Times* represent examples of Holmes' early attempts at graphic argument. They formed part of an award-winning series of six projects conceived, written and designed by Holmes in collaboration with illustrator Peter Brookes. Holmes and Driver worked closely together to create accessible, audience-friendly visual information. The charts show how academic facts have been translated into accessible information for a general audience.

Visual analysis and extent of exposure to Isotype principles

There is no evidence of Isotype principles of graphic argument in these diagrams. However, there are several elements that bear similarities to the underlying philosophical, intellectual and methodological principles: the diagrams are educational and the design process involved translating complex data into comprehensible information using concise graphic forms. Immediate access to the storyline is gained through the use of arms which form strong metaphoric signifiers providing an instant overview of the subject matter and giving human dimension to a technological event. Supplementary information is available if deeper knowledge is required, supplied through a stylised menu and further inset diagrams. Complex

annotation directs the audience towards the conclusion. With these charts, It could be said that Holmes was taking on the role of the transformer by translating complex facts into simple humanising metaphors (although metaphors are not feature of Isotype) acting as graphic signifiers to attract attention and access to the information.

1977–1993 employment at *Time* magazine in New York and authorship of 'designer's guidebooks'

Holmes left London for New York in 1977 to work at Walter Bernard's newly redesigned *Time* magazine where he remained until 1993.[334] His primary documented encounter with the graphic language of Isotype happened in 1977 when he obtained a copy of Rudolf Modley's *Handbook of Pictorial Symbols: 3,250 Examples from International Sources* (published in 1976),[335] which cites Neurath as the person who developed 'the modern techniques of graphic presentation of facts and figures'. Modley's *Handbook* devotes seven pages to Arntz's symbols from the Nederlandse Stichting voor Statistiek (NSvS). Holmes was impressed by the simplicity and economy of Arntz's symbols and found the book useful as a symbol reference book or 'cheat-sheet' for fast-turnaround magazine work.[336] Holmes' second encounter with Isotype occurred in 1979, via Richard Yeend (then art director of the business section of *The New York Times*). Holmes had been commissioned to write a book on diagrams and Yeend recommended that the work of Neurath and Arntz should be included. On Yeend's suggestion, Holmes visited the Otto and Marie Neurath Collection.[337] *Designer's Guide to Creating Charts and Diagrams* was published in 1984.

From 1977–1993, Holmes designed a variety of symbols, charts and maps for *Time*, and other major American corporations. He also lectured, gave seminars and ran information design workshops at the Rhode Island School of Design and went on to write three more designer's guidebooks which all discuss the fundamental influence of Isotype on charts, symbols and pictorial maps in their introductory sections.

Bernard, art editor at *Time,* expected Holmes to design diagrams where statistical information was superimposed on to intricate illustration, similar to the work he had been producing for *Radio Times* and the *Sunday Times Magazine* in the UK. *Time* catered for an audience of busy readers not necessarily interested in statistics, but open to persuasion if they were presented in an attractive way. Holmes' aim was to deliver charts which gave a faithful overview of the information followed by the facts and numbers, an aim he considered he shared with Neurath and Arntz:

334 *Time*, *Fortune*, *People* and *Sports Illustrated* magazines (along with many others) all belonged to the Time Inc. organisation. Heller, *Nigel Holmes*, p. 19.

335 Rudolf Modley, (with the assistance of) Myres W.R., *Handbook of Pictorial Symbols: 3,250 Examples from International Sources* (Mineola, New York: Dover Publications, Inc.,1976).

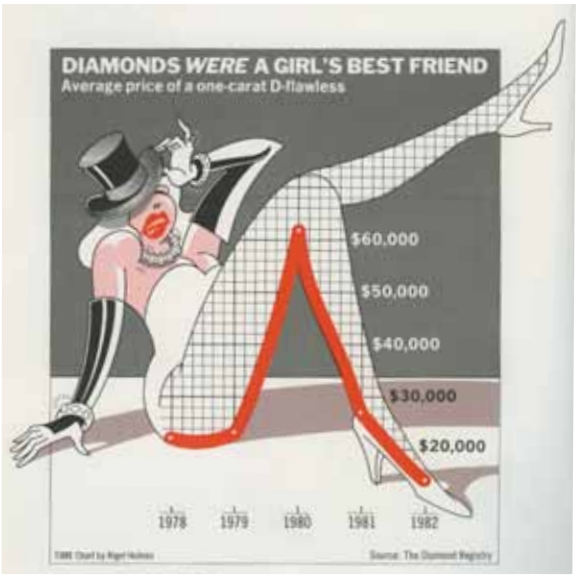
336 Holmes, *Pictograms: A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)*, (booklet), (Norwalk CT USA: copyright Nigel Holmes, 2003), p. 7.

337 Taken from a formal interview with Holmes, Zeist, Holland (March 2009), Appendix 2, p. 318.

> '… but just as Neurath was the analytical mind and Arntz was the artist who drew the images people saw, I had rock solid research behind everything I did at *Time*, while I used the best "drawing" I could to populate and display the information… '[338]

Tufte and 'chart junk'

Holmes' charts for *Time* were controversially accused of 'dumbing down' information and classified as 'chart junk' by E.R. Tufte in his 1990 book *Envisioning Information*[339] **(Fig. 60)**. Tufte defines 'chart junk' as having 'contempt for both information and for the audience',



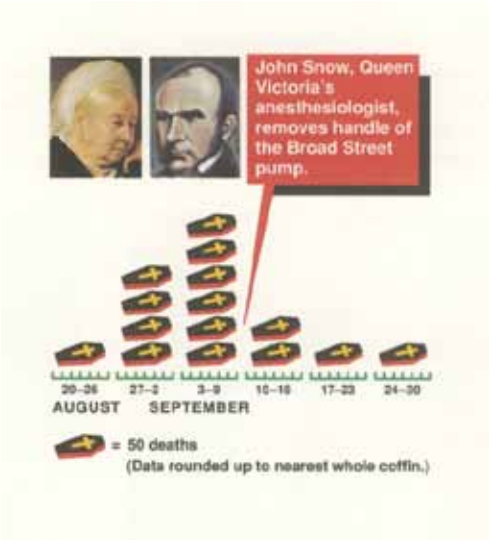
(Fig. 60)
'Chart junk or data junk'
E.R. Tufte published this early 1980s chart (designed by Holmes for *Time* magazine) in *Envisioning Information*, p. 34, describing it as 'chart junk' (this chart will be discussed later as part of the visual analysis of Holmes' work).

and merely 'dressing up the numbers'. Holmes disputed this accusation by stating that his charts were concerned with the 'true accounting of a story, whether statistical, geographic or diagrammatic […] there is room for enjoyment, wit and a friendly understanding approach.' Holmes further defended his position by drawing attention to the fact that his charts were meant for lay readers – busy, intelligent people who understood the news magazine genre, needing information instantaneously, who may disregard the charts if they were not presented in an eye-catching way.

> I liked the idea of paring things down to their absolute minimum and keeping it simple but keeping it pictorial as well. I got into a lot of trouble with academic people like Tufte who was incredibly critical of the work in *Time* because he said if you have to dress up the numbers then they are the wrong numbers, and people should be just intrinsically interested in the numbers themselves – which is a very hard academic viewpoint for a general magazine like *Time* […] A lot of the time we're not that far apart actually. He comes from an academic point of view. I'm a commercial artist. I do what people want to see, and have tried to apply some principles to it.[340]

338 Heller, *Nigel Holmes*, p. 41.
339 Tufte, *Envisioning Information*, pp. 34-35.
340 Taken from a formal interview with Holmes, Zeist, Holland (March 2009), Appendix 2, p. 318.

Tufte also criticised Isotype,[341] considering that it too dumbed down information, and 'over compressed the data' (by only giving an overview), referring to it only once in all of his books on graphic visualisation through one frivolous pastiche **(Fig. 61)**.[342] This fact allows parallels to be drawn between both Neurath's and Holmes' methods of graphic argument, even though they are visually totally different. Both styles allow the audience to grasp the whole concept at first glance; and both rely on the integrity of information presented. However, Holmes' charts clearly point to the conclusion whereas Neurath's lack of bias allowed the audience to draw their own conclusions.



(Fig. 61)
Tufte's parody of Isotype, a version of the 'John Snow Cholera Epidemic' chart, as he considers Neurath would have represented it in *Visual Explanations*, p. 37.

341 A critical example of how Isotype graphic argument could be questioned can be seen in a report taken from an Isotype exhibition on housing in Bilston in 1946. Neurath always stated that Isotype was not for university level education, but hoped that its simplicity and accessibility would prompt further study. But the following quotation clearly shows an audience who thought that Isotype charts should contain more detailed information than they actually did. Rather than promoting further study, the charts left this audience feeling cheated out of more detail:

'The only criticism which I feel I must offer to you on the subject of the charts, is this. A large number of people told me that they thought that the charts were unnecessarily complicated, but subsequent discussion disclosed that they had discovered the idea behind the chart in the first few seconds of examining it, and dismissed the idea as being much too simple to be offered to them in such an interesting looking way; always there was the feeling that there must be something much more complicated behind it and which was beyond the capabilities of their intelligence and understanding.' Letter from A.M. Williams, (Town Clerk, Borough of Bilston) to M. Neurath, 24 May 1947 (after the Bilston exhibition closed due to a series of unfortunate incidents). IC 1/14.

342 Tufte, *Visual Explanations*, p. 37, shows an interpretation of how Tufte viewed Isotype seen through a version of Dr John Snow's famous 1854 Cholera Epidemic diagram. **(Fig. 61)** Tufte described it as 'how pop journalism might depict Snow's work, complete with celebrity factoids, over-compressed data, and the Isotype styling of those little coffins'. [Isotype is uncapitalised]. Kinross refers to correspondence received from Tufte in 1984 regarding Isotype, and concluded that his main criticism of Isotype surrounded its apparent 'lack of quantitative depth', M. Neurath & Robin Kinross, *The Transformer*, p. 96. Tufte's criticism ignored the contribution of the Isotype transformer who, as 'trustee of the people' carefully selected statistical data to relay the correct story: 'This system [Isotype] does not take for its field the more complex part of science; its field is only the teaching of the very first stage – but this work it does seriously and as well as those responsible for building it up have been able to make it.' Neurath, *International Picture Language*, p. 104. In many respects Holmes' quirky cartoon-style charts also presented the main argument behind the data clearly, making them immediately accessible for busy audiences. His amusing charts were noticed and because *Time* researchers provided reliable facts, he was able to relay information with accuracy and integrity.

Designer's guidebooks

Holmes' first authored book, *Designer's Guide to Creating Charts and Diagrams* was published in 1984. At the time he was combining the roles of full-time executive art director and part-time author as well as attending seminars and lecturing across the US. In this book, Holmes made reference to the Geschellshafts- und Wirtschaftsmuseum and stated that [the museum] 'produced in the '20s charts of precision, clarity, and graphic excellence that are still models of "how-to-do-it" today'.[343] Holmes discussed how Neurath's work was based on the communication of social knowledge, and the importance of statistical accountability, describing the simplicity and lack of decoration found in Isotype symbols and the use of repetition (rather than size) to indicate magnitude. He considered that 'many of the symbols created by Neurath and the 'museum's art director Gerd Arntz, can still be seen in charts today, for they have never been bettered'.[344] *Designer's Guide to Creating Charts and Diagrams* reviewed examples of types of charts and diagrams,[345] combined with a brief history of the presentation of statistical information and a list of innovators in the field.[346] Holmes' selection of historical charts and diagrams was taken from work of (amongst others) Irving Geis, Herbert Bayer and Otto Neurath, and his contemporaries in the UK and US Richard Yeend, John Grimwade, Peter Sullivan, Diagram Visual information Ltd and Pentagram, alongside examples of his own charts and diagrams for *Time*. Holmes' charts largely followed a set format based on a humorous metaphor and headline. They took the form of a line (or fever) chart where the shape of the statistical curve was imitated to form the illustrative content.[347]

In the introduction of Holmes' second book *Designing Pictorial Symbols* (1990), he briefly described the history of symbol design from the ancient Sumerians and the Egyptians, 4,000 and 2,000 years BC. He cited Baron Gottfried Wilhelm Von Leibniz, the German philosopher and mathematician, for envisioning 'a universal system of pictorial symbols that could be

343 Holmes, *Designers Guide to Creating Charts and Diagrams*, p. 21.

344 *Ibid.,* Holmes' use of the term 'art director' is his own invention.

345 Bar charts, fever charts, timelines, flow diagrams, tables, illustrative comparative sequences, pictorial statistics, pie charts, organizational charts, star charts, charts with same size repeated symbols, charts using scale to differentiate between quantity and many other variants of these types of chart.

346 Roger Bacon, Thomas Bradwardine, Albert of Saxony, Marsilius of Inghen, Nicole d'Oresme, Leonardo da Vinci, René Descartes, William Playfair (inventor of the fever or line chart, bar chart and pie chart), Jacques Quételet (creator of the new science of statistics) and Otto Neurath 'inventor of the pictorial representation of statistical data,' Holmes, *Designers Guide to Creating Charts and Diagrams*, pp. 12-13.

347 'That's what I was doing initially, when I would do some kind of drawing which had a chart on it. I did a lot of those things and they became very popular and copied but using the Neurath (Vienna) Method is much better because of statistical accountability. The best way is something that contains both pictures and numbers in the right relationship to each other'. Taken from a formal interview with Holmes, Zeist, Holland (March 2009), Appendix 2, p. 324. Two charts in this style for *Time* from 1982 will be discussed later in this section – 'Diamonds were a Girl's Best Friend', describing the fall in diamond prices, and 'Monstrous Costs', showing the high cost of House and Senate campaign expenditures.

read in all languages'.[348] In terms of visual languages, Holmes briefly discussed C.K. Bliss' 'Semantography',[349] and Yukio Ota's 'LoCos'[350] as ambitious attempts to create abstract pictorial alphabets. He considered that these synthetic languages didn't function due to their complexity and linguistic inaccessibility, in contrast to Isotype, which although not strictly a self-sufficient picture language, he deemed universally accessible:

> With his [Neurath's] ISOTYPE he does not try to supply a complete visual equivalent of a language that can encompass all human emotions, nuances of feeling, and layers of meaning (as Bliss claimed for his system). Neurath (1882–1945) did, however, produce symbols that could be understood by anyone.[351]

Holmes' third authored book, *Pictorial Maps: History, Design, Ideas, Sources* (1991) examined the design of pictorial maps, timelines and schematic diagrams. Some of the design sources he referenced are emulated in his own work: the unconventional mapping techniques of Richard Edes Harrison; the annotated news story landscapes of Peter Sullivan; the stacked symbols and repeated cartographic diagrams of Herbert Bayer (from *The World Geographic Atlas* of 1953); and the maps with symbols of Otto Neurath, Gerd Arntz and Rudolf Modley. In this book, Holmes made further reference to his 'all-time hero Otto Neurath' stating that Isotype symbols captured 'the *essence* of a thing and were not a representation of what a thing *looked* like. That is probably as good a definition of a symbol as you need'.[352]

> The principles he [Neurath] used are still relevant, and his description of his own work is as good a definition of diagrammatic graphics as one could find today.[353]

In his fourth authored book *The Best in Diagrammatic Graphics* (1993), Holmes commented on Neurath's use of large charts for teaching at the Gesellschafts- und Wirtschaftsmuseum, citing Neurath's wish to communicate ideas and information to every museum visitor whatever their class or reading ability. Holmes acknowledged the contemporary relevance of Neurath and

348 Holmes, *Designing Pictorial Symbols*, p. 9. Neurath also cites the writings of Leibnitz as a factor in the development of Isotype. 'In the writings of Leibnitz we come across the idea that picture-making is to be done with the help of science. Leibnitz' desire was to make an 'atlas universalis' in conjunction with an encyclopedia'. It was Neurath's ambition to also make an encyclopedia: 'The ISOTYPE picture language would be of use as a helping language in an international encyclopedia of common knowledge. Such an encyclopedia will be the work of our time. A number of pictures which have been worked out may be part of such an encyclopedia in pictures'. Neurath envisaged it as a 'starting point to knowledge'. Neurath, *International Picture Language*, pp. 65-66 & pp. 109-111.

349 Blissymbolics **(Fig. 84)** were developed by Charles K. Bliss (1897–1985). Bliss originally called his invention 'Semantography', which formed an attempt at creating a pictorial alphabet from a hundred semi-abstract images. It was designed as a universal written language that would enable speakers of different languages to communicate with one another. Since 1971 Blissymbols have been used as an aid for people with communication, language and learning difficulties, with limited or no ability to use ordinary spoken and/or written language. Blissymbolics consists of over 2,000 basic written symbols, made from simple shapes which can be combined together to create new symbols and form into sentences based on English word order.

350 Prof. Yukio Ota researched and developed LoCos while studying in Italy in 1964. LoCos is an experimental visual language combining form, sound and expression that Ota considered universally accessible. See http://www.tamabi.ac.jp/soumu/gai/hojo/seika/2002/kyoudou-ota.pdf.

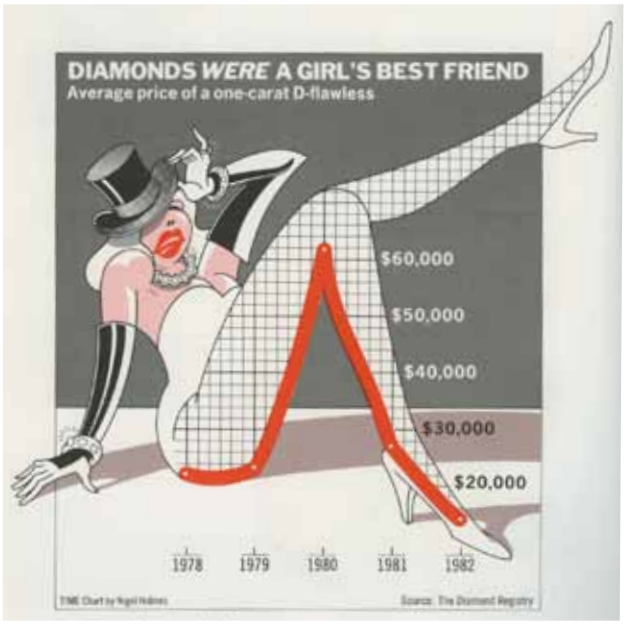
351 Holmes, *Designing Pictorial Symbols*, p. 9.

352 Holmes, *Pictorial Maps: History, Design, Ideas, Sources*, p. 155.

353 Holmes, *Designer's Guide*, pp. 20-21 and *The Best of Diagrammatic Graphics* p. 197.

Arntz's work in the introductions of all three of his designer's guidebooks published between 1982 and 1993, written while employed by *Time*.[354] But although he placed Neurath's work firmly within the traditions of the design of charts, diagrams, pictorial maps and symbols, there is no practical evidence of the principles of Isotype within his design work during this period.

Charts for *Time* (1982) (Figs. 62 & 63)



(Fig. 62)
'Diamonds *were* a Girl's Best Friend'
Time chart (early 1980s).



(Fig. 63)
'Monstrous Costs'
Time chart (early 1980s).

Context

These charts were designed for *Time* and reproduced by Holmes in *Designer's Guide to Producing Charts and Diagrams* to show how the plotted pathway of a line (or fever) chart can

[354] Holmes, *Designer's Guide*, pp. 20-21; *Designing Pictorial Symbols* pp. 9-10 and *Pictorial Maps*, pp. 154-155. *The Best in Diagrammatic Graphics*, p. 197 also makes reference to Neurath and his museum work.

both visually describe the context and concurrently present accurate statistical information (in contrast to Tufte's description of the 'Diamonds' chart as 'chart junk'). Holmes worked on the assumption that *Time* readers were attracted to statistics by pictures, so his job was to provide easily digestible statistics to busy readers, often using humour. This is a potentially unhappy mix which could bring the integrity of the information into question.

Visual analysis and extent of exposure to Isotype principles

Although at this point in his career, in his writing, Holmes placed Isotype firmly within the traditions of chartmaking, there is no evidence of the principles of graphic argument in these diagrams. Line charts were never a feature of Isotype, as they were considered inaccurate means of conveying statistical information by virtue of the guesswork involved in randomly joining consecutive points. Holmes' ability to translate complex data into accessible information is evident, again leading to parallels with transformation being drawn. He attracted attention to statistics through humour, analogy and metaphor, while maintaining statistical integrity through the rigorous data supplied by the research department at *Time* (which counteracted Tufte's 'chart junk' criticism). In summation, by using humour as a graphic signifier, statistics are brought to the attention of the audience – who may have overlooked them if they were presented in a more conventional format.

1993 – leaving *Time* magazine

Holmes left *Time* in 1993 (originally courtesy of a sabbatical) and founded Explanation Graphics. He never returned to his job. One of the main reasons for leaving was a disagreement over the trivial presentation of news graphics, which he considered challenged readers' integrity. His new approach favoured simplification with less reliance on extravagant illustration. Holmes was also aware that *USA Today* was publishing detrimental imitations of his charts[355] facilitated by the influx of new graphics software packages. Editors at *Time* were disdainful of Holmes' ideas of simplification, thinking them unappealing to their audience. This led to a parting of the ways – Holmes' desire to produce serious information design was more important than designing attractive charts to sell magazines; he no longer wanted to be known as a cartoonist who overlaid statistics onto illustration. He maintained that to produce accurate information design, facts had to be understood and conveyed simply – without over-

[355] *USA Today* was founded in 1982, cited as 'a visual newspaper'. It had a reputation for being colourful and bold with many large diagrams, charts and photographs, but was criticised for dumbing down journalism as it condensed large amounts of information into small areas (it was nicknamed 'McPaper' due to its lightweight content). *USA Today* was also known for its championing of information design (or 'infographics') and the inauguration of a new era of sophisticated visual journalism. Examples of visual journalism can be found at www.visualopolis.com.

elaborating the message just because technology allowed it.[356]

Starting Explanation Graphics in 1993 and publishing *Drawing to Explain*

Holmes' reputation at *Time* quickly allowed him to establish an extensive client base for Explanation Graphics.[357] Working solo allowed him to take a more serious approach to graphic argument, and focus on the explanation of difficult concepts using word and image, maintaining full editorial control by either conducting his own research or relying on clients to provide links to accurate data.

Drawing to Explain

In 1998 Holmes published a small-format 36-page booklet *Drawing to Explain: The Gap Between Drawing and Seeing* based on ideas he had spoken about at the 'Languages of the Brain' conference in Paris earlier that year. The booklet was designed to bridge the gap between editorial and creative departments in the publishing industry. It included a section on Isotype, and showed how Holmes' theoretical knowledge of the principles was beginning to permeate into his design practice. He was impressed by the simplicity of Neurath's charts, and how he combined pictures with statistics, considering that the Isotype system had been devised 'to counter bad representations of numbers':[358]

> Created to fit together in rows, Arntz's symbols fulfilled Neurath's desire to be both pictorially attractive and mathematically accountable.[359]

The booklet articulated several of the graphic and operational principles of Isotype: use of repeated symbols to show magnitude, symbols functioning as repeatable units 'marked-off' in groups to facilitate counting, **(Fig. 64)** silhouette as the most recognizable view of an object, a humorous approach to composite symbols and a warning against the use of perspective.[360] Holmes reinforced Neurath's advice on how to achieve simplicity by reducing the object to its essence through silhouette, but suggested that a compromise was sometimes needed to find the best way to represent form. Holmes' ideas on the form a symbol should take are much less

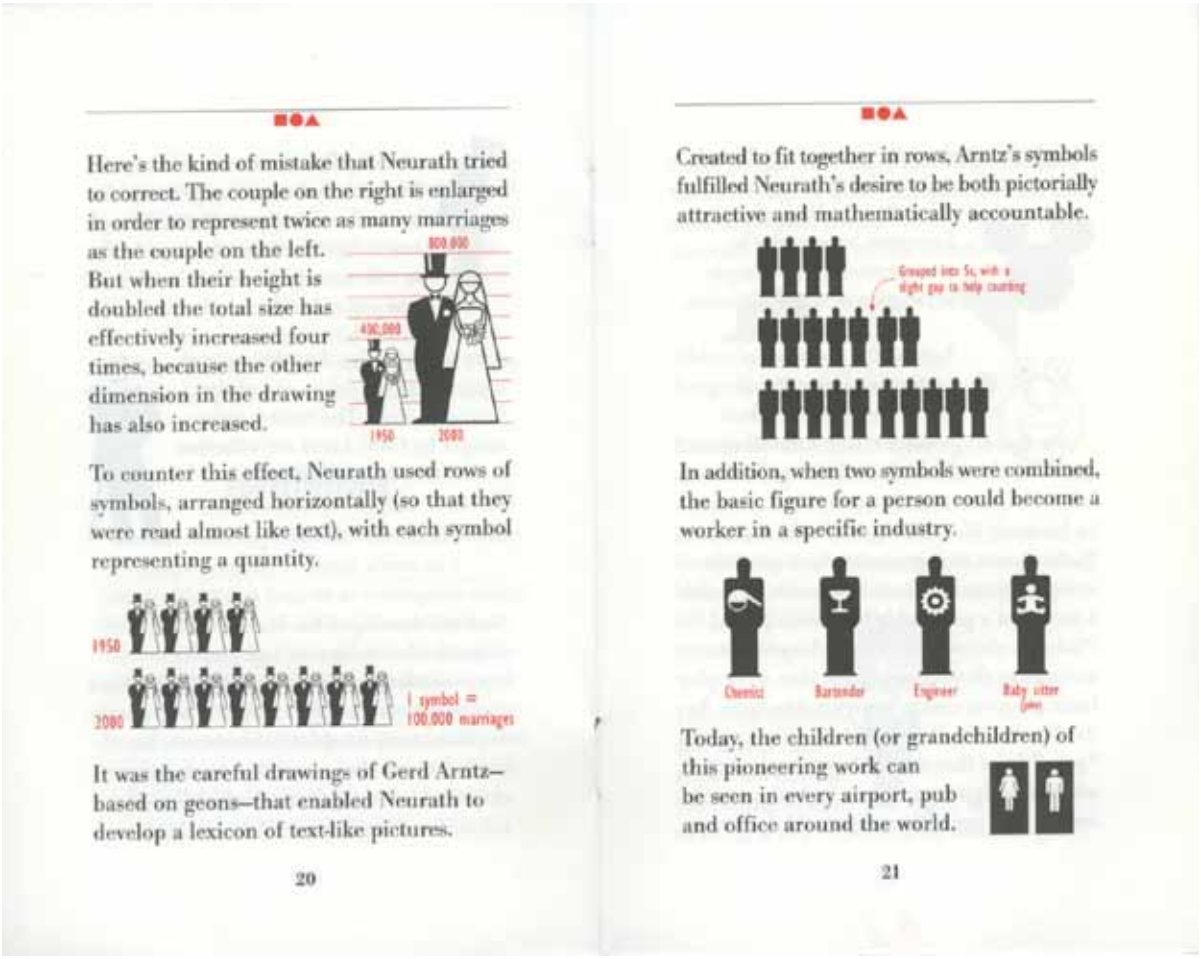
356 'If you have a news article and you are going to render it completely you've got to know everything about it because those programs [3D computer software] demand all the detail that you want to see. But if we were to come to a war you would want to know, how exactly did a bomb go off, or what did people look like when they fell down, or what was Saddam's bunker like when they discovered it? There are countless examples of people who got it wrong because they were using very involved 3D renderings to make them look like photographs. [...] They got it wrong because they were making it up because the technology demanded the detail. So that confirmed even more that I should go simpler for these kinds of things…' Taken from a formal interview with Holmes, Zeist, Holland (March 2009). See Appendix 2.

357 Explanation Graphics' client list includes: Apple, *Fortune* magazine, Nike, The Smithsonian Institution, Sony, United Healthcare, US Airways, Visa, *Discover*, *Harper's OnEarth* (NRDC), *The New Yorker*, and *The New York Times*.

358 Nigel Holmes, *Drawing to Explain: The Gap Between Drawing and Seeing* (Nigel Holmes, 1998), pp. 18-21.

359 *Ibid.,* p. 21.

360 Holmes cited the example of a tall and a short man sharing the same spatial plane. We perceive the short man to be standing behind the tall man, whereas they are actually both just different sizes occupying the same plane.



Here's the kind of mistake that Neurath tried to correct. The couple on the right is enlarged in order to represent twice as many marriages as the couple on the left. But when their height is doubled the total size has effectively increased four times, because the other dimension in the drawing has also increased.

800,000
400,000
1950
2000

To counter this effect, Neurath used rows of symbols, arranged horizontally (so that they were read almost like text), with each symbol representing a quantity.

1950
2000
1 symbol = 100,000 marriages

It was the careful drawings of Gerd Arntz—based on geons—that enabled Neurath to develop a lexicon of text-like pictures.

20

Created to fit together in rows, Arntz's symbols fulfilled Neurath's desire to be both pictorially attractive and mathematically accountable.

Grouped into 5s, with a slight gap to help counting

In addition, when two symbols were combined, the basic figure for a person could become a worker in a specific industry.

Chemist
Bartender
Engineer
Baby sitter

Today, the children (or grandchildren) of this pioneering work can be seen in every airport, pub and office around the world.

21



(Fig. 64)
above Page from *Drawing to Explain,* demonstrating Holmes' knowledge of the principles of Isotype.

(Fig. 65)
left Holmes' contact details showing the construction of symbols using metaphor, elevation, plan and parallel projection.

rigid than Neurath's, as can be seen by the variety of drawing systems he uses – elevation, plan and silhouette, often combining them with metaphor. **(Fig. 65)**

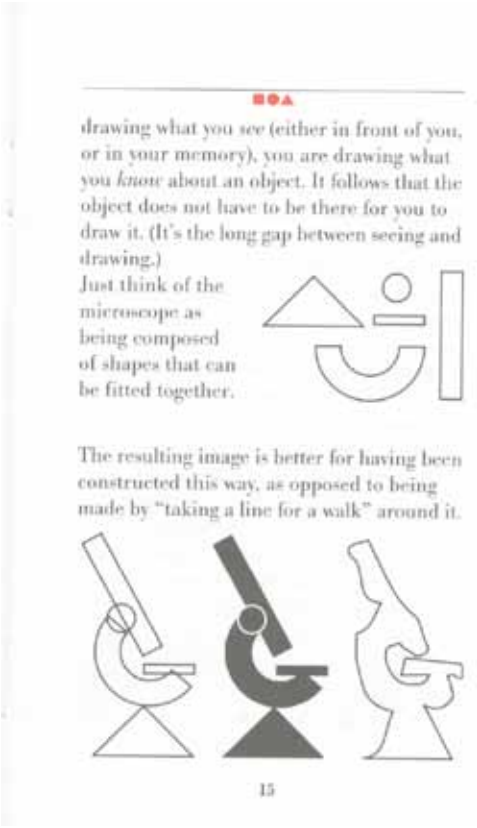
Holmes also explained how he created symbols, using what he understood about an object as a starting point, not what he immediately saw. He blended freehand drawing, with 'geons'[361] to capture the essence of the object and combined simple geometric shapes to form new symbols. He introduced the notion that Isotype symbols are composed of geons,

361 Irving Biederman put forward the notion of geons to explain object recognition. The 'Recognition-by-Components theory' (RBC) suggests that there are less than 36 geons or three-dimensional shapes which we mentally assemble to form unlimited objects, and use as a guide to understand new objects. The theory proposes that the main components we look for when identifying new objects are the edges, enabling us to maintain the same perception of the object regardless of the viewing orientation. We also look for where edges meet, so we can separate out the individual geons that make up each new object. http://en.wikipedia.org/wiki/Geon_(psychology).

easily understood shapes, reproducible in small sizes, capable of being used in multiples and assembled to represent known objects and form a complete visual language. (Fig. 66)

> It was the careful drawing of Gerd Arntz – based on geons – that enabled Neurath to develop a lexicon of text-like pictures.[362]

Drawing to Explain highlights the admiration Holmes has for the qualities of simplicity, clarity and humanity found in Arntz's drawing, describing how these qualities gave Neurath's statistical charts a sympathy with the subject matter. (Fig. 67) Holmes began to emulate Arntz's drawing style, and examples of this can be seen throughout his later work.



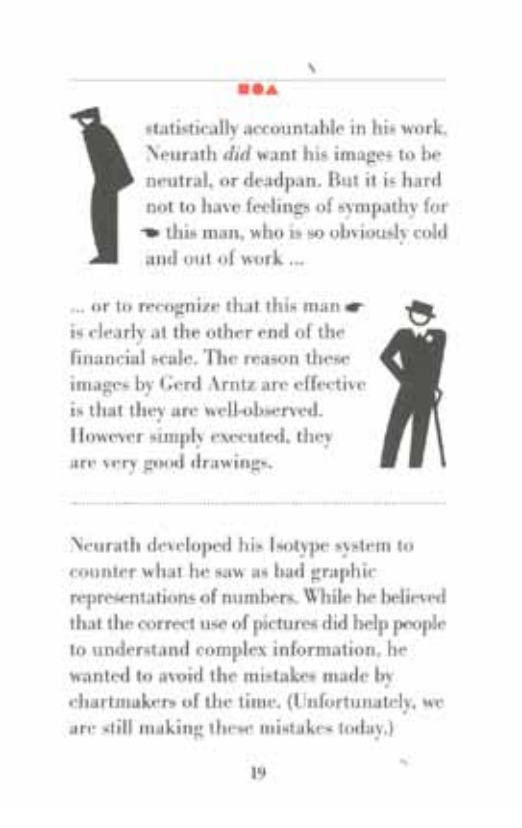
drawing what you *see* (either in front of you, or in your memory), you are drawing what you *know* about an object. It follows that the object does not have to be there for you to draw it. (It's the long gap between seeing and drawing.)

Just think of the microscope as being composed of shapes that can be fitted together.

The resulting image is better for having been constructed this way, as opposed to being made by "taking a line for a walk" around it.

15

(Fig. 66)
Page from *Drawing to Explain* showing how Holmes constructs symbols.



statistically accountable in his work. Neurath *did* want his images to be neutral, or deadpan. But it is hard not to have feelings of sympathy for this man, who is so obviously cold and out of work ...

... or to recognize that this man is clearly at the other end of the financial scale. The reason these images by Gerd Arntz are effective is that they are well-observed. However simply executed, they are very good drawings.

Neurath developed his Isotype system to counter what he saw as bad graphic representations of numbers. While he believed that the correct use of pictures did help people to understand complex information, he wanted to avoid the mistakes made by chartmakers of the time. (Unfortunately, we are still making these mistakes today.)

19

(Fig. 67)
Page from *Drawing to Explain* showing Holmes' appreciation of Arntz's symbols of an unemployed and a wealthy man, which often feature in Holmes' design work. (These symbols appear in Modley's 1976 *Handbook of Pictorial Symbols* credited to 'The Pictograph Corporation' (they were not designed by Arntz). They can also be seen in Modley's *1100 Pictorial Symbols* and in Krampen et al, *World of Signs*).

362 Holmes, *Drawing to Explain*, p. 20.

'A Quick Scan on Bar Codes' Diagram for US Airways *Attaché* magazine (1998) (Fig. 68)

Context

After leaving *Time*, Holmes began to move away from metaphor-laden images in favour of a more simplistic approach. He lost the support of a rigorous in-house research department and took overall control of data collection, editorial and graphic realization, revisiting the role of 'designer-journalist' from *Sunday Times* days. Although humour still played a part in his work, his focus moved towards education and the process of explaining complex ideas. This chart represents one of his early solo projects for Explanation Graphics, and described the technology behind bar codes, using the notion of a 'Noah's Ark Supermarket' and the visual analogy of a bar code likened to a zebra's stripes


[INFORMED SOURCES]

HOW IT WORKS

A QUICK SCAN ON BAR CODES

After a quarter century of use, those little lines are appearing on cars, the space shuttle, even bees. BY JIM COLLINS

(Fig. 68)
'A Quick Scan on Bar Codes', *Attaché* (1998).

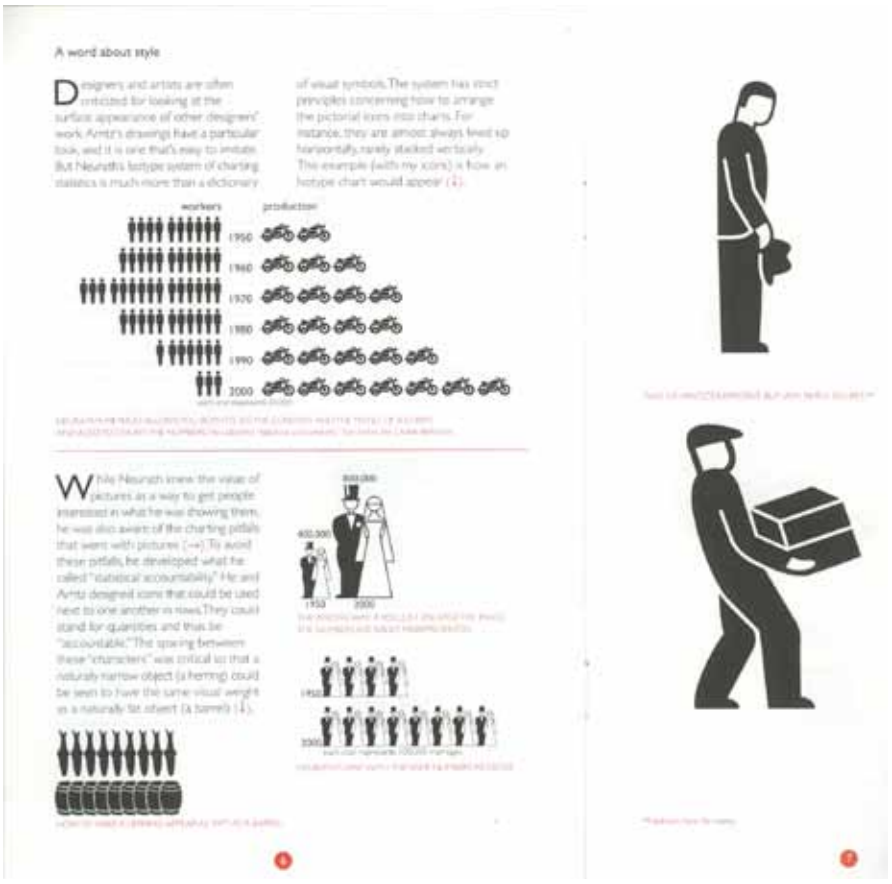
Visual analysis and extent of exposure to Isotype principles

While the mode of graphic argument used in 'A Quick Scan on Bar Codes' chart does not conform to Isotype principles of graphic argument, the diagram did incorporate several of the philosophical and intellectual, and methodological principles; most particularly Holmes' desire to produce work which explains difficult concepts to the public (although *Attaché* had a select audience). Holmes continued to adopt the role of transformer, researching a complex subject and explaining it with clarity using metaphor, simple language, graphic signifiers, and a flow chart in this project.

2000 onwards – continuing work with Explanation Graphics

In 2000, Holmes wrote his most outspoken endorsement of Isotype in the paper[363] *Pictograms: A View from the Drawing Board, or, What I Have Learned from Otto Neurath and Gerd Arntz (and Jazz)*, acknowledging the part that Isotype played in his work, building on content from *Drawing to Explain.* References to Neurath and Arntz are extensive, both in the appreciation of Arntz's deceptively simple drawing style, (which Holmes again connects with geons) and Neurath's statistical accountability. **(Fig. 69)**

> Am I stealing Arntz's work? I hope it's seen more as homage to him. I have tremendous respect for his work, and I'd like to think this essay might help others appreciate his influence on aspects of current graphic design[364] **(Fig. 70)**

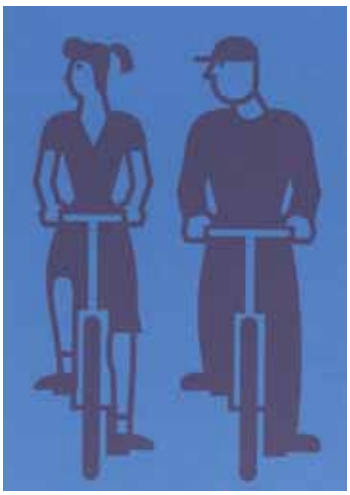


(Fig. 69)
Pages from *Pictograms: A View from the Drawing Board, or, What I Have Learned from Otto Neurath and Gerd Arntz (and Jazz)* (2003).

Holmes used this paper to discuss the practical development of his own graphic language: how he made symbols appear as a cohesive set using shape, how he retained evidence of the physical action of drawing in a mechanical symbol and the compromise between personal

363 Also reproduced as a self-published booklet and in Annick E. & Bruinisma M., (eds) *Gerd Arntz Graphic Designer,* (Rotterdam: 010 Publishers, 2010).

364 Taken from inside the front cover of the self-published booklet Nigel Holmes, *Pictograms: A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)* (Norwalk CT USA: Nigel Holmes, 2003). On the cover of the same booklet is a pictogram of a male and a female cyclist 'Erin and I cycling' that Holmes has based on a symbol designed by Arntz from the 1930s. **(Fig. 70)**



(Fig. 70)
Homage to Arntz, 'Erin and I cycling'
Pictograms: A View from the Drawing Board, or, What I Have Learned from Otto Neurath and Gerd Arntz (and Jazz) (2003).

visual vocabulary and client requirements. Some of these considerations have parallels with Isotype. In *Pictograms* Holmes illustrated pictorial symbols from various stages of his career; from the complex individual icons he drew for *Radio Times* from 1969–78, to the more unified set he produced for the *Mexican Yellow Pages* in 2001. He also included a more varied set of icons taken from 1987– 2003, drawn using realistic and simplified silhouette, various forms of parallel projection, plan views, elevations, caricature and differing line weights. Some of these symbols bear a resemblance to Arntz's work. **(Fig. 71)** Holmes' diversity of styles raises the question of whether there should be a universal language of symbols, as Neurath had hoped to achieve with Isotype, but Holmes concluded that while he employed a personal lexicon of symbols, the only suitable place for a universal language was the airport, to counteract language difficulties.

Holmes also warned of the dangers of plagiarising Isotype without a full understanding of the principles and emphasised the importance of statistical accountability by repeating examples from *Drawing to Explain,* explaining how spacing and a sensitivity towards the visual weight of units led to a more unbiased impression, so avoiding 'charting pitfalls'.[365]

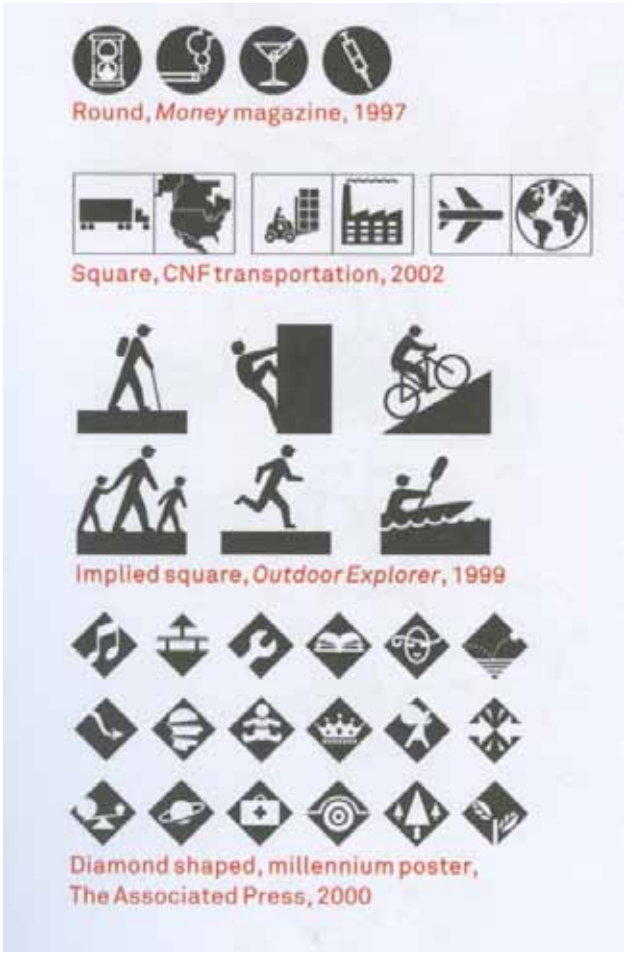
> When designers imitate just the look of an Isotype chart, even if the original underlying 'system' is not strictly adhered to, we give our graphics only the 'feel' of information design. We fool ourselves if we do not admit that this kind of copying happens. But what we are doing is producing decoration, not information design. [...] It is a sort of salute to the language that Marie and Otto Neurath developed with Arntz and others, but those who don't follow Neurath's rules, cannot really 'speak' his language.[366]

[365] *Ibid*., p. 6.
[366] Holmes, 'Pictograms: A View from the Drawing Board', 138.

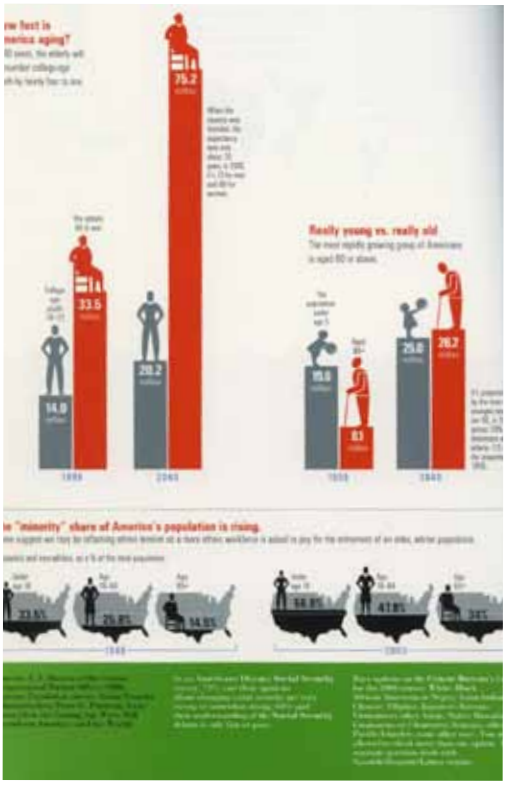


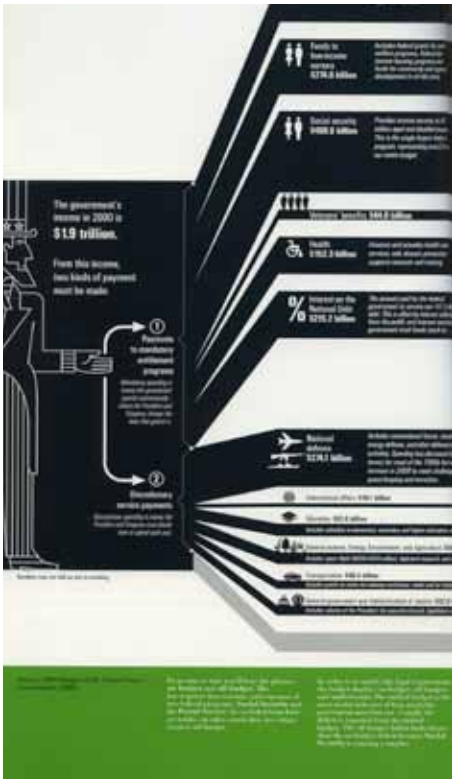


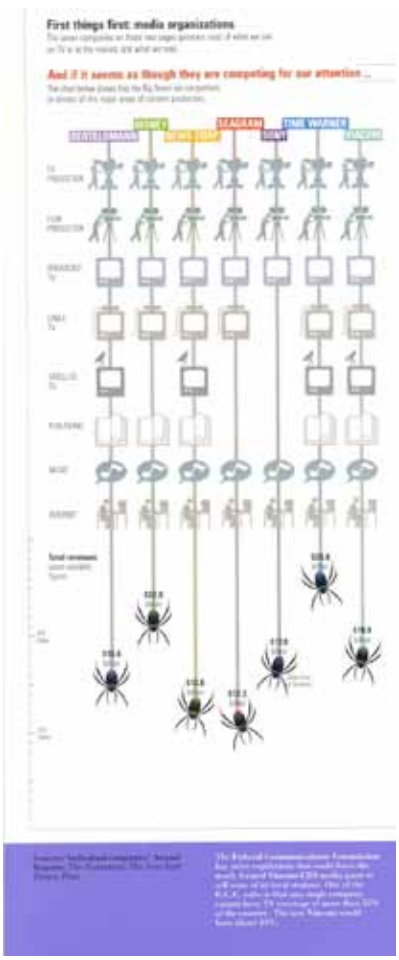


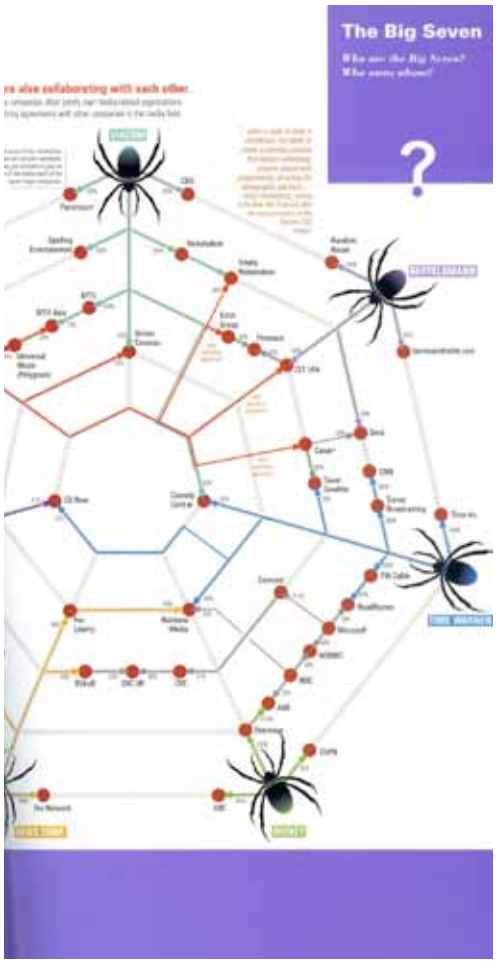


(Fig. 71)
Symbols from various stages of Holmes' career.
top left Radio Times 1969–78, *above* Mexican Yellow Pages 2001.
left various 1987–2003.
below, various 1997–2002, *Pictograms: A View from the Drawing Board, or, What I Have Learned from Otto Neurath and Gerd Arntz (and Jazz)* (2003).









(Fig. 72)
Pages from *Understanding USA* (1999).

Later graphic work for Explanation Graphics

In late 1999, Holmes was one of the sixteen 'information architects'[367] who collaborated with Richard Saul Wurman in *Understanding USA,* published by TED Conferences Inc., and described by Daniel S. Levy of *Time* (March 2000) as 'a 324 page graphic snapshot that amounts to a candy coloured encyclopedia'. *Understanding USA* takes the form of a visual reference on everything the average citizen needed to know about the US, with colour coded sections on war, crime, education, environmental issues, federal income and expenditure. It consisted exclusively of differing examples of graphic argument from a variety of designers – the only pages of pure text are found in the introduction. Holmes designed two chapters: 'Aspects of the Federal Budget'[368] and 'The Media'. **(Fig. 72)** using flow diagrams with symbols, three-dimensional bar charts (with dollar bills), block diagrams, pie charts, stylised illustration and simple maps to present the information. He made extensive use of Isotype-inspired symbols, often as repeated units to show magnitude.

Holmes designed more explanatory books with Wurman during the early 2000s, including *Diagnostic Tests for Men* (2001) and *Diagnostic Tests for Women* (2001) also employing simple diagrams, flowcharts with pictograms, large headings and eye-catching typographic pointers. The caricature signifying head of 'Dr Seemore' dispenses additional advice to draw attention to important information. These books were predominantly printed in black and red (for emphasis), with subdued tints for infill, text boxes and background images. **(Fig. 73)**

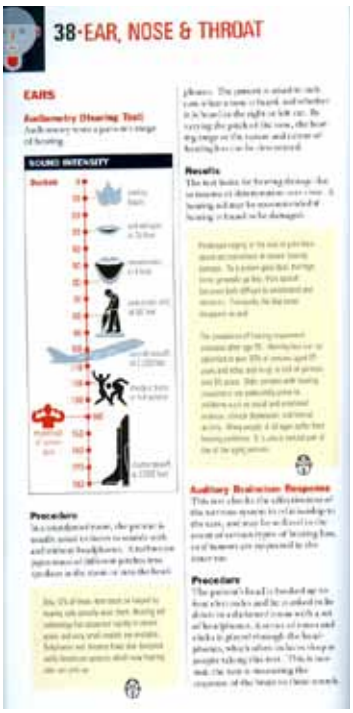
The short animated film that Holmes produced for TEDX [369] illustrated how thoroughly he had absorbed Isotype principles of graphic argument into his work. The film clearly explains the enormity of the US Surplus and National Debt using the relative thickness of a $100 dollar bill, which grows vertically over time, using changes of scale to show comparison combined with commentary, text, and animated pictorial charts with *Führungsbild*. The film uses simple passive silhouette images, which are stylistically close to Arntz's symbols.[370] Holmes' animated film lacks the austerity of Isotype animated diagrams in films such as 'World of Plenty', where diagrams

[367] Wurman originally coined this phrase expressly to lift the design profession away from being concerned with surface appearance. The term has now been adopted by the online industry to describe designers who navigate through web-based information. Holmes prefers to be known as an 'explanation designer', Heller, *Nigel Holmes*, p. 71. The 'Information architects' who have designed sections of this book (along with Wurman) are: Nigel Holmes, Reed Agnew, Don Moyer, Clement Mok, Krzysztof Lenk, Paul Kahn, Joel Katz, Michael Bierut, Kit Hinrichs, Robert Greeenberg, Hani Rashid, Lise Anne Couture, Ramano Rao, Tom Wood, Nancy Green and Michael Donovan. There is considerable evidence of the use of simple pictograms in this book (sometimes repeated to indicate magnitude) combined with many other varied modes of graphic argument.

[368] Holmes collaborated with Meredith Bagby, (a financial writer) on this section.

[369] TED is a small non-profit making organisation devoted to 'Ideas worth spreading', founded by Wurman in 2002 as an International conference bringing together people from the three worlds of Technology, Entertainment and Design.

[370] This film, along with Vampire Power, can be seen on Holmes' website www.nigelholmes.com. Holmes cites the film 'Powers of Ten' by Charles and Ray Eames (described on the inside front flap of the book of the same name as 'A Film Dealing with the Relative Size of Things in the Universe and the Effect of Adding Another Zero, made by the Office of Charles and Ray Eames') as being useful in describing visual comparisons, Heller, *Nigel Holmes*, p. 50. See www.youtube.com/watch?v=0fKBhvDjuy0.



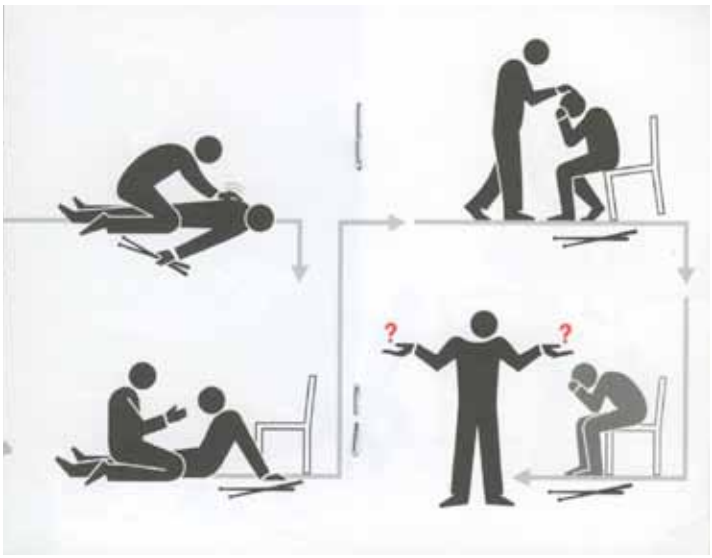
(Fig. 73)
Page from *Diagnostic Tests for Men* (2001).

are preceded by the authoritative announcement 'I am Isotype' explaining why peacetime house building schemes are not functioning, and offering visual solutions to ameliorate the situation.[371]

Holmes' adherence to Neurath's principle of ordering information to allow its significance to become visually evident can be seen in the animated film 'Vampire Power'. The metaphor of a blood-sucking vampire is used to represent electrical appliances left on stand-by needlessly using up power. The overall concept of the vampire is used to highlight secondary information evidencing exactly why appliances should be switched off. In this witty animation Holmes is transforming facts into the components he needs to tell the story responsibly with truth and clarity.

The majority of Holmes' explanatory projects consist of a combination of text, image and graphs, as can be seen in *The Citizen's Guide to the Airwaves* (2003), (discussed later in this section). *It's the Economy, Stupid!* (2008), formed one of *The Good Sheets* – a weekly series explaining important issues to the public,[372] describing the state of the economy from 1920 to 2008 using timelines with symbols, annotation and a fever chart. Many of his symbols bear a resemblance to those of Arntz, and Holmes' homage to Arntz's unemployed man also appears. There are also several elements which could be related to the integrated picture-text principle including use of horizontal landscape elevations, and sequences of repeated images.

371 See Paul Rotha, 'Land of Promise: The British Documentary Movement 1930–1950' (DVD, BFIVD756).
372 The Good Sheet No. 006 October 16-22 2008 www.good.is/everyone.



(Fig. 74)
Pages from *The Red Hat* (2008) showing sequential narrative imagery.

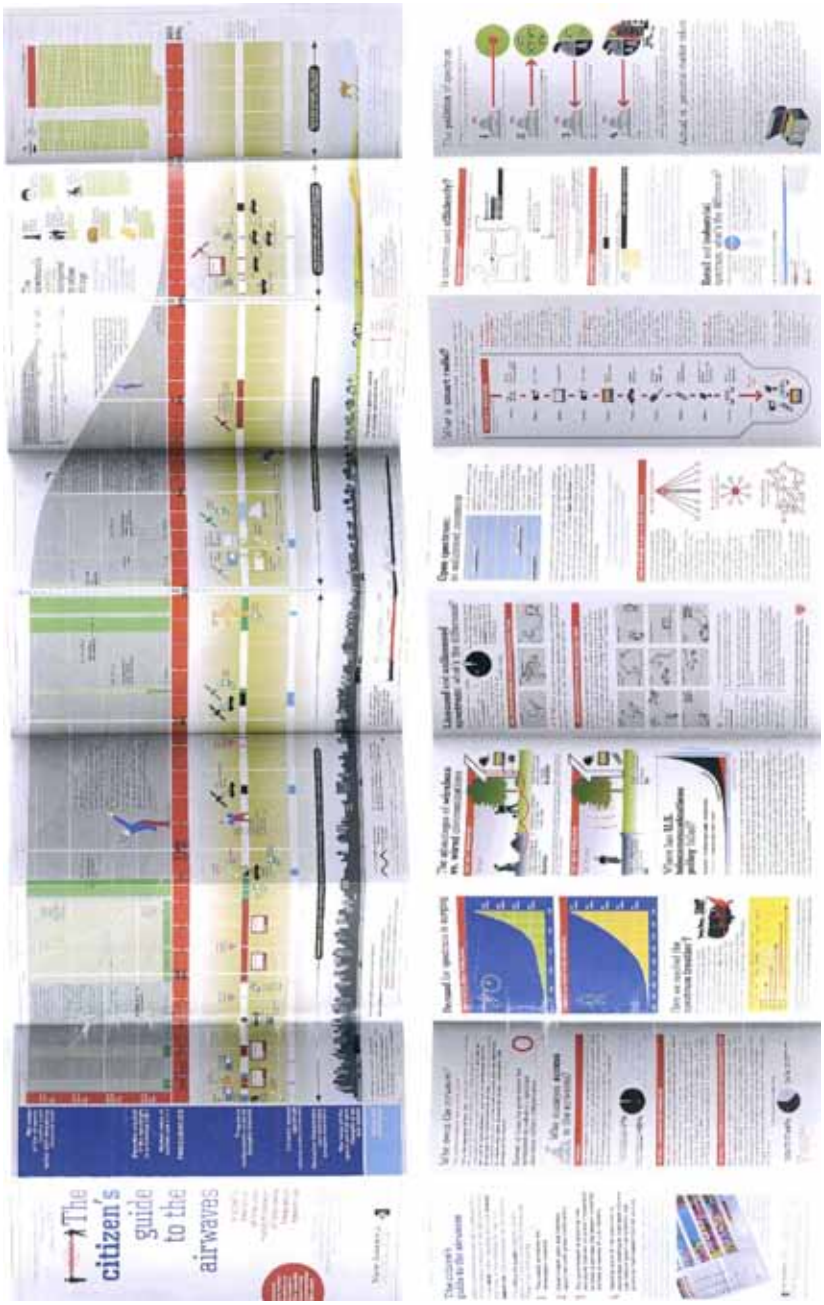
More recently, Holmes has designed pocket-sized books using his own simple visual language, including *Wordless Diagrams* (2005) and *Red Hat* (2008),[373] which contain no text (other than contents, credits and titles) and rely on sequential diagrams and simple narrative illustration. *Wordless Diagrams* is a witty visual experiment containing small groups of step-by-step diagrams which explain how things work. *Red Hat* **(Fig. 74)** uses repeated simple graphic language arranged in a narrative sequence without words to tell a simple story. In contrast, *The Enlightened Bracketologist* consists of an amusing set of algorithmic pathways for making effective decisions – without images.[374] In these projects Holmes has shown that he can communicate effectively using just words or images, but he maintains that a combination of word and image forms the best method of communication.

For the last decade, Holmes has been involved in socially inclusive projects explaining complex concepts in layman's terms, involving subjects such as the economy, the airwaves, the Iraq war, 9/11, climate change and social reconstruction after Hurricane Katrina. He has also produced a his series of booklets *The Smallest Ever Guide to Life Sciences, The Smallest Ever Guide to the Hydrogen Economy* and *The Smallest Ever Guide to the Internet.* From the visual appearance of much of his design work after 2000, it would appear that his academic knowledge of Isotype has been influencing his mode of graphic argument.

373 A self-published booklet which grew out of Holmes' love of jazz.

374 Mark Reiter & Richard Sandomir, (eds), *The Enlightened Bracketologist: The Final Four of Everything.* (New York: Bloomsbury, 2007). A book designed without pictures, just words. Through a process of elimination, a panel has selected the most popular element from each category, i.e. the best font, the best film, or the best food.

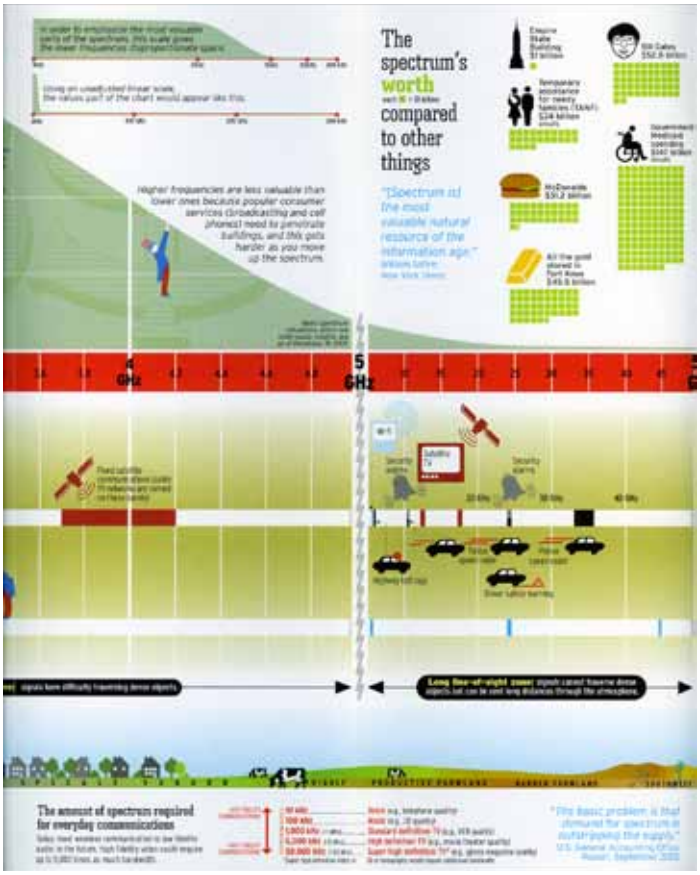
‘The Citizen’s Guide to the Airwaves’ for the New America Foundation (2003) (Fig. 75)



(Fig. 75)
‘The Citizen’s Guide to the Airwaves’ (2003).

Context

Holmes stated that ‘The Citizen’s Guide to the Airwaves’ **(Fig. 75)** was the most difficult job that he had undertaken up to that point in his career due to the huge variances in numerical information, complexity of subject matter, industry jargon and undefined target audience. The resulting multi-layered, two-sided concertina-folded chart (with supporting explanatory diagrams and information) puts forward the notion that the US Government had been misusing a public facility (the airwaves) and explains how high speed Internet access could be provided for all. By attempting to explain complex data, Holmes has designed information to increase knowledge on a little understood subject and introduce it as a public facility, rather than a privilege.

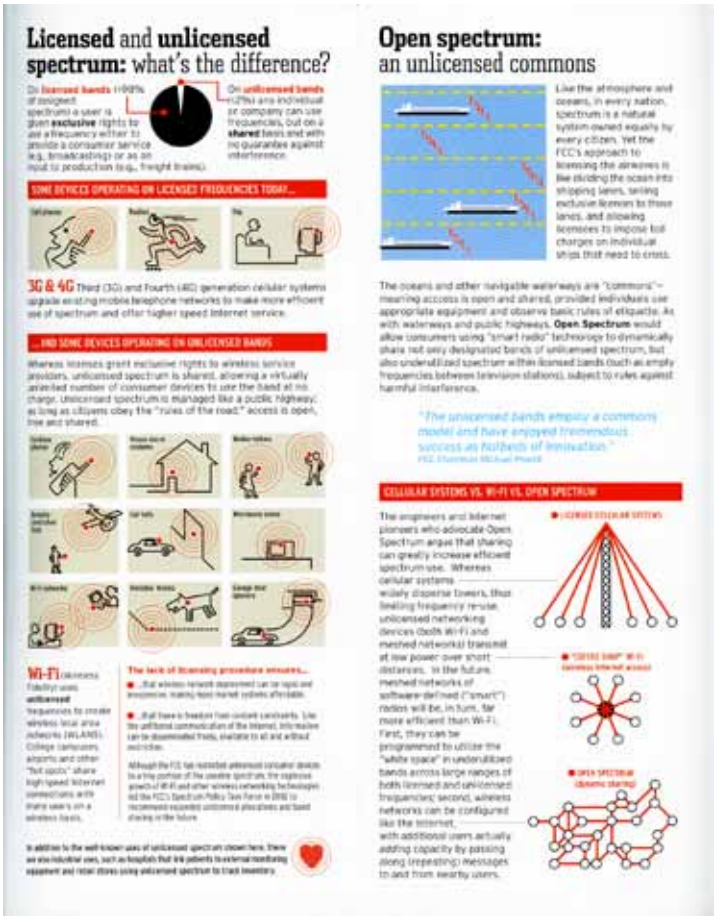


(Fig. 75)
'The Citizen's Guide to the Airwaves' (2003) showing use of simple symbols, *Führungsbild*, repeated units used to represent magnitude, and a horizontal cut through section used as a timeline. The Uncle Sam motif reappears throughout Holmes' work.

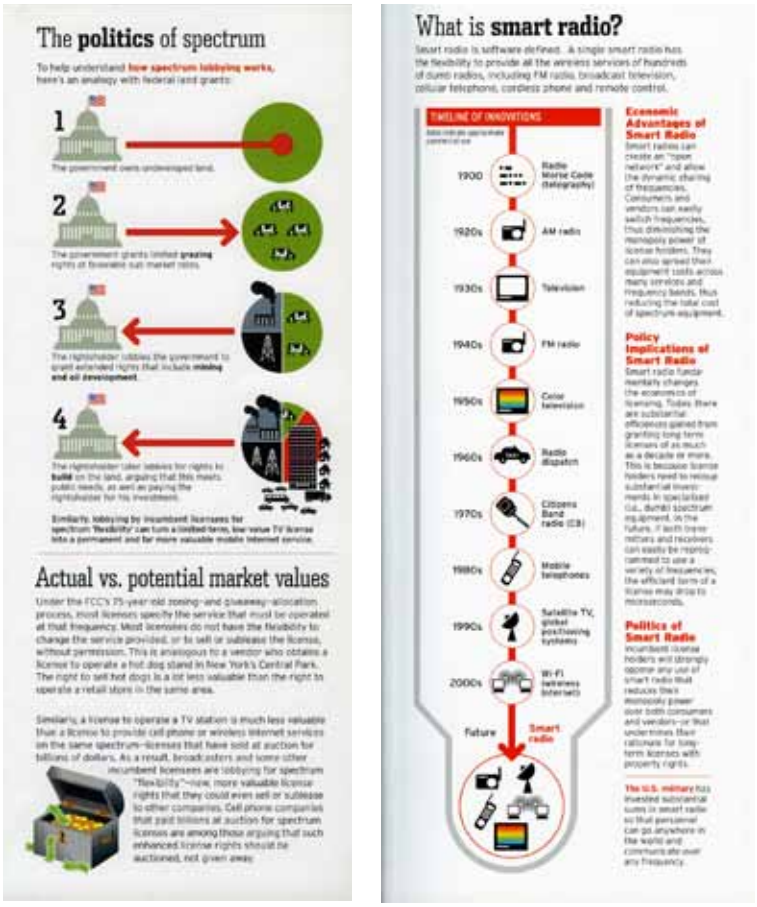
Visual analysis and extent of exposure to Isotype principles

There is sound evidence that Holmes has incorporated Isotype principles of graphic argument into 'The Citizen's Guide to the Airwaves'. He continued to adhere to the philosophical and intellectual and methodological principles through his preference for projects of a socially inclusive educative nature and in his ability to transform complex data into accessible public information. His mode of graphic explanation also incorporated many of the graphic and operational principles; magnitude is represented by repeated equal-sized units and concise graphic symbols in outline or silhouette form appear (mostly avoiding perspective). There is evidence of *Führungsbild,* set along a horizontal time-line, and repeated tabular block diagrams (which can be likened to the integrated picture-text principle). Holmes mixes these elements with alternative modes of graphic argument and other drawing styles to add variety and differentiate between categories of information.

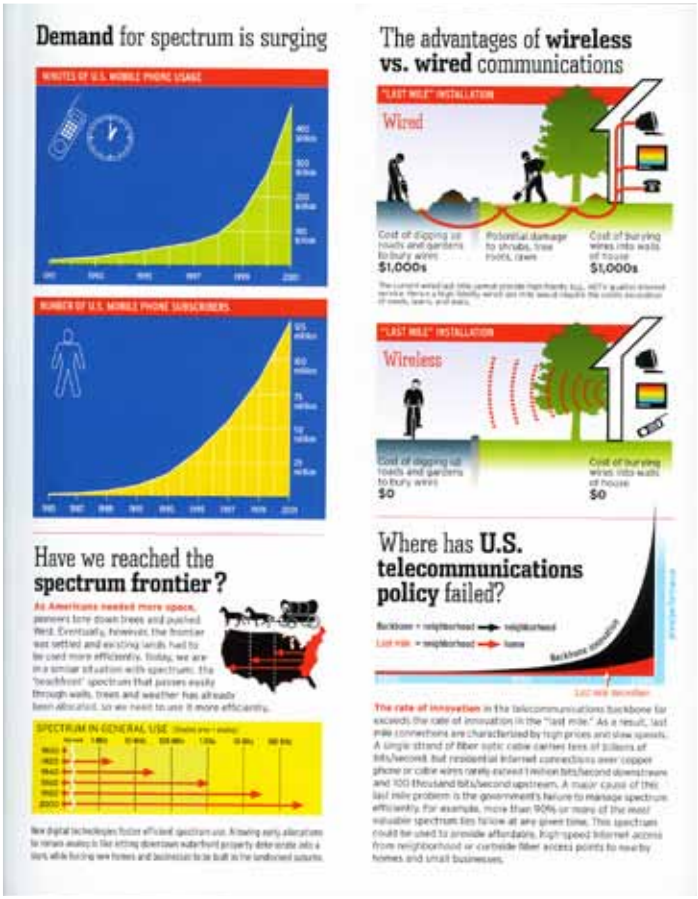
Holmes writes about his admiration for the principles of Isotype, and considers that plagiarising them negates their effectiveness, but in summary, his inclusion of the principles within his work is as just one of a number of methods which make up his combined repertoire of graphic argument. The following section summarises which specific principles Holmes incorporates into his mode of graphic argument and those he chooses to ignore.



(Fig. 75)
'The Citizen's Guide to the Airwaves' (2003) showing use of sequential diagrams and Arntz-inspired shipping combined with a variety of other modes of graphic argument and drawing styles.



(Fig. 75)
'The Citizen's Guide to the Airwaves' (2003) showing use of simple symbols arranged sequentially, pie charts with symbols and *Führungsbild*.



(Fig. 75)
'Last Mile installation' from 'The Citizen's Guide to the Airwaves' (2003) showing use of sequential horizontal cut-through sections.

Which principles does Holmes include in his design work?

Evidence of philosophical and intellectual principles

2. socially inclusive
3. disseminated social knowledge
4. educational
5. International

> Neurath is probably the biggest single influence on my work and thinking […] He wanted the people of Vienna to be interested in their social conditions, housing.[375]

Over the last decade, Holmes has chosen to concentrate on projects which explain complex social issues to a general audience. He is passionate about 'Information literacy' – visually describing what numbers really stand for in simple terms.[376] His TEDX film on the Federal deficit used this fascination with numbers through scale and comparison. His work with Richard Saul Wurman gave him access to issues involving the simplification of healthcare and his design for the two sections of *Understanding USA* took him further into the political arena, lucidly explaining the state of the economy to the American public. He considers that it is his

375 Heller, *Nigel Holmes*, p. 12.
376 *Ibid.*, pp. 89-92.

responsibility as 'an average man on the street' to be informed about social, governmental and electoral issues, firmly believing that information designers should present facts that benefit society, echoing Neurath's fundamental beliefs.[377]

Evidence of methodological principles

1. transformation and teamwork
2. ordered information to allow its significance to become visually evident
3. reductive by nature, achieving a balance between abstraction and pictorial representation
4. symbols function as repeatable units
5. universally accessible symbols and syntax
8. use of simple clear language
9. formed a 'helping language'
10. fidelity to material and viewer
11. symbols arranged to show comparative information
12. new symbols only added or adapted if content demands it

Transformation

Latterly, Holmes has been able to concentrate on projects of a socially inclusive nature, which may stem from a greater awareness of the philosophical and intellectual principles of Isotype, but in consequence may align with the type of work he was becoming known for with Explanation Graphics. As has been shown, it is not until the later stages of Holmes' career that many of the graphic and operational principles have been assimilated into his methods of graphic argument, incorporating concise Arntz-inspired repeated unitary symbols, mixed with his own visual repertoire of graphic devices which do not outlaw perspective, line charts and increasing size to indicate magnitude.

> ... just as Neurath was the analytical mind and Arntz was the artist who drew the images people saw, I had rock solid research behind everything I did at *Time*, while I used the best 'drawing' I could to populate and display the information, never forgetting that I was actually there to do informative charts, not just to make interesting images to draw people into the text. But in fact, I always tried to give the reader a visual idea of what the chart was about, and then deliver the information, the numbers, immediately after that first impression.[378]

> The picture-maker has to be guided by the rules of education through the eye and to make a *selection of material which will give a certain teaching effect.*[379]

377 Heller, *Nigel Holmes*, pp. 91-92.
378 *Ibid.*, p. 41.
379 Neurath, *International Picture Language,* p. 29.

Holmes' mode of graphic argument incorporates a process that can be likened to transformation; but the term doesn't feature in his writing, nor does it initially stem from a knowledge of the methodological principles of Isotype. It derives from his ability to write, draw, understand and explain, enhanced by 'designer-journalist' training. Throughout his career, he has had access to primary data allowing him to achieve an overall accurate impression and translate primary data into accessible information.[380] At *Time* Holmes instigated new working practises enabling designers to work directly with editors and information – which could be considered a form of transformation, as could his initial reason for publishing *Drawing to Explain* – to bridge the gap between art and editorial departments in publishing.

Neurath's practical model for transformation included the three roles of subject expert, transformer and art worker. Holmes reduces this model into two roles, by being both transformer and art worker, often also adopting the role of subject expert.[381] Working without the backing of a large organisation, he relies on Google references from clients to research subject matter, from which he extracts and compiles the necessary information. The computer has helped blur the boundaries between these three roles through the ease of researching data online, developing graphic concepts on screen and producing final artwork which can be stored as an electronic lexicon of symbols. Holmes has always 'straddled the gulf between "art" and "editorial" that exists in most publications', believing that 'facts drive the graphic', and the designer should fully understand the subject matter before commencing the design process.[382] This working methodology could be said to be describing a modern day 'trustee of the people'.

Ordering information to allow its significance to become visually evident

Holmes frequently quotes Neurath's maxim of the overall message being evident at first glance, with secondary and tertiary information seen at second and third glances. This has been a constant feature of his work.

Reductive by nature, achieving a balance between abstraction and pictorial representation

Holmes' use of graphic language in later work is reductive. He features simple accessible symbols, devoid of decoration, formed through a combination of drawing (to capture the

380 'For bigger, non-magazine projects I work with the company or organisation to gather facts. This is done by calling or meeting experts suggested by the people commissioning me, calling other sources of my own, reading printed matter and consulting the web. What follows is many email exchanges between various sources, with attached PDF of the work in progress, before a final work is delivered. In some cases I am responsible for the research, design, production of the graphics and ultimately the printing of the piece'. Heller, *Nigel Holmes*, p. 47.

381 'The Citizen's Guide to the Airways' required Holmes to collect data from many diverse sources to compile this complex chart and set of supporting information. He admits that it was the most difficult job he had ever worked on, due to the difficulty of understanding the technical jargon, and working out the right level at which to address his audience. 'I argued that members of Congress were no more likely to understand the science than I was, and eventually we adopted a friendly approach in both the written and the graphical elements.' Heller, *Nigel Holmes*, pp. 86-87.

382 *Ibid.*, p. 37.

essence of the object) geons and the simplifying qualities of Freehand software to create concise artwork. He considers that Arntz worked in a similar way and also incorporated geons into his design process.

Symbols function as repeatable units

in *Understanding USA,* there is evidence of symbols functioning as repeatable units. But Holmes combines them with several other alternative methods of graphic argument such as increasing size to indicate magnitude.

Universally accessible symbols and syntax

Holmes has built up a lexicon of stored electronic symbols, which reappear throughout his work (i.e. the unemployed man and Uncle Sam symbols), but he is aware that a truly universal symbol is difficult to achieve, and is always dependent on cultural nuances, familiarity and context:

> That made me think, you're using these things again and again […] which saves you time, but much more importantly it starts a language […] you see the same little icon again and again […] it speeds things up, I don't have to think about it again, I thought about it hard in the first place […] So that I have in a certain sense my own alphabet and that's why I want to control the words and the pictures.[383] **(Fig. 76)**

Use of simple clear language

Holmes is a proficient writer of clear explanatory texts. He thinks of himself as a designer who writes, not vice versa, but it is clear that he considers that the two go hand-in-hand.[384]

Formed a 'helping language'

Holmes is well aware of Neurath's description of Isotype as a 'helping language' – pictures 'help' words. While he has experimented with just pictures or just words, (*Bracketology* and *Wordless Diagrams*) in 'Pictograms: A View from the Drawing Board' he acknowledges that the best way to communicate is to use a synthesis of both together, which he calls the 'Picture/ word mix'

> …while some airport and traffic sign systems aspire to form a wordless international language, most of the time it is a combination of words and pictures that make the best explanations.[385]

> The words and the pictures are all the same thing, and you might say some things in pictures and some things in words. In *Wordless Diagrams* I was just trying to do it all in pictures. Most of the time it's a real marriage of the two.[386]

383 Taken from a formal interview with Holmes, Zeist, Holland, (March 2009), Appendix 2, p. 321.
384 'I do see myself as a writer of sorts, one who has the luck to have other tools – visual ones – to use in telling a story' Heller, *Nigel Holmes*, p. 37.
385 Holmes, 'Pictograms: A View from the Drawing Board', 142.
386 Taken from a formal interview with Holmes, Zeist, Holland, (March 2009), Appendix 2, p. 321.

Fidelity to material and viewer

Holmes has full editorial control over his work and places great store on the integrity and accuracy of factual information. At *Time* he had the benefit of a rigorous research department behind him, but working solo he relies on clients providing references and Google for additional support. He believes it is his duty as a citizen to be well informed, and this is reflected in the type of work he undertakes at Explanation Graphics.

Symbols arranged to show comparative information

Evidence of this principle can be seen in *Understanding USA*, in the chart 'First things first: media organizations'. He shows the differences between the 'Big Seven' media organizations in USA, combining eight pictograms to illustrate competition amongst media organisations.[387] **(Fig. 72)**

New symbols only added or adapted if content demands it

Many of Holmes' symbols are reused in his own pictorial lexicon. He adapts existing symbols when technology changes their shape. They are stored electronically. '… it's your own set of symbols that work for you, which you up-date and you add to […] which actually is what Neurath wanted to do'.[388]

Evidence of graphic and operational principles

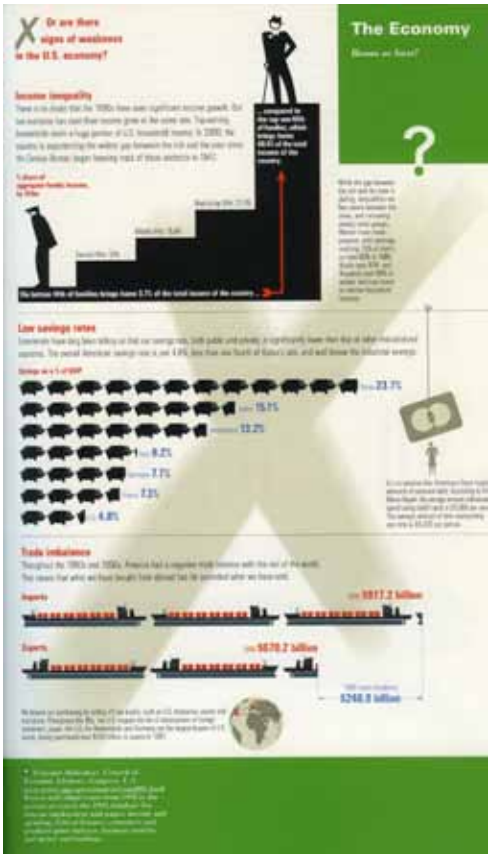
1. equal sized repeated symbolic units arranged horizontally, left to right in rows (unless argument dictates otherwise i.e. height) to indicate magnitude
2. symbols and syntax combined to form a visual grammar
3. symbols are seen in silhouette or outline form, are tonally balanced and occupy a similar visual space
4. avoidance of perspective, adoption of parallel projection and elevation as drawing systems
5. meaning evident in black and white
6. colour used symbolically, taken from a limited palette
8. guide (or qualifying pictures) *Führungsbild* heightened comprehension (graphic signifier)
13. avoidance of certain conventional statistical techniques
    - sizing circles and squares to show comparative amounts
14. integrated pictures and text

Equal sized repeated symbolic units arranged horizontally, left to right in rows to indicate magnitude

Holmes' later attempts at graphic argument make great use of equal sized repeated symbols, but their arrangement varies according to the information presented. In *Understanding USA*

[387] Richard S. Wurman, *Understanding USA* (no folio), 'The Big Seven', (Newport, RI: TED Conferences Inc., 1999).
[388] Taken from a formal interview with Holmes, Zeist, Holland, (March 2009). See Appendix 2, p. 321.

repeated symbols of people, cargo vessels and piggy banks **(Fig. 76)** indicate differences in quantity. However, Holmes does not apply Neurath's rigid axial rules to these charts, neither does he limit rows of information to six, but simply uses repeated same size symbols to show magnitude, arranged either in blocks or rows, 'marked-off' to facilitate counting.



(Fig. 76)
'The Economy' from *Understanding USA* (1999) showing Holmes' 'unemployed man' and 'better off man' symbols, and use of repeated symbols to indicate magnitude.

Symbols and syntax combine to form a visual grammar

In essence, the balance between word and image in Holmes' work is dependent on finding the best way to explain the concept, and varies according to the nature of the work. Holmes enjoys playing with pictograms in a humourous way, but realises that they will only be accessible to a culturally similar audience.

Symbols are seen in silhouette or outline form, are tonally balanced and occupy a similar visual space

Holmes has several graphic styles at his disposal, one that is very similar to that of Arntz, presented in silhouette or outline form, but not exclusively. He is aware of 'charting pitfalls' – the tonal balance required within charts to provide unbiased information.

> The spacing between these 'characters' was critical so that a naturally narrow object (a herring) could be seen to have the same visual weight as a naturally fat object (a barrel).[389]

389 Holmes, 'Pictograms: A View from the Drawing Board', 137.

Avoidance of perspective, adoption of parallel projection and elevation as drawing systems

Holmes does not avoid perspective, but warns against its misuse in terms of perceived scale in *Drawing to Explain*. He constructs symbols using the projection that delivers the essence of the object most effectively, incorporating geons. He uses silhouette, elevation, parallel projection and perspective, as he deems appropriate.

> When you understand perspective and the hold it has on our brain, you will sometimes have to deliberately discard it so that readers are not fooled into getting a wrong impression from your graphics.[390]

Meaning evident in black and white

Holmes' work is often in black and white (sometimes because of printing constraints), but also because of the discipline of only using colour to create emphasis.

Colour used symbolically, taken from a limited palette

Holmes states that he only ever uses colour symbolically, never for decorative reasons.[391] He uses a limited colour palette, mostly red and black, with reflex blue for tertiary information, and shows a reluctance to use other colours unless in subdued form as background tints.

Guide (or qualifying) pictures *Führungsbild* heightened comprehension as graphic signifier

Holmes makes frequent use of graphic signifiers – *Führungsbild* – sometimes as a metaphor to make charts more accessible to the audience.

Avoidance of certain conventional statistical techniques

- sizing circles and squares to show comparative amounts

Holmes believes that to repeat symbols is better than to enlarge them to indicate magnitude. If symbols are enlarged, they become geometrically thicker and accurate differences are difficult to detect. He criticised *The New York Times* for 'overdoing the values represented by the area of a circle' because it only works if there are large differences between the data represented by the circles.[392] Hans Rosling uses comparative circles to show differing amounts, in *Gapminder,*

390 Holmes, *Drawing to Explain*, p. 30.

391 'I also started to work in black and white only and add colour only when it was necessary, so that colour was never decorative. Sometimes you break your own rules but mostly it's symbolic'. Taken from a formal interview with Holmes, Zeist, Holland (March 2009), Appendix 2, p. 321.

392 Willard C. Brinton, *Graphic Methods for Presenting Facts* (New York: The Engineering Magazine Company, 1920), p. 38, also disagrees with the use of comparative circles, as they make the viewer underestimate the comparative ratios. Brinton considers that a bar chart is a much better way to differentiate between amounts.

which Holmes disagrees with:[393]

> The *Gapminder* things look precise because they're abstract and they're nice, and they're animated, you can play with them and you can put in different coordinates and different countries or whatever you're dealing with. But you can't really get precise numbers out of them. Now I know, that from William Playfair onwards, the designers of statistical diagrams and charts have always said that they are representing pictures of numbers, they aren't the numbers themselves. And so if you can get the impression then that's better than nothing or it's better than a load of numbers. I think actually Neurath said that 'you will remember a picture but you won't remember the numbers' and you can always go back to the numbers. But what was great about Neurath was that you could see what the subject was about as well as the numbers, and you can't with *Gapminder* – and you can't because it's all abstract.[394]
>
> …to remember simplified pictures is better than to forget accurate figures.[395]

Holmes concurred with Darrell Huff's ideas in the tongue-in-cheek book *How to Lie with Statistics* (1954). In 'The One-Dimensional Picture', Huff discussed the dangers of increasing size to form graphic comparisons. He stated that if you increase the size of symbols in proportion to each other, you are not only thickening the outlines, but by doubling the height of a symbol, (inferring that one icon represents twice as much as another) you are actually increasing the ratio 4-1, not 2-1. Huff concluded that repeating symbols to show magnitude was the only honest way to show pictographs that 'do not deceive your hasty glance' and remain 'honest and clear'.[396]

Integrated pictures and text

Holmes' later charts all make extensive use of integrated pictures and text. While he discusses elements taken from Neurath's statistical charts and Arntz's symbols he does not make reference to this later adaptation of the Isotype principles of graphic argument as seen in M. Neurath's graphic explanation from the late 1940s and 1950s. In many respects Holmes' use of

393 Ola Rosling, Anna Rosling Rönnlund and Hans Rosling founded Gapminder in Stockholm on 25 February 2005. It is a non-profit making foundation (acquired by Google in 2006). It is intended to be a 'fact tank' to promote a fact-based world. It is a non-profit making venture developing software tools to visualize human development http://gapminder.org. It consists of animated graphs showing statistical information through quantitative circular forms (one for each country). Like Isotype, it differentiates between different parts of the world through 6 colour-coded geographical areas: America, Europe and Central Asia, The Middle East and North Africa, Sub-Saharan Africa, East Asia and Pacific and South Asia. Each individual country within these six areas is represented by a circle. The Gapminder system utilises a graph format with chronology indicated by the horizontal axis and statistics (i.e. the spread of HIV, Infant mortality, population etc.) represented on the vertical axis. The user can select a country and watch its representative circle enlarging and reducing, over an animated time sequence. At the 'Data Designed for Decisions' conference in Paris (June 2009), Yuri Engelhardt and Raul Niño Zambrano of University of Amsterdam presented a paper entitled 'Engaging Citizens with Animated Statistics: From Neurath to Gapminder', in which they found many similarities between the philosophical approaches of Rosling and Neurath. Rosling was also present at the conference.

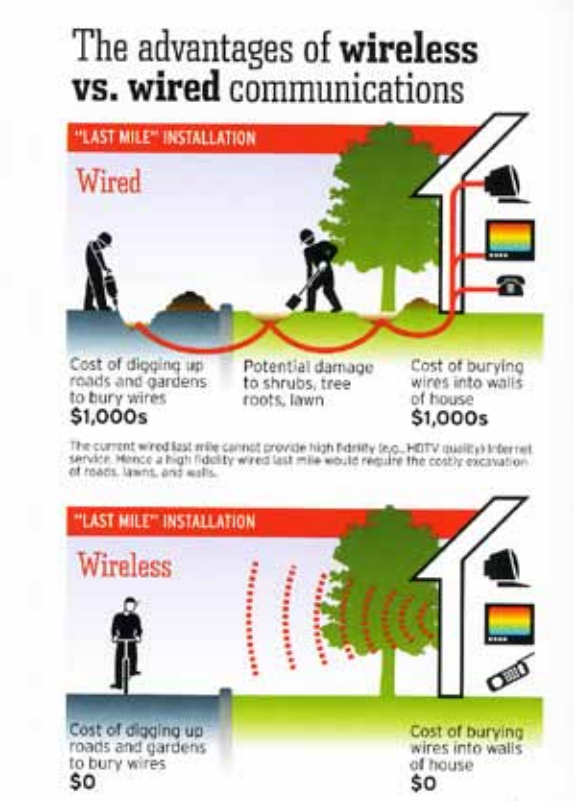
394 Taken from a formal interview with Holmes, Zeist, Holland, (March 2009), Appendix 2, p. 319.

395 Neurath, *Empiricism and Sociology*, p. 220.

396 Huff, *How to Lie with Statistics*, pp. 64-71.

horizontal landscape cut-through sections and sequential tabular charts do bear a resemblance to M. Neurath's work but there is no evidence from Holmes to support the fact, and he only discussed the influence of pre-war principles on his work in his writing and formal interview. (Fig. 77)





(Fig. 77)
Comparing Holmes' work with an example of the Isotype integrated picture-text principle.
left A 'strip' from 'A Visual History of Mankind' series showing narrative sequential diagrams arranged in a tabular format with simple repeated graphic language, featured in Lancelot Hogben, *From Cave Painting to Comic Strip* (Max Parrish: London, 1949).

above 'Last Mile Installation' from 'The Citizen's Guide to the Airwaves' (2003) showing Holmes' use of sequential horizontal cut-through sections and reductive imagery. Note the reappearance of the Arntz-inspired symbol of a man on a bicycle.

Which Isotype principles does Holmes avoid?

Logical positivist/empiricist, anti metaphysical

Neurath avoided metaphors. He developed Isotype as the visual (or physical) embodiment of logical positivism, based on observation and an analysis of everyday and scientific language, using clear factual statements. The language of Isotype was based on the elimination of the metaphysical and vagaries of speech.[397] A metaphor is representative or symbolic of something else – an abstract concept, and a synthetic judgement, and therefore against the principles of Isotype. Holmes' symbols can represent what they sound like or allude to, as can be seen in his contact details: lips represent voice, and a snail represents the postal service. **(Fig. 65)**
These examples are abstractions and therefore metaphysical. The recurring use of metaphor (and visual puns such as likening a zebra's back to a bar code) is a common feature in Holmes' work, often used as a graphic signifier to create interest, combined with his use of wit:

> Wit has been defined as the ability to perceive and express in an ingeniously humorous manner the relationship between seemingly incongruous or disparate things. In simpler words: wit is putting things in interesting contexts. Since much data is best understood through context, wit clearly has a role in explanations.[398]

Internationalism

Neurath attempted to arrive at one set of standardised pictograms that would work in an international context, when used to support words, as a 'helping language'. He tried to avoid symbols that were 'peculiar to certain countries', [399]and it was his wish to use Isotype to support international cooperation. Holmes also wants to celebrate cross-cultural communication, but is against an homogenised approach:

> People have different visions of what things are, and I like variations in languages, in styles; Russian looks different to this; Japanese looks different to this. So I don't want the whole world to be the same because I think that would be very boring. The world is becoming very homogenised. That might be good socially for communication but the difference in cultures should be celebrated as well.[400]

Universally accessible symbols and syntax

> We have made one international picture language (as a helping language) into which statements may be put from all the normal languages of the earth.[401]

> For a democratic society it is important to have a common language.[402]

397 Kolakowski L., *Positivist Philosophy from Hume to the Vienna Circle* (Harmondsworth: Penguin 1972), p. 204.
398 Taken from an abstract introducing Holmes' film 'A Very Short Film about Wit and Humour in Information Graphics', (presented at DD4D, Paris 2009).
399 Neurath O, & Rotha P, (introduction) 'From Hieroglyphics to Isotypes' Future Books, London: Collins, (produced by Adprint, 1946), 3, 92-101.
400 Taken from a formal interview with Holmes, Zeist, Holland, (March 2009), Appendix 2, p. 322.
401 Neurath, *International Picture Language*, p. 17.
402 Neurath, *Empiricism and Sociology*, p. 247.

Isotype symbols were simply realised for the ordinary citizen to understand. Holmes does not believe that an international visual language can or should exist, due to cultural nuances and the desire of designers to continually find new ways of expressing ideas and concepts:

> I don't think there is a universal graphic language – it would be a pity if there were. Individuality is as important in graphics as writing. All languages must evolve, buzzwords, slang, and new inventions. But I do believe in basic forms and I think information artists do use parts of the same language, because they produce clear, symbolic images that are appropriate for the visual explanations.[403]

However in terms of being specific about exact types of symbols, Neurath encountered difficulties, which he illustrated using the example of symbols for trees. Which type of tree should be chosen to form the generic international symbol for a tree?

> … the more general an expression, the less self-explanatory the symbol is. Thus in visual education one cannot make statements as general as in verbal language.[404]

In theory, both Neurath and Holmes stood for differing ideas on international language, but in practice, it would appear that Neurath's notion of an internationally understood language was impossible to achieve due to cultural differences. Holmes admits that to understand his work, the audience needs to understand his cultural nuances, very much like choosing the preferred shape for a generic tree. Working in a commercial environment, Holmes produces bespoke design solutions; 'And thus the Babel of visual symbols grows.' This comment relates back to Modley's use of the phrase to describe his attitude to universal language in his original 1937 version of *Pictographs and Graphs: How to Make and Use them*:

> The crux of our [Modley and Neurath's] difference of approach lies in our different interpretation of the character of the symbols. Dr Neurath holds firmly to the belief that pictorial symbols should be international, designed within rigid limitations so that a pictorial Esperanto will be created. He wishes to circumvent a pictorial Tower of Babel and produce at once an international picture language. With that ultimate aim I heartily agree, but I believe his method of achieving it is Utopian.[405]

Holmes has built up a personal electronic lexicon of symbols that he uses and adapts as the shape of technology changes.[406] He doubts whether there could ever be a truly international visual language, understood by everyone everywhere, and firmly believes that strictly

403 Heller, *Nigel Holmes*, p. 29.

404 Neurath, *Empiricism and Sociology*, p. 244.

405 Holmes, *Pictograms: A View from the Drawing Board*, p. 4. Rudolf Modley, *How to Use Pictorial Statistics.* (New York: Harper & Brothers, 1937), (Introduction XIII). During the 1930s when this differing of opinion was taking place, Neurath felt the need to protect Isotype from plagiarists by keeping tight control over it. Modley, in the US also wanted to protect his picture language, but his solution was to join forces with other symbol designers, bring all newly created symbols together and standardise them. The standardisation of symbols was to become Modley's life's work.

406 Holmes was greatly impressed by the collection of loose-leaf pasted-up symbols forming the 'visual dictionary' in the Isotype Collection at University of Reading. Taken from a formal interview with Holmes, Zeist, Holland, (March 2009), Appendix 2, p. 321.

unchanging international symbols should only belong in places like airports.[407]

Standardised style of drawing, rigid use of silhouette, avoidance of perspective

Holmes represents his objects using the best viewpoint with the least ambiguity, employing perspective, silhouette, parallel projection, elevation or plan view; whichever works best for each particular object. Some symbols appear visually close to Arntz's, but sometimes bear a resemblance to Masaru Katsumi's or Keith Bright's Olympic pictograms from 1964 and 1984. Holmes sometimes uses a single unbroken line, reversed out of a geometric shape, or simple realistic silhouettes. He constructs his symbols using a combination of how he mentally perceives the object and the geometric shapes that they are formed from (geons), combined with mechanical artwork production. He tries to achieve the balance between humanity and functionality, a quality he admires in Arntz's work. In many respects, Holmes' more relaxed approach to symbol design and variety of styles at his disposal may well have more in common with the early pictographic work of Rudolf Modley.[408]

Stylistically as neutral as possible

Holmes considers that because of the warmth and humanity found in Arntz's symbols, that Isotype charts do not appear stylistically neutral.[409]

> While Otto Neurath wanted the content of his Vienna wall charts to be deadpan and neutral, he found the best artist he could, Gerd Arntz, to make images in charts come alive and have feeling. Their combination of passionate artistry and statistical accountability was a great model for succeeding generations of information designers.[410]

Holmes' later style of graphic language shares many similarities with Arntz's symbols, which were designed to be as stylistically neutral as possible, but to modern eyes are imbued with many historical and contextual references. Holmes has managed to instill modernity into his graphic language which references Arnzt's designs, but due to the difference in subject matter, injection of humour and the slightly more angular animated quality, creates a more contemporary feel through the combination of drawing, understanding the essence of the object and use of geons. Holmes pays homage to Arntz's symbol designs, and considers that they both share a similar design methodology.

407 Holmes quotes the work of Paul Mijksenaar in relation to the standardisation of icons for use in airports. Taken from a formal interview with Holmes, Zeist, Holland, (March 2009), Appendix 2, p. 319.

408 See Modley & Myres, *Handbook of Pictorial Symbols 3,250 Examples from International Sources* (New York: Dover, 1976).

409 As has been discussed earlier, stylistic neutrality is almost impossible to achieve, and the visual references in Isotype will always signal Arntz's style of working, and to a contemporary audience aspects of modernism and wartime austerity.

410 Heller, *Nigel Holmes*, p. 106.

Avoidance of certain conventional statistical techniques

• absence of line graphs (Fever charts)

Holmes uses whichever form of graph convention he feels best conveys the information, and does not avoid line or fever charts, which Neurath deemed inaccurate.[411]

Conclusion

An examination of the evolution of Holmes' methods of graphic argument from the late 1960s onwards has shown a gradual assimilation of a selection of the principles of Isotype into his work, but he dislikes the 'straightjacket' of rules, and admits to breaking them once in a while:

> It's the thing about the symbols looking equal [in size], which again is one of the principals of Isotype. And I must say I break that rule a bit myself sometimes. But I'm aware that I'm doing it […] there is a reason.[412]

Holmes adheres to the principles if they suit his needs. Like Neurath, the information is foremost, and if the point can be conveyed more effectively, then adaptations took place.[413] He combines graphic conventions not permitted in Isotype (line charts, perspective, and use of metaphor) with principles relating to use of reductive, repeated, same size symbols, and statistical integrity. Metaphor is used (often combined with humour) as a humanising factor to contextualise facts, promote understanding and allow the audience to engage more instantaneously with the subject matter.

Holmes can be seen as a designer who has taken the genre of explanation graphics forward, building on experiences with news magazines in the UK and US through the later expansion of graphic journalism. An analysis of his work has revealed alternative modes of graphic argument by others such as Tufte (who considers that graphic argument should be 'envisioned' or raised above the minimum levels of comprehension) and Rosling (who bases Gapminder on comparisons of scale).

Holmes understands how to avoid plagiarising Isotype, and suggests that merely imitating the look of an Isotype chart without adhering to the underlying principles simply purports to decoration, and can led to meaningless 'chart junk'.[414] He believes that if the whole message in a chart is not delivered succinctly, it can only be considered as illustration.

411 See Neurath, *International Picture Language*, pp. 99-103.

412 Taken from a formal interview with Holmes, Zeist, Holland, (March 2009), Appendix 2, p. 324.

413 As in the use of a vertical arrangement to show height, and the isometric arrangement used to show the dead and wounded on both sides in WW2. **(Fig. 13)**

414 Those who don't follow Neurath's rules cannot really 'speak' his language so that readers understand it […] Designers can signal 'information design' by the surface appearance of their work. But we must deliver the information too, otherwise we can be rightly criticised for publishing meaningless 'data junk'. Holmes, 'Pictograms: A View from the Drawing Board', 138.

It is clear from the socially conscious work that Holmes currently undertakes that his ideas align with many of Neurath's philosophical and intellectual principles. He is passionate about 'Information literacy' – visually explaining what numbers really stand for, and explaining social issues to a general audience in simple terms.[415] This is exemplified by the TEDX film on the US Federal Debt, which shows how he has extended the principles using scale and comparison for a contemporary audience through animation.[416]

Holmes is a natural transformer, by virtue of his broad education and ability both to draw and write. His designer-journalist training has facilitated the ability to take on roles of subject expert, writer and designer of projects. He transforms facts into the visual and textual elements he needs to tell the story responsibly with truth and clarity, often using the principle of ordering information to allow its significance to become visually evident, and allow the audience to form their own opinions based on well-constructed, visually significant statements:

> At the first look you see the most important points, at the second, the less important points, at the third, the details, at the fourth, nothing more – if you see more, the teaching-picture is bad.[417]

Discussions on Holmes' work open up the debate on standardisation, revisiting the argument between Modley and Neurath in the 1930s,[418] questioning whether graphic language should be standardised. Holmes' ideas differ fundamentally from Neurath's – Isotype was designed as a standardised pictographic language that was only added to when new symbols were required to extend the reach of the graphic argument and ensure consistency. Holmes welcomes individuality and deplores homogenisation, but he too draws from a lexicon of standard pictograms that appear throughout his work, which he updates when technology changes shape. Holmes and Neurath's ideas on Internationalism also clash – Holmes deplores homogenisation, Neurath promoted internationalism.

Parallels can be drawn between M. Neurath's integrated picture text principle and Holmes' later mode of graphic argument, but Holmes doesn't acknowledge them, only citing pre-World War II Isotype principles (mostly appertaining to Neurath's 'statistical accountancy' and Arntz's drawing style) as being informing factors in his work. By comparing Holmes' methods of graphic argument and some of the sequential diagrams found in M. Neurath's educational publications, it is just feasible that the integrated picture-text principle formed the logical development of the principles for both the Isotype Institute and Holmes independently, with both parties reaching similar conclusions on the adaptation of the principles for non-quantitative visual information; arrived at through a firm understanding of the original principles of Isotype.

415 Heller, *Nigel Holmes*, pp. 89-92.
416 See the motion graphics made for TEDX on the relative sizes of the US Surplus and Debt at www.nigelholmes.com/motion/index.htm.
417 Neurath, *International Picture Language*, p. 27.
418 Standardisation will be discussed in the next chapter.

CASE STUDY 3

Graphic Language

An evaluation of the place of Isotype in the development of international pictographic systems from the late 1950s to the early 1970s, and an investigation into the dissemination of principles of graphic language by key individuals and organisations, culminating in the design of Otl Aicher's Munich Olympic pictograms which can be seen to represent a synthesis of expertise in this area.

This case study aims to evidence the influence of the principles of graphic language during a time when work on pictographic systems was expanding worldwide, making connections between the Isotype Institute and later work in this field. It will begin by examining the influence of the 1956–61 'Preparatory Survey for a Study of Communication through Graphic Symbols',[419] which involved Marie Neurath and consider the impact this project had on later international pictographic systems.

> Otl Aicher sketched the 1972 Munich Olympic Games pictograms, drawing from the ISOTYPE example according to a grammar and simple rules: all figures have to move within a square according to a combined orthogonal and diagonal grid. So, all arms, legs and bodies of the figures representing various sports intersect at 45 degree or 90 degree angles.[420]

Aicher's Munich Olympic pictograms share little visual similarity with Isotype, but scholars and designers associate them with the graphic language of Isotype.[421] Wim Jansen recently stated that Aicher drew from the grammar and rules of Isotype and Ellen Lupton in her 2000 illustrated essay on Isotype, 'Modern Hieroglyphics', referred to Aicher's pictographic system as 'the semiotic climax of international pictures: a geometric body alphabet is deployed on a consistent grid…'[422] By evidencing the presence of the principles of Isotype in international graphic language from the early 1960s to 1972, this case study will determine why Isotype is cited with such scholarly acclaim in relation to Aicher. It will also identify the international designers and organisations responsible for the dissemination of Isotype principles of graphic language from the 1960s onwards which ultimately connect Aicher's Olympic pictograms with Isotype.

419 Henceforth referred to as the 'Preparatory Survey'.
420 Jansen, 'Neurath, Arntz and ISOTYPE', 228.
421 Nigel Holmes mentions Aicher's Olympic pictograms in *Pictograms: A View from the Drawing Board*, p. 12, and Markus Rathgeb refers to Isotype as a factor that informed Aicher's design methodology in 'Otl Aicher: Design as a Method of Action' (unpublished doctoral thesis, University of Reading, 2002), p. 139, and *Otl Aicher* (London & New York: Phaidon, 2006), p. 106 & p. 118.
422 Ellen Lupton & Abbott Miller, *Design Writing Research: Writing on Graphic Design* (London: Phaidon, 1999), p. 43.

Pictographic language formed a newly expanding area of international design during the 1960s, and the overall aim of this case study is to provide an assessment of the place of Isotype graphic language within this genre, during a time when organisations and individuals were struggling to find ways to standardise and classify symbols and scientific research was becoming part of the design process.

The Isotype Collection contains correspondence from 1956–61 between Marie Neurath and Rudolf Modley relating to the 'Preparatory Survey'.[423] The project had US funding for one year only, but the machinations involved as it ran its course meant it took considerably longer, hampered by the fact that for the most part it was conducted via Air Mail. Its primary objective involved the formulation of an initial strategy for the collection and classification of international signs and symbols, with the ultimate aim of compiling a symbol dictionary.[424] Participants included Marie Neurath, Rudolf Modley, Henry Dreyfuss and Martin Krampen, (along with other international associates). The wider outcome of the project was unrealised, but the Preparatory Survey was cited in key books and papers on signs and symbols at the time and formed a link between designers working on international pictographic language and the Isotype Institute.

The involvement of communication scientist and designer Martin Krampen in the Preparatory Survey is significant. Modley commissioned Krampen, (then a Fulbright fellow studying at Michigan State University)[425] to author two reports for the Survey: 'An Approach to the Classification of Graphic Symbols' and 'Classification of Graphic Symbols and Scientific Method'. Krampen went on to forge an international reputation as a design research consultant specialising in signs, symbols and semiotics and was a member of the Icograda Commission on Signs and Symbols (ICSS). He was also involved in the development of ISO standards during the 1970s. Krampen had a fruitful collaborative working relationship with Otl Aicher, with whom he co-authored the book *Zeichensysteme (der visuellen Kommunikation)* in 1980.[426]

The decade from the early 1960s to the early 1970s saw a significant rise in projects involving aspects of internationalism; a factor which had begun to shape society and communications as early as 1900, with the greater availability of the telegraph, rail and steamboat. Neurath was well aware of the importance of internationalism when it came to global communication and the democratisation of knowledge; the world museum or 'Mundaneum Institute' he planned

423 IC 1/49.

424 Otto Neurath originally planned a 'thesaurus of symbols' to accompany the *International Encyclopedia of Unified Science*, which was published between 1938–1939 in collaboration with Charles Morris, Rudolf Carnap and others). The thesaurus was never realised.

425 The Fulbright Program consists of competitive, merit-based grants for international educational exchange for students, scholars, teachers, professionals, scientists and artists. It was founded in 1946.

426 Otl Aicher, & Martin Krampen, *Zeichensysteme (der Visuellen Kommunikation)* (Munich: Alexander Koch Verlag, 1980). Their collaborative work will be discussed in Section two of this case study. See also Krampen, Götte & Kneidl, *The World of Signs: Communication by Pictographs*. An edited transcript of a formal interview with Krampen in can be found in Appendix 3, p. 345.

with Paul Otlet is testimony to this, as is his founding of the Movement for Unified Science and the publishing of the *Encyclopedia of Unified Science*.

Increasing affluence in the west post World War II led to the 1960s being referred to as the 'jet and telecommunications' age. Spending on foreign travel, world fairs, expos and sports events increased, but contrasted strongly with undercurrents of the nuclear threat and ideological conflicts in Vietnam and Cuba. Pioneering designers working on pictographic projects during this time were grappling with issues of idealism and standardisation, and were sometimes faced with the dual task of attempting to break down language barriers to guide travellers around foreign airports and stadia and foster international peace.[427]

Neurath died in 1945, but had he been alive during the 1960s, his vision of internationalism could feasibly have taken the principles of Isotype forward for a new post-war generation, and even influenced the embryonic development of computer icons – the ultimate example of internationalism and democratisation of knowledge.[428] But the 1950s and 1960s did not see any radical internationalist adaptations to the principles of Isotype; M. Neurath, the remaining director, was sharing offices in London with book packager Wolfgang Foges, further developing the many series of children's books she produced from 1948–1969.[429] Until she received a letter from Modley in 1956, asking if she wished to be involved in the Preparatory Survey, her work had been primarily concerned with visual education, rather than the

427 See Margaret Mead & Rudolf Modley, 'Communication Amongst all People Everywhere' *Natural History*, 72: 7 (1968), 57-63 and Keith Bresnahan, '"An Unused Esperanto": Internationalism and Pictographic Design, 1930–70' *Design and Culture*, 3: 1 (2011), 5-24. In the UK, Ken Garland took a large part in the 1963 Aldermaston CND 'Ban the Bomb' march; see Barry Miles, *Peace: 50 Years of Protest 1958–2008* (London: Collins & Brown), 2008. See also Robin Fior 'Recollections of Designing and Politics in London, 1957–1970' *Typography Papers 8,* (2009), pp. 135-140 and Ian McLaren, 'Designing for CND' *Typography Papers 8,* (2009), pp. 149-150.

428 Frank Hartmann puts forward the notion that the icons found on computers may be interpreted as a kind of helping language to represent software and applications and facilitate our on-screen navigation. See Frank Hartmann, 'Visualizing Social Facts: Otto Neurath's ISOTYPE Project' (Rayward Book, Indb, 2007), 279-293.

429 This consisted of simplified, sequential, narrative and annotated images explaining how things work, as can be seen in M. Neurath's children's books published by Max Parrish & Co, i.e. *Railways under London* (1948), *If You Could See Inside* (1949) and in pamphlets designed for elections in West Africa. This is discussed in the previous Case study. See also work by Sue Walker and Eric Kindel in these areas as part of Isotype Revisited www.isotyperevisited.org.

standardisation of pictographic language.[430]

This case study comprises three sections evidencing the influence and dissemination of Isotype principles of graphic language on projects associated with international pictographic systems from 1956–1972. **Section one** examines bodies of work demonstrating the primary dissemination of Isotype principles – through those directly involved with the Preparatory Survey; **Section two** discusses how designers and communicators in the US, Europe and Japan were involved in the secondary dissemination of the principles; and **Section three** discusses the development of Olympic pictograms, which can be seen as a high point in ideas on international pictographic language systems for their time, seeking to qualify scholarly claims that link Isotype principles of graphic language with Aicher's 1972 Olympic pictograms.

Background

During the late 1950s and early 1960s, the desire to avoid nuclear disaster was fuelling the need to foster international peace, and organisations such as UNESCO,[431] United Nations (UN), the Ford Foundation and The Fund for Advancement of Education were all supporting projects promoting internationalism.[432] In particular, the UN dedicated 1965 (their twentieth anniversary) as 'International Co-operation year' and funded several projects to find more effective ways to communicate with international audiences.[433] In verbal and written terms, neither Esperanto nor LoCos[434] had been widely accepted, and attempts to formulate one universal language as

430 M. Neurath's previous involvement with the graphic language of Isotype came in 1947, while grappling with legalities behind copyright issues which came to light between the Nederlandse Stichting voor Statistiek (NSvS) and the Isotype Institute. The problem of copyright arose when a signed agreement between Arntz and the (NSvS) emerged, signed without the Neuraths' consent, which granted Arntz rights to the copyright of all symbols cut from 1934 onwards. This caused M. Neurath's collaborative partners Wolfgang Foges and Paul Rotha 'grave concern'. They both believed that they owned the copyright to Isotype symbols used in their respective books and films. Negotiations between M. Neurath and the NSvS ended in deadlock. Finally Foges intervened and proposed a formal contract between Wolfgang Foges (Adprint), Paul Rotha (Films of Fact) and the Isotype Institute, stating that they would all have equal shares in a new organisation. To comply, Isotype would sell (or give) its copyright to the new company, which would be in a better position to defend its copyright position with the NSvS. M. Neurath was worried about Isotype losing its independence and refused to sign the contract agreeing to this proposed merger (despite Foges' threats to sever links between Isotype and Adprint). The situation was finally resolved when a barrister pointed out that symbols could not be copyrighted, but published charts could. Consequently the name Isotype ceased to be used in Holland, and Arntz redrew a new symbol for the NSvS. Rotha unfortunately went bankrupt. Eve, 'Isotype in Trouble, 1946-1948'.

Previous to the situation being resolved, Foges put forward an idea to get around the copyright problem: he suggested producing a joint 'symbol publication' between the two organisations (Adprint and Isotype) which would show one symbol per page and would therefore be protected by copyright. M. Neurath was unenthusiastic about this idea, stating that 'the symbols are not so important'. Her interest was in the way that symbols were used in explanation. Marie Neurath, 'What I remember', unpublished manuscript, 'told and written down for Henk Mulder', December 1980, revised 1982; translated by Robin Kinross and approved by M. Neurath' 1984, 92-3.

431 UNESCO's Constitution came into force in November 1946; its mission was 'to contribute to the building of peace, the eradication of poverty, sustainable development and intercultural dialogue through education, the sciences, culture, communication and information.' Neurath would have broadly approved of these aims, as did many of his friends and correspondents. (Arntz contributed pictorial statistics to UNESCO from 1951–1962).

432 Neurath's ideas for Isotype were also based on trying to create a peaceful world in a time of political unrest: '... we are living in a world of warring interests and broken connections', *International Picture Language*, p. 13.

433 See Margaret Mead, 'The Future as the Basis for Establishing a Shared Culture' *Daedalus*, 94: 1 (1965), 135-155.

434 Ota Yukio designed LoCoS, (Lover's Communication System) as a systematic experiment in pictorial language based on 'Kanji' (Chinese characters) with an aim to make mutual communication possible.

a secondary language for all were proving logistically untenable.[435] Language barriers formed the stumbling block, and the need was growing to create a universal pictographic language, as Neurath had envisaged Isotype.

The spirit of internationalism was enhanced by the affordability of air travel and tourism. It was becoming clear that an increasingly mobile population demanded a more open approach to communication.[436] During the 1960s design research on language-independent communication increased worldwide with several organisations formed to respond to this need. In 1963, Icograda[437] was founded in the UK as a non-profit making body that provided a forum for ideas on International communication and the promotion of graphic design for the good of humanity. The first president was Willy De Mayo and F.H.K. Henrion was one of their founding members.[438] In 1965 a sub-committee was formed, the Icograda Commission on Signs and Symbols (ICSS). It was created specifically to address problems arising from international signs and symbols in relation to travel, tourism and wayfinding. It was chaired by Peter Kneebone.[439] The initial aim of the ICSS was the development of a set of standardised, tested pictograms for the traveller. They had identified a worldwide problem due to a lack of coordination and collaboration between designers working on international communication systems, which led to an absence of any real consistency in graphic language.[440] The shape of design was changing, and communication scientists and psychologists such as Martin Krampen[441] and G. Patrick Meredith were introducing semiotics, psychology, ergonomics and other science-related disciplines into the designer's spectrum, researching ways to make international communication more effective and taking an interdisciplinary approach to solving communication problems.[442]

435 One such project was to set up an international forum to discuss 'glyphs' (pictograms) and establish which of them could truly be deemed universal and used as a basis for a universal picture language. The work of Glyphs, Inc. will be discussed later in this case study.

436 Aicher reinforced this need for international communication during his first visit to Japan in 1960 when he was faced with a national written language that did not cater for foreigners. According to Rathgeb it was one of the reasons why he became aware of the need for a pictorial language that transcended linguistic barriers. Rathgeb, *Otl Aicher*, p. 116.

437 The International Council of Graphic Design Associations.

438 F.H.K. Henrion was aware of the principles of Isotype from his involvement with *Future* magazine during the 1940s. From correspondence found in the Icograda Archive it is clear that he wanted Isotype to be included in the original list of contributors to the 'Icograda International Signs and Symbols Special Thirtieth Anniversary Year' edition of *Print* (America's Graphic Design Magazine) 23: 6 (1969). Icograda Archive, SS67/3.

439 The ICSS included members from all over the world, including Masaru Katsumi, Martin Krampen and Rudolf Modley. Their most significant early achievements included instigating Icograda student competitions (1965, 1967 and 1969), the Ulm/Icograda research project (in collaboration with Martin Krampen) and projects concerning international road, railway, airport and hospital signage.

440 In 1965, Peter Kneebone, Chairman of the ICSS referred to the fact that '... serious international collaboration was urgently needed to solve effectively the important and complex problem of international signs and symbols. The situation at present is one of confusion and insufficient research'. Correspondence from P. Kneebone to M. Katsumi, 14 October 1965, Icograda Archive, SS67/3.

441 Krampen's role as Assistant Professor of Design and Psychology at University of Waterloo, Ontario and lecturer at the Hochschule für Gestaltung (HfG), put him in a good position to investigate problems of international communication. See Martin Krampen, 'An Approach to Classification of Graphic Symbols' and 'Classification of Graphic Symbols and Scientific Method', papers prepared for the Preparatory Survey 'Communication through Graphic Symbols' (New York: The Fund for the Advancement of Education) (Ford Foundation), 1959.

442 See the list of contributors to the 'Icograda International Signs and Symbols Special Thirtieth Anniversary Year' edition of *Print*, 23: 4 (1969) as an example of how design was becoming more interdisciplinary in nature and involving a far wider spectrum of scientists and psychologists in the design process.

During the 1960s, alongside projects that Icograda was endorsing, several other significant international developments in pictographic language systems were in progress. In the US, Soichi Kato was promoting the 'International Committee for Breaking the Language Barrier' (ICBLB),[443] Margaret Mead and Rudolf Modley were forming Glyphs, Inc., industrial designer Henry Dreyfuss (whose later work involved the design of safety control symbols for farm machinery) was developing plans for a Symbol Data bank; in Germany, Martin Krampen in collaboration with the HfG in Ulm was conducting research into the classification of symbols, and Tómas Maldonado and Gui Bonsiepe were developing their 'Dictionary of Semiotics'; in Canada, Paul Arthur was adopting pictograms in the design of international wayfinding systems for international events, national parks, universities and airports; in Australia, C.K. Bliss was promoting Blissymbols, his 'World writing system' (previously known as Semantography, originally developed during the 1940s); and in Japan, Masaru Katsumi was incorporating ideas taken from Isotype into the pictographic system he was developing for the 1964 Tokyo Olympic Games:

> The ISOTYPE (International System of Typographic Picture Education) developed by [sic] late Otto Neurath, Vienna, in the 1920s is the first great step towards an international symbology for common people. Lancelot Hogben wrote in his book: To the genius of one man, we owe the recognition of what such a universal picture language can accomplish as an instrument of civic education by recourse to standard symbols for social statics [sic]. His wife Marie Neurath, in London, and his old colleague, Rudolf Modley, in New York, followed in his path.[444]

Martin Krampen forms a transatlantic bridge between projects on international pictographic language. He was one of the first students at the HfG in Ulm from 1953 to 1957, and became known for his work as a communication scientist and research into the psychology of visual perception.[445] On the invitation of Rudolf Modley, early in his career in 1959, he contributed the papers 'An Approach to the Classification of Graphic Symbols' and 'Classification of Graphic Symbols and Scientific Method' to the Preparatory Survey, whilst still a Fulbright fellow, studying in the US. Krampen was connected with many international designers and

443 Soichi Kato worked for an export/import company in New York. His aim was to help foreign visitors to the US understand their environment by supplying universally comprehensible signs and maps. ICBLB (Kato's non-profit organisation) was supported by US Airlines, the American Hotel Association and the Port of New York Authority. Kato's campaign achieved much recognition, and he attended the Whitehouse Conference on International Co-operation in 1965 to put forward his ideas for an international experiment to determine a single language that would be taught throughout the world (in addition to the mother tongue), as well as a proposal for a competition to design an international symbol system in collaboration with Icograda. From correspondence in the Icograda archive between Katsumi and Kneebone, and Katsumi and Kato, it would appear that Icograda considered Kato's methods of collecting and classifying signs at the ICBLB lacking in academic rigour, but they did initially include the ICBLB in the ICSS. *The Washington Post*, 5 December 1965 'Japanese Urges Hand for Foreigners', Icograda Archive, SS67/3. Later on Modley (then of Glyphs Inc.,) replaced Kato as the ICSS partner in the US.

444 Masaru Katsumi, 'Towards an International Symbology – Tokyo, Osaka, Sapporo' *Graphic Design*, 42 (1971), 31-38, IC 8.1a.

445 Krampen was invited to teach in the Visual Communication Department at the HfG by Herbert Kapitzki just before the college's closure in 1968. Rathgeb, *Otl Aicher*, p. 233. See also edited transcript of a formal interview with Krampen, Appendix 3, p. 357.

communicators; he worked as a consultant to Paul Arthur in Canada,[446] Rudolf Modley in America, and Otl Aicher in Germany. Through Krampen connections can be made with the HfG[447] (where Krampen was taught by Aicher, and Krampen also taught).[448] Krampen cited the Preparatory Survey in his 1965 seminal paper 'Signs & Symbols in Graphic Communication' and the experience paved the way for several symbol-related projects.[449] He was an active member of the ICSS, a role which allowed him access to developments in international pictographic language during the late 1960s. However, it must be stated that although the ICSS was an international organisation, collaboration between members was limited due to geographic considerations, and Krampen was one of the few members to have links in both Europe and the US.

Many ideas put forward by designers and organisations during the 1960s in the pursuit of an international pictographic language reveal implicit similarities with Isotype principles of graphic language, but the ubiquitous stumbling block that continued to hamper attempts at creating universalism was 'debabelisation':[450]

> The attempt to make one International language has given us a parcel of new languages.[451]

The question of whether new pictographic systems should be designed based on style and national characteristics, or whether they should become part of a strictly controlled universally recognised system preoccupied Neurath and Modley during the 1930s, but continued to cause friction with the ICSS in 1966, when they referred to new pictographic systems being invented without knowledge of what had gone before. Krampen was fully aware of this problem, and in 1965 urged designers involved in signing system projects to use Isotype as a starting point.[452] (This will be discussed in Section two).

446 Krampen encouraged Arthur to adopt the pictogram in his international signing systems for Montreal Expo '67 and his Canadian airport projects. Michael Large, 'Communication Among All People, Everywhere: Paul Arthur and the Maturing of Design' *Design Issues*, 17 (2001), 81. See also the edited transcript with Krampen, Appendix 3, pp. 355-356.

447 The Ulm Model evolved from the HfG from 1962–66. Through the leadership of Otl Aicher and Guiseppe Maldonado, the Ulm Model equipped designers with a more scientific, informed approach to problem solving. Aicher and Maldonado attempted to strike a new balance between theory and practice and between science and design which led to designers working together on interdisciplinary projects with students and academics from other disciplines.

448 Krampen studied visual communication and semiotics at the HfG. An edited transcript of an interview with Krampen can be found in Appendix 3, p. 345.

449 Henry Dreyfuss, *Symbol Sourcebook, An Authoritative Guide to International Graphic Symbols* (New York: John Wiley & Sons, Inc., 1984); Rudolf Modley, (with the assistance of) W.R. Myres, *Handbook of Pictorial Symbols: 3,250 Examples from International Sources* (Mineola, New York: Dover Publications, Inc., 1976), Rudolf Modley (ed), *1100 Pictorial Symbols*, CD-Rom & Book (New York: Dover Publications, Inc., 2007); Otl Aicher & Martin Krampen *Zeichensysteme (der Visuellen Kommunikation* (Sign Systems for Visual Communication); & Martin Krampen, Michael Götte & Michael Kneidl, *The World of Signs: Communication by Pictographs* (Germany: avedition GmbH, 2007).

450 A term used by Neurath in *International Picture Language* to describe the banishment of conflicting symbols, p. 13.

451 Neurath, *International Picture Language*, p. 13.

452 Martin Krampen, 'Signs and Symbols in Graphic Communication' *Design Quarterly*, 62 (1965), 1-31, (23).

The differing opinions of Modley and Neurath on issues of standardisation during the 1930s have been well documented by Hisayasu Ihara.[453] Modley's first book *How to Use Pictorial Statistics* (1937)[454] highlighted the difference between Modley's early willingness to adapt and create a much less rigid interpretation of Isotype in the US (without strictly adhering to Neurath's principles) and Neurath's strict adherence to them.[455] Modley criticised Neurath for being too restrictive and 'utopian' in his aspirations, and not fully understanding the concept of internationalism.[456] Modley's looser interpretation of how the pictogram should be used during the 1930s was at odds with the ethos behind Isotype – consistency and universalism. Isotype pictograms were standardised and only added to or adapted if the educational point dictated it, never to create variety or novelty.[457] Neurath wanted to keep tight control of Isotype to protect it against the threat of plagiarism, which would dilute its strength as a system. Modley's ideas on standardisation will be discussed later in Section two of this chapter.

Section one

Evidence of the dissemination of Isotype principles of graphic language through the Preparatory Survey on Communication through Graphic Symbols

The Preparatory Survey forms the basis to this section and is cited in literature on international signs and symbols written between 1960–65 by Modley, Dreyfuss and Krampen,[458] and

453 Hisayasu Ihara 'Isotype in America: Otto Neurath and Rudolf Modley' (unpublished essay, 2010).

454 Rudolf Modley, *How to Use Pictorial Statistics* (New York: Harper & Brothers, 1937), p. xiii. Modley moderated his approach to Neurath's work in his 1952 update of this book. Neurath's *International Picture Language* was published in 1936 and forms an idealised view of Isotype and the strict principles behind it, as well as being a promotional tool for marketing Isotype as a system. In contrast, Modley's 1937 book is much more pragmatic, instructing the reader on how they can produce their own pictorial statistics.

455 In 1936 Modley started publishing 'Symbol sheets' allowing 'anyone' to make pictorial charts. However reviewers of Modley's *How to Use Pictorial Statistics* pointed out that an artist who had experience of constructing pictorial statistics was needed for the symbol sheets to be used effectively. Earl G. Millison, 'Review of How to Use Pictorial Statistics' *Journal of the Statistical Association*, 33 (1938), 489-90. Each symbol sheet measured 8.5 x 11 inches in size and contained 95 symbols. In 1937 Modley published *How to Use Pictorial Statistics*, and in 1940 established The Pictograph Corporation, which published *Pictorial Symbols* in 1942, (enlarged in 1943). This book contained 1000 symbols from a collection he had compiled, classified into 25 subject areas, ordered semantically, categorised as living beings, humans, materials, tools, products and buildings. These 1000 symbols form the basis of Modley's 1976 *Handbook of Pictorial Symbols* (New York: Dover, 1976), which contains 3,250 symbols, including, amongst others, those designed by Arntz as seen in *Basic by Isotype*.

456 Hisayasu Ihara considers that Modley was interested in standardisation as early as the late 1930s, due to the many copies of Isotype symbols that were springing up in the USA. Ihara states that Modley wanted to join forces with other groups active in the design of pictograms to cooperate and devise a standard set of symbols on which they could all agree. Ihara suggests that Modley would have asked Neurath to cooperate, but Neurath refused, hence Modley stating in *How to use Pictorial Statistics* that Neurath did not agree with the rigid standardisation of symbols. Neurath certainly advocated consistency and standardisation in Isotype, but Ihara considers that Neurath's primary aim at that point was to 'establish visual education' based on his 'social philosophy' rather than rigid standardisation. Hisayasu Ihara, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols' (2011), 7.

457 M. Neurath remembers replacing a symbol of a cross for a symbol of an urn – a more acceptable symbol to represent death for the US market. Ihara, 'Isotype in America: Otto Neurath and Rudolf Modley', 23.

458 Krampen, 'Signs & Symbols in Graphic Communication', 22, and Modley, 'Is Writing Obsolete?' *Print*, January/February (1960), 81.

associated M. Neurath with designers working on projects concerning international graphic language during the early 1960s. This section evidences the dissemination of the principles of graphic language through association with the Isotype Institute found in archival material located in the Isotype Collection. It focuses on the progress and outcomes of the Preparatory Survey and the team involved, and serves as a commentary on the explicit influence of the principles of Isotype on international graphic language during the early 1960s.

The Preparatory Survey 1956–1960

> About a year ago, the Fund for the Advancement of Education of the Ford Foundation asked me to make an exploratory survey to find out if the Fund should make a broader study of the role of graphic symbols in communications […] My assignment was not to 'produce' anything. It is merely to look and learn and to recommend if such a study should be worth-while, if it would be timely, and how much personnel, time and money it might require. […] The result could be the creation of a Dictionary of Graphic Symbols – a collection of all graphic symbols used in our culture, organized by meaning, by shape, by area of use, etc., etc. It would be a reference source to which all who use symbols could go to find what others have done and thought. [459]

The initial idea behind this project came from Dreyfuss (the industrial designer) who asked Modley if he could obtain financial support for a preparatory project with the ultimate aim of creating a dictionary of signs and symbols (as a resource or sourcebook). Modley was successful in gaining one year's funding for this project, which links Isotype with seminal ideas on universal graphic language from the late 1950s to the early 1960s and highlights M. Neurath's work in this area. The project took the form of a one-year feasibility study for a proposed five-year project submitted to The Foundation for Advancement of Education (the sponsor) in June of 1959, and formed an attempt to collect, observe, classify and catalogue western graphic symbols. Modley had identified the fact that 'there is no coherent effort which puts together all we know, and all we don't know' and was determined to promote the effective design and use of graphic symbols with the intention of creating a standardised universal symbol language compiled as a dictionary.

The following commentary summarizes four years' correspondence between 1956 and 1961, the majority being between M. Neurath in London and Modley in the US.[460] The Preparatory Survey was conducted largely via transatlantic mail. The extensive collection of typed and handwritten letters in the Isotype Collection (IC 1/49) describes the aims, objectives and methodology behind the project, which was described by Krampen in 1965 as 'an attempt to

[459] Modley, 'The Challenge of Symbology', IC 8.2. Iharu states that Modley worked in the capacity of a consultant and coordinator of projects regarding pictograms and graphic language. 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', 1. Modley had been involved in the design of symbols with the Pictograph Corporation and Pictographs Inc, but was originally trained in law.

[460] IC 1/49.

take stock of the number of graphic symbols in existence all over the world'.[461]

The start of the project

On 24 April 1956, Dreyfuss wrote to Modley asking if he was interested in preparing a proposal for a 'Preparatory Survey on Communication through Graphic Symbols'. Modley was not new to such projects, and had been involved in a similar project in 1940 with Harold Lasswell, a well-known American social scientist.[462] Modley was confident that the Fund for the Advancement of Education, (an offspring of the Ford Foundation) headed by Dr Alvin C. Eurich would agree to finance a one-year preparatory study, with sponsorship from Ralphe Bunche of the United Nations. The aim of the Preparatory Survey was to lay foundations for a much larger project based on the compilation and classification of an extensive collection of international graphic symbols; determining potential scope of study, establishing contacts and costs, organising methods of reproduction, classification and cataloguing, proposing staffing and organizational structures. From the beginning it was agreed that the project would restrict itself to research on symbols from western civilizations only.[463]

On June 13 1956, Modley (in his capacity of Survey director) wrote to M. Neurath asking if she would consider taking on the role of European representative for the project. It was clear from correspondence that there had been little or no contact for many years.[464] M. Neurath expressed initial interest and was prepared to include examples of contemporary and historical symbols designed and collected by the Isotype Institute in the survey.

On 4 August 1956, Modley, having conducted his own preliminary research, wrote to Eurich (Ford Foundation) stating that the estimated total cost of what would ultimately form a

461 Krampen, 'Signs & Symbols in Graphic Communication', 22. Krampen also states that in 1965, the results of the survey were 'not yet available', even though the project came to an end in 1960 when the Ford Foundation declined to commit to further sponsorship. This is discussed in an edited transcript Appendix 3, p. 351.

462 'A Proposal to Compile a Dictionary of Graphic Symbols in Current Use in America', which 'would provide an authority for reference, promote standardization and the wider use of symbols', was submitted to the Carnegie Corporation in May 1940. The project was not taken forward, but in 1942, two years later, Modley published *1000 Pictorial Symbols*. This earlier project also provided a starting point for the 1956 project. Modley was also involved in a third Symbol dictionary project in 1962 with Herman Weisman, the Executive Director of Colorado State University's Center of Research in Communication, a 'Feasibility Study for the Creation of a Dictionary of Symbols and the Development of a Universal Symbolic Language'. This project had a wider remit and included symbols in use in the US, Latin America, Europe, Asia and Africa. It was submitted to the National Science Foundation, but sadly came to nothing. 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', 3. Modley was also involved in a 'Project for Creating Archives' in 1970 (which also failed to reach fruition).

463 Correspondence from Modley to M. Neurath 7 July 1956, IC 1/49 'I would very much like to limit the scope of things to "Western" symbols leaving the east and the American Indian out, except where it had a definite influence on our present western symbols. Otherwise the thing will get unmanageable'. Modley had previously written articles on the language of the Navajo; see 'New Written Language Makes Debut in America', *Science News Letter,* 9 March 1940. In Correspondence from Modley to Eurich on 4 August 1956, it would seem that M. Neurath (maybe due to her recent work in Africa), would have liked to include symbols from African and Far Eastern civilisations, but Modley was 'scared' of the project becoming too extensive.

464 'It seems a hundred years since I have seen you – and it almost is. My kids love your books and it serves as a reminder between my pictograph past and the future.' Letter from Modley to M. Neurath, 13 June, IC 1/49.

comprehensive dictionary of symbols would be $50,000 (allowing for contingencies).[465] Modley met with Eurich on 23 October 1956, to discuss the way forward. Eurich was fearful that the project was overly ambitious, but Modley was confident that it could be contained, and described the process as one of 'investigation, contact, collection and evaluation – all of which seemed to offer no major problems'.[466] Eurich suggested a meeting of experts from different fields to guide the project.[467]

The Preparatory Survey began slowly; the Ford Foundation were unable to sponsor it, but the Foundation for Advancement of Education stepped in and in May 1958 agreed one year's funding. M. Neurath took up the role of European representative with responsibility for the organisation of the project in Europe. Her remit was to establish the feasibility of a more extensive project, identifying cost structures, staffing requirements, and potential problem areas. She planned to spend half of her working time on the Preparatory Survey, for a salary of 'not less than £1,500'.[468] Modley outlined M. Neurath's overall task: 'to collect and classify existing graphic signs and symbols; […] prepare a comprehensive dictionary of such symbols […] set up a workshop, on an international basis, to which people who need new symbols, or have problems with symbols can attend'.[469]

Modley set out detailed guidelines for the survey:

- Collect and make an inventory of all available material by establishing personal contacts with all agencies interested in symbols
- Include only symbols which are in current use, or are proposed for use
- Restrict symbols to those from the 'western civilization' (including the Soviet Union)
- Include mathematical, biological, social, political, religious, highway symbols, and warning signs on medicines and chemicals
- Exclude abbreviated symbols from Latin and Greek alphabets, trademarks and cartoons
- Research experimental ways to catalogue signs and symbols
- Cross-reference symbols with more than one meaning
- Trace and catalogue the origin and designer of each symbol

465 Harold Lasswell of Yale, Henry Dreyfuss and Harden Bishop were all contracted to work with Modley on the US arm of the project.

466 Minutes of meeting between Modley and Eurich, 23 October 1956, IC 1/49.

467 Modley's 'experts' included Harold Lasswell of Yale, Renee D'Harnancourt of the Museum of Modern Art, representatives of the American Standards Association, trade, professional and government associations. Minutes of meeting between Modley and Eurich, 23 October 1956, IC 1/49.

468 M. Neurath initially received a formal four-month contract from The Fund for Advancement of Education for $125 per month. Her initial suggested reading list for the project included books on heraldry, hieroglyphics, botany, flags and emblems, signboards, migration of symbols, maps, playing cards, and also Brinton's *Graphic Methods for Presenting Facts*, Comenius' *Orbis Sensualium Pictus*, and Jean Piaget's *La Formation du Symbol chez l'Enfant*. Letter M. Neurath to Modley, 15 May 1958, IC 1/49.

469 Letter Modley to M. Neurath, 20 June 1958, IC 1/49.

M. Neurath encountered problems with Modley's instructions;[470] there were no firm guidelines and the target audience could not be identified. She was also concerned that technical symbols would prove incomprehensible for mainstream audiences.[471] The complexity of the project was evident from the start. From correspondence it would appear that M. Neurath approached the task of collecting symbols with great enthusiasm, making contact with many of the foremost European designers of the time, including Ella Reiner Lingen, Phillippe Pieger, Armin Hoffman, and Theodore Bestermann (a symbol expert from the Institut Musée Voltaire in Geneva). She also renewed connections with old colleagues from Vienna and The Hague including Bernath, Tschinkel, Pfitzner, Scheer, Jodlbauer and Matzalik. M. Neurath also contacted representatives from DIN (German National Standards Organisation), BSI (British Standards Institution), the Automobile Association, the Industrial Psychology Research Group, and the Psychology Department of University College, London. She considered asking the Institut Izostat for examples of symbols, but had heard nothing of their existence for many years.[472]

The following list is extracted from M. Neurath's notes dated 1 August 1958 and indicates her approach to the project:

1. Collect all signs and symbols
2. Sources – books on symbols, symbols used in publications, personal contacts and designers, organisations that promote symbols, students and others
3. Classification
4. Standardize (by image or formal acceptance)
5. Adaptable or suitable for standardization?
6. Categories/classes/major groups – social and natural sciences, geography, should adopt or adapt existing system. Visit to DIN and Symbol Documentation Organization in The Hague
7. Area where used
8. Period of use, degree of acceptance, field of application, form of presentation (abstract, horizontal lines, square, round, rectangle etc)
9. Self-explanatory? – from simple pictorial symbol to stylized systems

Criteria for cataloguing and classifying symbols included investigating:

- Designer/producer/origin
- System type or single use (i.e. barber's pole, traffic lights)
- Design principles (stylized, naturalistic, pictorial, abstract)

470 It was also decided that the project would not consider the philosophical issues pertaining to symbol design, (based on reports supplied by Eurich from the 1956 Congress for Scientific Study of Symbolism) but only consider the practical applications, i.e. symbol systems such as DIN, DNA and ISO. The type of symbolism favoured by Carl Jung, or Blissymbols would not be included. Letter M. Neurath to Modley 24 January 1959, IC 1/49, and M. Neurath to Modley, 16 December 1958, IC 1/49.

471 Dreyfuss' *Symbol Sourcebook* has many such examples of technical symbol systems for engineering, architecture, agriculture and manufacturing.

472 The Institute Izostat stopped paying their fees for instruction in the Vienna Method in 1934. See work by Emma Minns in this area.

- Colour matching
- Combination of symbols
- Codification
- Sources/manuals
- Evaluation
- Attention
- Retention
- Tests
- Sources and references
- Remarks

Classification systems

Throughout 1958, both M. Neurath and Modley communicated with standards organisations such as DIN and BSI.[473] It became increasingly clear that a standardized classification system was urgently needed to systematise the collective data. Modley suggested using the Universal Decimal Classification System (UDC) [474] to facilitate transatlantic data-sharing. Throughout the project, he had debated how best to establish criteria for classifying symbols, but no firm decisions had been made regarding hierarchy, and whether name, origin, period of acceptance or generic subject matter should take precedence.[475] In 1959 Modley introduced the IBM punch card system to help with the classification of data, which (at that point) he considered more future-proof than the rest.[476] However, later that year it was discovered that IBM systems operated differently on both sides of the Atlantic,[477] making data classification even more difficult to coordinate.

Symbol testing

Modley's over-arching aspirations for the Preparatory Survey were to devise a scientific testing procedure through which the 'science of symbology' could be established:

> We shall have to develop working hypotheses and test them to see if they really work. Much has been said and much has been written on the subject. But we don't know for sure. If we could accomplish these two things – CLASSIFICATION and WORKING THEORIES – we would have established the basis of a new science, the science of symbology.[478]

473 M. Neurath discussed meeting Mr Paul Jones 'the symbols enthusiast from the British Standards Institution' Letter M. Neurath to Modley, 22 October 1958, IC 1/49.

474 A sophisticated multi-lingual manual indexing and retrieval classification system developed by Paul Otlet (bibliographer and museologist) of the Palais Mondial and Henri La Fontaine (bibliographer) at the end of the 19th century.

475 Other classification systems discussed were Royal McBee cards, a punch hole card system, capable of pin-pointing up to 105 different variables. If the project was aiming to include 20,000 symbols, and the Royal McBee cards could accommodate up to 105 different variables, then the proposed system was logistically unworkable. The Royal McBee system could function for up to 40,000 cards.

476 Modley considered that within two to five years from 1959, IBM machines would be able to graphically analyse symbol shapes electronically. Letter Modley to M. Neurath, 11 April 1959, IC 1/49.

477 Letter M. Neurath to Modley 22 May 1959, IC 1/49.

478 Modley, 'The Challenge of Symbology', IC 8.2.

Part of the project focus involved establishing methods to help prospective end-users of the proposed dictionary (most probably designers) to design the most effective symbols. This led to a meeting in winter 1958 with Dr. Rifka Eifermann, a young research psychologist from Birkbeck College, University of London. M. Neurath contracted Eifermann (then working on her doctorate) to conduct a pilot study to investigate psychological aspects of symbols.

The initial main areas of investigation comprised:

- The relationship between simplicity, symbol recognition and retention
- Appropriateness of colour
- Use of negatives
- The relationship between speed of recognition and accuracy of response
- Symbol retention

Eifermann chose to test these factors using 'maze learning' techniques. Respondents were asked to draw a line starting from a given point and follow a command prompted by a symbol at each juncture. Time and mistakes were measured, so commands could be noted.[479] Eurich, (the sponsor) had many comments on the functionality of Eifermann's tests during the early stages of the project, particularly regarding negative commands,[480] which Eifermann adapted and simplified in the final submission:

> A technique for testing the efficacy of different signs has been devised; the two criteria of efficacy are time taken to respond, and number of errors made in response. Experiments using this technique were carried out. These experiments compared: instructions through words, shapes (with colour constant) and colour (with shape constant), affirmative as against negative instructions represented in the above three forms. Significant differences have been found; they suggest a range of additional problems to be explored. The experience gained indicates possibilities for much wider applications of the new technique than so far utilized.[481]

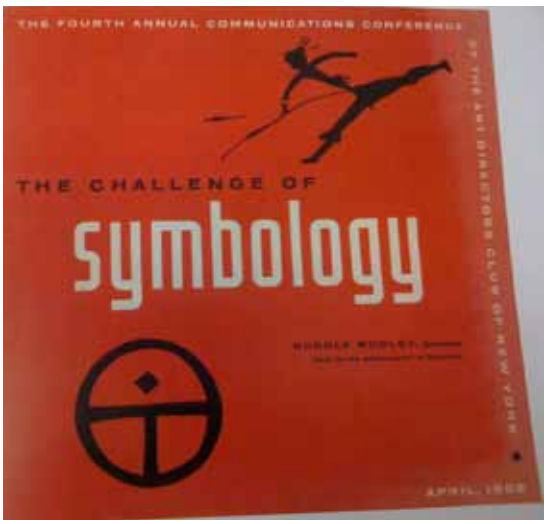
Modley's comments on Eifermann's report concluded that 'it shows that known words are better means of command than recently learned, not self-explanatory pictures. What gives me encouragement is the fact that repetition shows a considerable improvement in results in pictures. If pictorial symbols were well taught – or self-explanatory – they might give drastically better results than words'. This was a small survey, and Modley recognized the need for a wider testing, with severe controls in place.[482]

479 As a secondary step, the time taken for each action to be accomplished was added, so additional equipment was used in the form of a frame containing two buttons. When the symbols were shown, the time taken for the correct (or incorrect) button to be pressed was monitored. Letter M. Neurath to Modley, 4 June 1959, IC 1/49.

480 '…can you give a negative command by negating a positive command […] If an arrow pointing to the right indicates a right turn, how can the command "NO RIGHT TURN" best be given? By the right turn symbol with a red bar across, by a straight line with a (subordinated) barred right exit, or how?' Correspondence between Eurich and Modley copied to M. Neurath, 22 May 1959, IC 1/49.

481 As reported in letter from M. Neurath to Modley, 22 June 1959, IC 1/49.

482 Letter from M. Neurath to Modley, 10 September 1959, IC 1/49.



(Fig. 78)
Rudolf Modley, 'The Challenge of Symbology' (1959).

Apart from this example of early controlled symbol testing, several interesting asides came out of the Preparatory Survey, highlighting areas of later significance:

'The Challenge of Symbology'

Eifermann's results were of great interest to Modley; in tandem with the Preparatory Survey, he was also devising 'Laws of Symbology'. In April 1959 Modley gave a speech at the Fourth Annual Communications Conference of the Art Director's Club New York, in which he discussed 'Symbology' and work in progress on the Preparatory Survey.[483] **(Fig. 78)**

> We need symbols which can bring closer to us the newly revealed aspects of nature and the increasingly complex workings of our social and economic world. It will demand on the artists and designers to make them a living part of our world. This is the Challenge of Symbology. […] The science of symbology will increase the scale of the knowledge and broaden the base from which the artist and designer can create new symbols which have coherence and meaning for the eye and for the mind […] The challenge, then, is to put into the picture those communicators which can be graphically symbolized. If we can do so, we have not only found a way of more direct impact, we may have found a way to overcome the language barrier.[484]

In this lecture, Modley covered many aspects of universal communication. He also discussed how several nations were attempting to standardise symbols for machine tool controls through trade and national standards associations and International Standards Organisation (ISO), reporting that standardised signs for 'stop', 'start', 'power on' and 'power off' (amongst

[483] Modley, 'The Challenge of Symbology', IC 8.2 **(Fig. 78)**. In this printed speech, Modley explained why his ideas on the definition of a symbol differed from Neurath's. He considered that Neurath's idea of a symbol was as a stylized, simplified representation of the object it stood for. Modley's definition of a symbol was coloured by fellow Viennese Sigmond Freud's ideas on symbols. Freud considered that a symbol referred to an object or the act of representing a repressed desire of which the individual was unconscious. Modley concluded that his definition of a symbol was as a graphic device that stood for something else – a metaphor, a much broader, but more tangible definition than Freud's, lacking the physicalist (anti-metaphorical) ideas of Neurath. It was noted that intangible symbols from the world of psychology would not be included in the Preparatory Survey.

[484] Modley, 'The Challenge of Symbology', IC 8.2.

others) had already been developed by industrial designers such as Dreyfuss. But in general, Modley berated the lack of designers' input into the development of effective symbols, stating that engineers and technical experts alone were responsible for their implementation.

If the dictionary project were to become a reality, Modley wanted to extend it by commissioning leading designers and design schools to devise sets of universal graphic symbols that would be tested for 'relatedness' (how similar they were to each other). This in turn would be published in the proposed dictionary in the form of a manual for developing graphic symbols with simple rules on grids, simplification and standardisation. Modley described his ideas in a letter to M. Neurath stating that his aim was to commission graphic symbols for a set of the most commonly needed signs such as 'stop', 'go', 'no smoking', 'slower', 'faster', 'hot', and 'cold'. Results would need to be widely tested, but Modley wanted to see if a form of symbol grammar could emerge, and if it could be the basis of a simple international language. These ideas are similar to those he formulated with Margaret Mead for Glyphs, Inc. later in the mid 1960s which are discussed in Section two.[485]

M. Neurath's work on industrial machine controls

M. Neurath got a good response to an article she had placed in the February 1959 *BSI Newsletter* asking for readers to send examples of symbols and their uses for inclusion in the Preparatory Survey.[486] Many industrial symbol users responded, collectively expressing the growing need for standardization. A letter received from a steel company reported a 'great confusion of symbols for properties of steel in metallurgical papers, mostly Greek letters and sub fixes'. The sender pleded that an international symbol language was sorely needed.[487] Modley used M. Neurath's research into machine controls in his 1959 lecture on 'The Challenge of Symbology' to highlight the language barriers faced by machine operators using imported machinery:

> Can we clearly show the machine operator in India, in Chile, and in Ghana how to start and how to run a machine that was made in the United States or Switzerland?[488]

The involvement of Martin Krampen

In April of 1959, Modley met Martin Krampen, a Fulbright fellow researching the organisation

485 Letter Modley to M. Neurath, 16 December 1958, IC 1/49. This also relates to collaborative work that Modley was involved in during the mid-1960s with Mead. Dreyfuss also makes reference to this limited set of basic symbols in his 1972 *Symbol Sourcebook*.

486 'Under the auspices of the Ford Foundation it is hoped to compile an international directory of graphical signs and symbols used in trade and industry, the arts and in other spheres. The field will be extremely wide and will bring in all kinds of symbols used to provide information or instruction. In this country the work is being undertaken by Mrs. Marie Neurath of the Isotype Institute Ltd., 68, Oxford Street, London, W.1. She will be glad to hear from any of our readers having special knowledge and interest in this subject. 'Information wanted', *BSI News*, February, 1959, p. 7. Also reported in 'On the Shelf' by Frank H. Smith *Engineering*, 13 March 1959, p. 343, IC 1/49.

487 Letter M. Neurath to Modley, 25 May 1959, IC 1/49.

488 Modley, 'The Challenge of Symbology', IC 8.2.

and classification of visual communications in Washington D.C.[489] Modley thought Krampen would be 'a good person to help with the large-scale project'. They met for a second time at the 9th International Design Conference at Aspen, Colorado from 21–29 June 1959 where the use of symbols in communication was being discussed. Modley commissioned Krampen to write the papers 'An Approach to the Classification of Graphic Symbols' and 'Classification of Graphic Symbols and Scientific Method' for the Preparatory Survey.[490]

Contact with the Hochschule für Gestaltung [491]

On 26 June 1959 Modley wrote to Frau Aicher-Scholl at the HfG, suggesting that the HfG could help to lay foundations for the realisation of the five-year project that he hoped would result from the Preparatory Survey. [492] He introduced himself through mutual contact Krampen, and mentioned M. Neurath as the European representative.[493]

Culmination of the project

The one-year Preparatory Survey was completed and presented to Eurich at The Fund for the Advancement of Education in New York, in June 1959. As part of the original submission, Krampen presented his two papers on the classification of graphic symbols, along with his idea for a symbol classification system where symbols were classified according to seven criteria: geometrical, human, animal, vegetal, element, object and letterform.[494] M. Neurath had also devised an alternative classification system based on four major classes of symbols: geometric, pictorial, convention, weight and colour.[495] To complete the submission, Eifermann presented

489 Martin Krampen (born 1928) was one of the first students to attend the HfG in 1953, where he studied visual communication and semiotics. Krampen's diploma thesis was based on traffic signs as a practical system of semiotics. While in the US working on his dissertation on the 'apparent movement of pictograms' he met with Modley, and began working on the Preparatory Survey; Krampen, *The World of Signs*, p. 120. Krampen returns to the theme of moving pictograms in *The World of Signs*, which contains a CD with animated pictograms, using Aicher's original artwork. Krampen discusses this book in the edited transcript of a formal interview in Appendix 3, p. 345.

490 Letter M. Neurath to Modley, 6 June 1959, IC 1/49.

491 The Hochshule für Gestaltung in Ulm viewed itself as an international centre for teaching, development and research in the design of industrial products and was originally planned as a continuation of the Bauhaus. It was founded by Otl Aicher and Inge Scholl (Aicher's wife) in the early 1950s. It will be discussed in Section two.

492 Letter from Modley concerning 'Communication through Symbols Project' to Mrs Inge Aicher-Scholl, Volkshochschule für Gestaltung, Ulm, Germany, copied to M. Neurath, 26 June 1959, IC 1/49 (translated from German by James Wong).

Dear Mrs Aicher-Scholl, Miss Mildred Constantine from the Museum of Modern Art and Mr Martin Krampen have both often talked to me about the work you carry out in Ulm. For a while now I have been carrying out preliminary research into Graphical Symbols and recently discovered that to do this I need to complete a 5-year course of study. There is a good chance that in the eventuality that my suggestion is accepted, that we will have the opportunity to work together. Mrs Marie Neurath is representing this project in Europe; her address is Isotype Institute, 68 Oxford Street, London, W1. From 3 July onwards, you may reach Mrs Neurath c/o Frau Fraenkel, Wintererstrasse 37, Freiburg im Breisgau.

493 M. Neurath was sceptical of this contact, thinking nothing would come of it, but in speculation, had this collaboration materialized, Aicher could have had primary contact with the Isotype Institute at a crucial time whilst the Ulm curriculum was developing, and the principles of Isotype could feasibly have had some impact on the development of the Ulm Model (discussed in Section two of this chapter).

494 Iharu, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', p. 4. Krampen's recent book *The World of Signs: Communication by Pictographs* builds on this system which he expanded on in *Zeichensysteme der Visuellen Kommunikation* (Sign Systems of Visual Communication) which Krampen originally co-wrote with Otl Aicher from 1977–1996.

495 Iharu, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', p. 4.

her pilot survey on the efficiency of affirmative and negative signs and words and M. Neurath and Modley supplied reports based on how the larger project would be realised. Modley also included a reprint of his 1959 speech 'The Challenge of Symbology'. Modley wholeheartedly believed the only way to deal with symbols in a scientific manner was to find rational classification methods, as he had encouraged M. Neurath and Krampen to do for the project proposal. Sadly, Eurich's immediate verdict on the project was that the costs were too high, and alternative finance would need to be sought.

On 8 December 1959, Modley re-submitted a reduced proposal to Eurich for the renamed 'Graphic Symbol Project', but was 'disappointed about the pessimistic outlook […] I strongly feel that our project can open up a very significant avenue towards improved communication'.[496] Eurich was concerned that the project was getting too theoretical. In response, Modley suggested the idea of a further simplified 'Dictionary of Symbols'. But on 3 June 1960, Modley wrote to M. Neurath informing her that the Fund for the Advancement of Education were ultimately not prepared to support the wider venture, and all hopes for the dictionary of symbols subsided.

In hindsight, the wider outcome of the Preparatory Survey was overly ambitious and almost impossible to realize; it failed because it was too far-reaching, expensive and the criteria for selection and classification were never finally agreed. Finally, the problem of coordinating a transatlantic project by mail was unwieldy and time-consuming, all of which led to the failure to secure funding past the initial phase. However, although disappointed, Modley stated that he wanted to keep the project alive and publish *Glyphs,* 'a small magazine' at irregular intervals.

The legacy of the project

Although the Preparatory Survey did not achieve the desired outcome of a symbol dictionary, it did succeed in activating interest in literature on graphic symbols authored by Krampen (1965 and 2008),[497] Dreyfuss (1972),[498] Modley (1976 and 2007).[499] It also prompted Modley to take part in a further symbol dictionary project with Herman Weisman in 1962,[500] and a 'Project for Creating Archives' with US anthropologist Margaret Mead and Dreyfuss in 1970 (which also failed to progress). The Preparatory Survey facilitated Modley's further collaboration with

496 Whilst waiting to hear Eurich's verdict on the revised proposal, M. Neurath reported that she had discussed the idea of using visual language for computer processing with the Documentation Centre in The Hague, so it could be utilised independent of language barriers. Letter M. Neurath to Modley, 9 February 1960, IC 1/49.

497 'Signs and Symbols in Graphic Communication' (1965), *The World of Signs: Communication by Pictographs* (2007).

498 Dreyfuss, *Symbol Sourcebook*, (1972).

499 Modley, *Handbook of Pictorial Symbols*, (1976), and *1100 Pictorial Symbols*, (2007).

500 'A Feasibility Study for the Creation of a Dictionary of Symbols and the Development of a Universal Symbolic language'. The team had a much deeper scientific basis than those included in Modley's previous symbol dictionary projects and included academic researchers, psycho linguists and psychologists. Iharu, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', p. 3.

Dreyfuss and Mead.[501] In 1964, Modley and Mead formed Glyphs, Inc., and published several editions of the newsletter *Glyphs* intermittently between 1966 until his death in 1976. Mead originally proposed the development of 'glyphs' (universal graphic symbols or pictographs). With the help of her friend Modley, they attempted to develop 'a language in which all the peoples of the world can really talk to each other'. Glyphs, Inc. will be discussed in Section two.

There is no further documented evidence of M. Neurath's involvement in projects relating to international pictographic language during the 1960s after the Preparatory Survey came to an end, but in 1970 Modley visited her under the auspices of Glyphs, Inc. to enlist support for a 'Project to Create Archives'. Modley had also visited other 'symbol experts' including Masaru Katsumi in Japan, Anton Stankowski in Germany and Peter Kneebone in the UK to raise awareness for this project which will be discussed in Section two.[502] Isotype symbols were (and continue to be) a common feature in publications on international pictographic systems and Modley made a point of promoting Isotype-related matters whenever he could in *Glyphs* newsletters.

The Preparatory Survey is quoted in key authored books and papers on symbols during the 1960s and 70s by Dreyfuss, Krampen and Modley. It must be noted that the Preparatory Survey was conducted largely through Air Mail correspondence (although Modley made one visit to the UK to meet M. Neurath). M. Neurath had no actual contact with either Dreyfuss or Krampen, and in a recent interview Krampen confirmed that he learned of the principles of Isotype through Modley.[503] Section two initially describes the ventures that can be seen to have originated from the Preparatory Survey in the US by Dreyfuss, Modley and Krampen, including attempts to standardise and classify symbols in the form of dictionaries, sourcebooks and symbol archives. Section 2 also evidences the dissemination of Isotype principles of graphic language in the US, Europe and Japan, largely through the work of Dreyfuss, Modley, Krampen and Masaru Katsumi. Dreyfuss and Krampen were introduced to the principles of Isotype through contact with Modley, but the dissemination of Isotype principles in Japan derived from alternative sources which will be discussed later in Section two.

Section two

The dissemination of Isotype principles of graphic language in the US, Europe and Japan

This section discusses the dissemination of the principles of graphic language in the US, Europe and Japan during the 1960s through literature reviews, archival research and interviews. Several organisations and individuals were active in spreading ideas based around the

501 Jane Howard, *Margaret Mead A Life,* (New York: Fawcett Columbine, 1984), p. 369.
502 Iharu, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', p. 6.
503 Taken from an edited transcript of a formal interview with Martin Krampen at the HfG in Ulm, Appendix 3, p. 349.

principles of Isotype in these parts of the world, but in general, even though pictographic design was intended for international audiences, those responsible for the work did not travel widely. There are several examples where designers worked across the continents, Krampen being a prime example due to his work in the US, Canada and Germany, and the Icograda Commission on Signs and Symbols (ICSS) was an international organisation which numbered Modley, Krampen and Katsumi as international members. It was not until the 1970s when Otl Aicher was able to liaise with Masaru Katsumi in Japan (courtesy of the International Olympic Committee) that international boundaries became less restrictive. The section begins with the dissemination of the principles in US, through the work of Modley, Dreyfuss and Krampen, who were all involved in the Preparatory Survey. It will continue by discussing the work of the Icograda Commission on Signs and Symbols (ICSS) in the UK and the Hochshule für Gestaltung (HfG) in Germany, finally tracing the spread of knowledge about the principles in Japan through the work of Katsumi, leading up his work for the 1964 Tokyo Olympic pictograms.

The dissemination of Isotype principles of graphic language in the United States

Rudolf Modley is known for his work on symbol classification, and was largely responsible for disseminating ideas on Isotype in the US. After his 1937 book (updated in 1952) on how to design and use pictographs,[504] he went on to successfully publish the *Handbook of Pictorial Symbols: 3,250 Examples from International Sources* in 1976. But previous to this came an extensive body of work on symbol classification and standardisation which included several unsuccessful attempts to originate symbol dictionaries and archives (which will be discussed later in this section). Some of Modley's more successful ventures were conducted in collaboration with industrial designer Henry Dreyfuss, who appeared more able to acquire funding for symbol-related projects. This section will begin by discussing Dreyfuss' work in this area, culminating in the publication of his *Symbol Sourcebook* in 1972, which could viably be seen to have evolved from the legacy of the Preparatory Survey.

Henry Dreyfuss

> 'The greatest impediment to the development of symbols today is the confusion caused by their uncontrolled proliferation. Many individual groups create symbols for their own specific needs – often without consideration of existing symbols or knowledge of parallel efforts by others.'[505]

Henry Dreyfuss' Symbol Data Bank project started life as yet another proposal for a symbol dictionary – a project he wanted to explore during his retirement, which culminated in the

[504] Rudolf Modley, *How to Use Pictorial Statistics* (New York: Harper & Brothers, 1937), Rudolf Modley, & Dino Lowenstein, *Pictographs and Graphs: How to Make and Use Them* (New York: Harper & Brothers, 1952), *Handbook of Pictorial Symbols: 3,250 Examples from International Sources* (New York: Dover, 1976), and *1100 Pictorial Symbols* (New York: Dover; Boston USA: D. Reidel, 2007).

[505] Henry Dreyfuss (1904–1972) taken from the Special ICOGRADA Thirtieth Anniversary Year issue of *Print* Magazine November/December 1969, Icograda Archive.

publication of the *Symbol Sourcebook* in 1972. Dreyfuss had originated the idea of the Preparatory Survey in 1956, and the Symbol Data Bank (in collaboration with Modley) related back to it. In 1967, Dreyfuss asked Modley (then part of Glyphs, Inc.) to suggest suitable names for an international advisory board for a dictionary of symbols. In response, along with a list of suggestions, Modley put forward a scheme to investigate the problems of symbol classification and make Glyphs, Inc.'s collections of symbols available for use on the project. Modley also suggested making contact with other international symbol designers (which he also did for his own Symbol Archive project in 1970) and providing design consultancy on symbol-oriented matters. Unfortunately, as with previous dictionary projects, there was no available funding. Undeterred, Dreyfuss continued to develop the project as a Symbol Data Bank. He took it forward by working with a small staff and initiating an extensive programme of research to compile existing information on international symbols. The accumulated data was analysed, classified and catalogued in one of 53 sub-classifications. It was Dreyfuss' intention to integrate this mass of material with other research and collections worldwide,[506] enabling it to become 'the basis for a future automated symbol information system'.[507] Dreyfuss then formulated the idea of publishing the classified data as a compendium, or sourcebook, rather than a dictionary. Modley approved of the idea, and urged Dreyfuss to use a classification system based on simple graphic form, which can be seen in *Symbol Sourcebook: An Authoritative Guide to International Graphic Symbols,* which was published in 1972.

Symbol Sourcebook

> Recently under a grant from the National Endowment for the Humanities, I explored the feasibility of an international dictionary of symbols. The idea was – and still is – to bring together, with the help of a world-wide task force, the historic and contemporary symbols of different countries and, from this great mass of material, select existing symbols that would provide the elements of a universal graphic vocabulary.[508]

This quotation from Dreyfuss in 1969, is most probably describing work produced for the Preparatory Survey. Documents from the Icograda Archive show that he maintained contact with Eurich during the 1960s after Eurich moved from the Fund for the Advancement of Education to UNESCO,[509] and the *Symbol Sourcebook: An Authoritative Guide to International Graphic Symbols* would have formed a logical conclusion to the Preparatory Survey.[510] The ICSS wanted to cooperate with this project (believing they might attract funding and recognition

506 Modley was keen to include Dreyfuss' Symbol Data Bank collection alongside material collected by Glyphs, Inc. in his own proposal for a Symbol Archive in 1970.

507 Ambitious future plans included the creation of a 'computerised' data bank of universally accessible symbols, functioning from a central computer containing an annotated illustration of each symbol accessed by 'small low-cost terminals', linked to the central computer by telephone providing input/output capabilities in remote locations. 'Conversations' would be conducted in standard language, minimising the need for specialised training, and all data would be multi-lingual. Special ICOGRADA Thirtieth Anniversary Year issue of *Print* Magazine November/December 1969, Icograda Archive.

508 'Speaking in a Thousand Tongues' *The Conference Board Record*, 4: 3 (1969), p. 17, Icograda Archive, SS67/3.

509 Correspondence between Peter Kneebone and Alvin Eurich, 17 December 1968, copied to Julian Behrstock, Henry Dreyfuss, F.H.K. Henrion, Pieter Brattinga and Rudolf Modley, Icograda Archive, SS67/3.

510 It contains an acknowledgement of the help of Alvin C. Eurich, chair of the UNESCO US National Commission in helping him compile the 20,000 symbols in his Data Bank.

in the US through it) as was UNESCO.[511] It was thought that Dreyfuss, with his international reputation as an industrial designer and experience in the design of symbols for machine controls was more likely to secure funding for such a project at the time than anyone else. The ICSS was keen for Dreyfuss to hold a conference based around the *Symbol Sourcebook,* supported by UNESCO. But Dreyfuss declined the opportunity and his death in 1972 ended any idea of a symbol conference.[512]

Dreyfuss' *Symbol Sourcebook* [513] comprised a compilation of sets of international symbols, many drawn from technical and industrial sources, not immediately accessible to the layman. It also contained an example of Modley's trial symbol classification system, showing sixty pages with symbols classified according to graphic form and a section which combined form with colour. The *Symbol Sourcebook* formed the natural progression from Dreyfuss' authored chapter on the design of symbols for industrial controls based on a case study for Deere and Co., published in *Sign Image Symbol* in 1966.[514] Primary research into symbol classification led Dreyfuss to divide symbols into two categories, 'pictographs' which reassemble the object or depict qualities associated with the object (and are easily recognised through prior knowledge), and 'abstractions', which are initially obscure, but become meaningful through education. He refined his research in the 1972 *Symbol Sourcebook* by dividing symbols into three categories:

- representational i.e. a silhouette of a locomotive to denote a railway crossing or a person on a bicycle to denote a cycle path

- abstract (glyphs) where a symbol reduces the essential elements of the message into a graphic form (i.e. a horizontal wavy line for water, and a vertical one for fire)

- arbitrary – invented symbols which must be learned i.e. the symbol for danger of radioactive presence, a diagonal bar or interdict for prohibition, a treble clef, or mathematical signs for + or -

The *Symbol Sourcebook* is limited to symbols in use in the early 1970s, 'that serve to give instructions, directions, and warnings'. Dreyfuss acknowledged the help of Modley, Mead, Katsumi and Arthur amongst many others in the compilation of these many thousands of symbols, many of which came from his Symbol Data bank. The book is designed for those

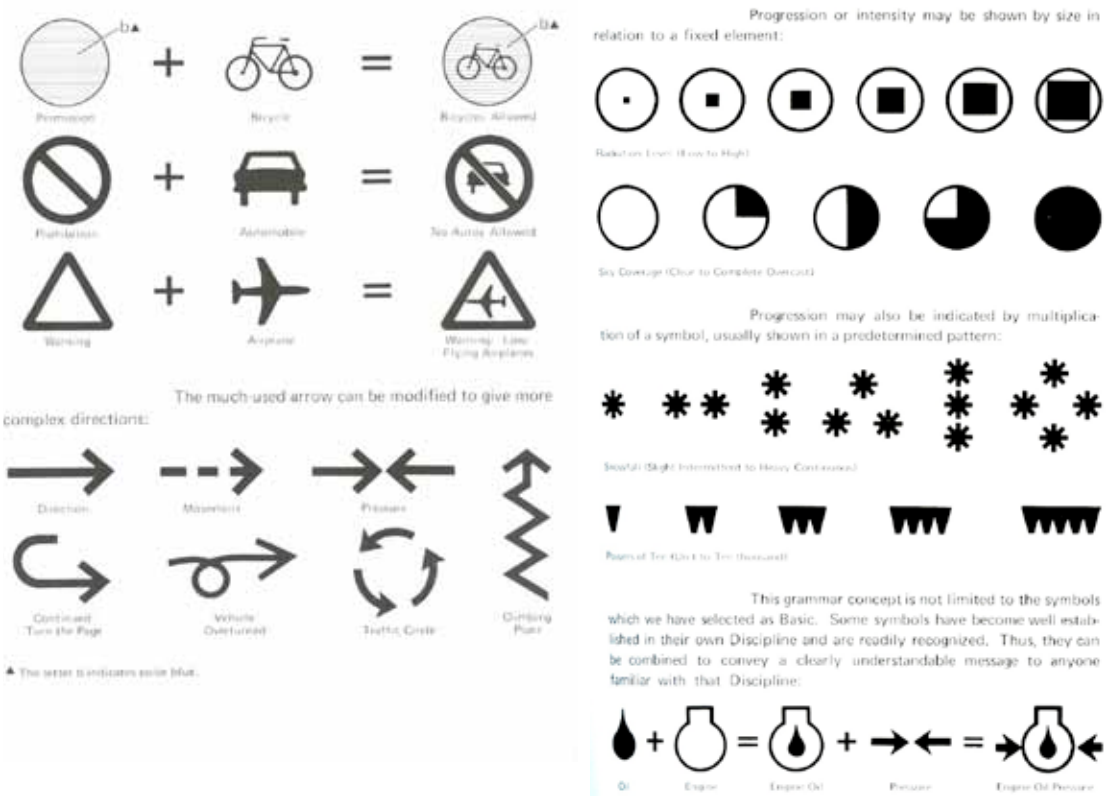
511 Letter Alvin C. Eurich (UNESCO) to Peter Kneebone, 9 January 1969, Icograda Archive, SS67/3.

512 See Wibo Bakker, 'Pictopolitics: Icograda and the Development of Pictograms', *Iridescent,* (2012).

513 Dreyfuss used the term 'Sourcebook', rather than 'Dictionary'. In the Introduction to *Symbol Sourcebook*, he stated that 'It would be folly to assume that our files include all existing symbols, for the task of assembling so complete a record would tax the capabilities and endurance of any man', p. 16.

514 Dreyfuss considered that the graphic form of a symbol was almost as important as its content, and that graphic guidelines for the design of symbols for industrial machinery should be based on simplicity, clarity, consistency of line weight, use of stark contrast, consistent proportions and legibility when reduced. Dreyfuss and his team designed an entire copyright-free vocabulary of symbols for Deere and Co., which became industry standards. It was Dreyfuss' wish that his symbols would 'form a nucleus of a symbol language, which could then be applied to other fields of communication, transportation and manufacturing'. Kepes, (ed) *Sign Image Symbol* (New York: George Braziller Inc., 1966), pp. 126-133. Dreyfuss also saw the economic advantage (as well as the safety and efficiency aspects) of using symbols instead of lengthy captioning for machine controls.

working with symbols and features 'Education by the Eye' by M. Neurath (an introduction to the language of Isotype), along with a description of Semantography by C.K. Bliss. Dreyfuss was concerned that attempts at the development of written international languages, (Esperanto,[515] Interlingua, Ido, Volapuk, Ro, Suma and BASIC English), all relied on the Roman alphabet, which he felt was a barrier in itself. He believed that the creation of a universal picture language was possible, and as with Neurath's 'helping language', suggested that it should form a supplement to existing languages, rather than being a stand-alone system. Dreyfuss envisaged an international pictorial language formed from a standardised limited set of basic symbols. He illustrated examples which he considered to be universal and would contribute to this 'limited symbology'. Many are based on the genre of road signs, with



(Fig. 79)
Basic symbols from *Symbol Sourcebook* (1972).

extensive use of reductive imagery, some include metaphoric images[516] of hares and tortoises for 'fast' and 'slow', directional arrows, the quintessential W.C. pictograms, light bulbs (for light and dark), and simplified silhouettes of bicycles, cars and planes. Dreyfuss also illustrated how more complex meanings could be developed by combining symbols into a form of grammar, which is not unlike the syntax found in Isotype. **(Fig. 79)**

515 Esperanto is an auxiliary international language (or second language) invented by Ludwik L. Zamenhof, a Polish physician (1858–1917) to foster harmony between nations. It translates as 'to hope'. It was first used in 1887 although it was never adopted by any one nation. Esperanto was officially adopted by UNESCO in 1954; the number of speakers is unknown.

516 Use of the metaphor is strictly against the principles of Isotype.

Dreyfuss' ideas on 'symbology' generally concur with the philosophical principles of Isotype in relation to their desire to attempt to achieve neutrality, their educationalist stance and their inclusiveness, (except when used for a specialist or technical audience, and metaphor is used). From the methodological perspective, Dreyfuss' ideas align with Neurath's principles in their attempt to be universally accessible (again with the exception of those intended for a technical audience), achieve a balance between abstraction and pictorial representation and make use of existing symbols – promoting 'debabelisation'.

> If a system of symbols could be compiled that would be equally recognizable in Lagos and Lapland, perhaps the dream of a universal basic means of communication could be realized. I believe this is possible.[517]

Rudolf Modley and 'debabelisation'

Modley's championing of the pictographic chart in the 1930s in the US gave way to his desire to classify and standardise international symbols from the 1940s onwards, as can be seen through his attempts to instigate symbol dictionary projects from 1940–1970. Hisayasu Ihara considers that Modley had always been an advocate of the standardisation of pictograms,[518] but Modley also became increasingly concerned with the formulation of a universal pictographic language (another of Neurath's aims) with his work with Glyphs, Inc. This section will review a cross-section of Modley's projects and collaborations (many involving Dreyfuss) through authored chapters, published lectures, essays and books from the late 1950s to the mid 1970s. Over the decades, it becomes apparent that Modley's ideas on the standardisation of international language are seen to align closely with Neurath's, which in 1937 Modley considered restrictive:

> I hope that the success of our American experiments will convince him [Neurath] that the restrictions he has set up are not fundamental implications of the method.[519]

Modley outlived Neurath by over three decades. He was present when Isotype was in its infancy at the G&W in Vienna; he took Isotype to the US and popularised the pictogram during the Great Depression (in part out of necessity due to difficult economic conditions) and he publicly criticised (what he considered to be) Neurath's 'monopolistic'[520] attitude in print[521] during the late 1930s. Operating in the role of symbol consultant from the 1940s to the mid-1970s

517 Dreyfuss, *Symbol Sourcebook*, p. 18.

518 Iharu, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols'.

519 Modley, *How to use Pictorial Statistics*, p. xiii. Modley amended his ideas on universal language when he updated *How to use Pictorial Statistics* (1937) with *Pictographs and Graphs: How to Make and Use Them* (1952). In the introduction, Modley quoted Neurath from *International Picture Language* p. 17, 'We have made one International Picture Language (a helping language) into which statements may be put from all the normal languages of the earth', and continued by toning down his criticism stating that Neurath's contribution to the growth of modern pictographs 'has been widely acknowledged; and although the system was not universally accepted, ISOTYPE symbols have been used ever since in most European countries'. Modley, *Pictographs and Graphs, How to Make and Use Them*, p. 6.

520 Iharu uses this word in 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols'.

521 Modley authored *How to use Pictorial Statistics* (1937) *A History of the War* (1943). He then went on to design four books (with graphic charts) on the US and European economies for the Twentieth Century Fund from 1949–64, as well as *Pictographs and Graphs: How to Make and Use Them* (1952).

allowed collaboration with anthropologists, psychologists and other design professionals along with access to scientific testing procedures at a time when work in the area of international pictographic language was flourishing. Modley became a spokesman for 'Symbology', the study, interpretation and classification of the symbol in visual communication, and a US representative of the Icograda Commission for Sign and Symbols. He was latterly involved in the formulation of some of the first ISO symbol standards for public use during the mid-1970s.

'The Challenge of Symbology' 1959

In April 1959 Modley's speech at the Fourth Annual Communications Conference of the Art Director's Club New York, discussed 'Symbology' and work in progress on the Preparatory Survey. Much of the published speech illustrated how strongly he felt about standardisation and the acceptance of universal language. Modley was careful to point out that the spirit of creativity should not be lost in the face of standardisation and uniformity in the development of universal symbols. He made the point that standardised graphic symbols were urgently needed in everything from technical machinery to household appliances, and that 'If we don't face the challenge today, we may face the Tower of Babel tomorrow'.[522] **(Fig. 78)**

'Is Writing Obsolete?' 1960

In January 1960, Modley's essay 'Is Writing Obsolete?' was published in US *Print* magazine. It discussed the superiority of pictographic language over written language, and how the public were 'paying the price' for the inadequacy of commonly accepted symbols 'in industrial, and home accidents, in traffic accidents, in misused and damaged appliances and machines, in delays, confusion and errors.'[523] He described how interest in the study of visual communication and graphic symbols was increasing and identified the great demand for symbols in business and scientific communities, urging designers to devote increasing attention to symbol design. Modley again cited the Preparatory Survey as an example of current work in progress, highlighting Krampen's contribution to it.[524]

Modley shared many of his ideas on symbol classification with Dreyfuss, dividing graphic symbols into two main categories; pictorial symbols (as Neurath envisaged Isotype – those with a fidelity to the object they stand for) and arbitrary symbols, (which stand for a concept such as '+' or '$ '). To evaluate which category of symbol should be used for which purpose, he offered the following criteria: for swift comprehension, pictorial symbols were easier to

522 Modley, 'The Challenge of Symbology', IC 8.2.

523 Modley, 'Is Writing Obsolete?' *Print*, January/February (1960), p. 81. In this article Modley acknowledged the fact that most of the work on scientific and professional symbols had been produced by the American Standards Association and the US Government. It was generally difficult to achieve funding for projects involving international signing systems during the 1960s, with the exception of work involving road signs, which were badly needed due to the rise in numbers of cars on the roads. The UN were developing a standardised world-wide system for international road signs during the early 1960s, and in 1963 the UK and Japan made the decision to introduce international versions of these signs. Kinneir Calvert Associates designed the signing system for British roads from 1964–67, they had previously designed the signing system for the newly introduced British motorways during the late 1950s.

524 Krampen, 'An Approach to Classification of Graphic Symbols'.

learn than arbitrary symbols; arbitrary symbols were best used when permanence of use versus obsolescence came into question (i.e. objects that may change shape over time such as technology and transport). Modley also took into consideration the ease with which symbols could be incorporated into text, and their relative flexibility when combined with other symbols – concluding that the more flexible a symbol is in combination with others, the fewer basic symbols are needed.

Modley's classification system could be said to roughly concur with Neurath's concept of graphic language in terms of pictorial symbols, but arbitrary symbols used metaphor, which was against the physicalist principles of Isotype. Isotype symbols were simply realised, and designed with permanence in mind, based on a combination of historical and current thinking on how objects were perceived,[525] and intended to be combined with words and other symbols to form a graphic syntax. Neurath was well aware of the fact that future adaptations to Isotype symbols would be needed.

'Graphic Symbols for World-wide Communication' 1966

> We are on the threshold of truly historic events in graphic communication. Steps are underway to create graphic symbols which can be understood by large groups of people – maybe even by people speaking all languages and living and working in all stages of technical and cultural development. Moreover, more effective graphic symbols may soon remake the many different written or printed languages which are still being used all over the world.[526]

In this authored chapter Modley again promoted the need for international symbols, building on experience gained from the Preparatory Survey. At this time, he was one of the three US members of the ICSS, (with Paul Rand and Colin Clipson) and continued to reference Krampen's research on the effectiveness of symbols. Modley cited examples of projects where international symbol systems were being developed in conjunction with ICSS, including the Union Internationale de Chemins de Fer (International Union of Railways) (UIC), the International Civil Aviation Organisation (ICAO)[527] and United Nations (UN), who had prepared a new protocol for a worldwide road sign system.[528] Modley considered the auxiliary graphic language system invented by C.K. Bliss, and the work of Margaret Mead, who proposed the development of 'Glyphs' (universal graphic symbols that could not be syntactically combined),

525 'The ISOTYPE list of signs, put together in the last ten years, is based equally on experience of the past and present forms. If we were not in a position to make use of past experience, it might be a very long time before our store of signs was complete.' Neurath, *International Picture Language*, p. 41.

526 Modley, 'Graphic Symbols for World-wide Communication' in *Sign Image Symbol*, p. 108.

527 Martin Krampen was the author of this survey. Rathgeb, *Otl Aicher*, p. 223.

528 The 1949 Geneva Protocol on Road Signs and Signals came into force in December 1953. See http://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XI-B-3&chapter=11&lang=en. The standard set of symbols developed for road signs formed an exemplar for the standardisation of symbols during the 1960s. Japan's adaptation of them in 1964 brought Japan in line with the rest of civilised countries at a time when they were trying hard to prove themselves as a peaceful civilised nation as they hosted the 1964 Olympics.

to be part of this move to develop international graphic symbols.[529]

Modley reported on the growth of standardised symbol systems for professional and technical organisations, predicting that the American Standards Association (ASA), and the International Standards Organisation (ISO) would play a large part in the standardisation of technical symbols in the future, aiding international trade by replacing words with symbols on manufactured items.[530] With this authored chapter, Modley further aligned his viewpoint with Neurath's by agreeing with 'debabelisation' and suggesting that an international effort to lay the groundwork for a system of universally applicable symbols was badly needed. But he warned that this would be difficult to practically achieve, as 'in the thousands of years of man's cultural development only a limited number of graphic symbols has found wide acceptance (and even these are in limited areas).'[531] He considered that successful symbols should be constructed from graphic elements familiar to the intended audience, or must be taught to them, 'alongside reading, writing and arithmetic' as a secondary language, otherwise symbols would be subject to different interpretation, be overlooked or would fail to function on a universal basis.

Modley's criteria for the creation of international symbols included:

- broad public support
- only the most urgently needed symbols should be considered (due to the expense of developing, testing and teaching symbols to the general public)
- careful preparation and study of potential cultural nuances and implications must take place before deciding on which symbols to adopt.[532]

Glyphs, Inc. 1964–76

Glyphs, Inc. was a voluntary organisation founded to encourage the development of universal graphic symbols. It was originally proposed in 1964 by cultural anthropologist Dr Margaret Mead and presented to the UN by the Canadian Delegation as part of the programme for 'International Co-operation Year' (1965 being their twentieth anniversary).

> We are becoming acutely aware that we need to build a culture within which there is better communication – a culture within which interrelated ideas and assumptions are sufficiently widely shared so that specialists can talk with specialists in other fields, specialists can talk with laymen, laymen can ask questions of specialists, and the least educated can participate at the level of political choice, in decisions made necessary by

529 During the 1960s (until 1976) Gerd Arntz continued work with the Dutch Foundation for Statistics (Nederlandse Stichting voor Statistiek) in the Hague producing visual statistics according to the Isotype method. His personal work, whilst still politically focused was less overt and more about the human condition. Arntz's work did not have a primarily international focus, but he was a member of the Dutch Federation of Applied Artists, whose aim was to help citizens be well-informed and enable them to critically assess visual information. Ed Annink & Max Bruinsma (eds), *Gerd Arntz Graphic Designer* (Rotterdam: 010 Publishers, 2010), p .48-49. An archive containing Arntz's work can be found in the Gemeentemuseum, The Hague.

530 See Dreyfuss' Deere and Co. case study in *Sign Image Symbol*, pp. 126-133.

531 Modley, 'Graphic Symbols for World-wide Communication' in *Sign Image Symbol*, pp. 113-14.

532 *Ibid.*, p. 115.

> scientific or philosophical processes which are new, complex and abstruse.[533]

Mead was a great supporter of the UN[534] and UNESCO.[535] Many of her ideas on promoting better cross-cultural communication would have rung true with Neurath had he lived to see the 1960s. Mead and Modley formed Glyphs, Inc. in 1964 and became co-chairmen of this not-for-profit organisation. Directors included Harold Lasswell of Yale, James R. Patton, Curtis Roosevelt (UN) and Emily O. Barnes. Glyphs, Inc.'s mission was to develop a core set of glyphs that 'have a meaning that is separable and independent from the names which are given to the symbol in different languages'.[536] Everyone would learn a new universally shared language enabling free communication irrespective of national or cultural boundaries, as a second language to their native tongue. Each glyph would take the form of a self-contained unit with a universally understood meaning that could not be syntactically combined.[537] Glyphs would be thoroughly tested to ensure total universality and avoid ambiguity and cultural loading, responding to concerns over a lack of inclusiveness, and a desire for better international communication.[538]

Glyphs, Inc.'s objectives were to:

1. Act as a 'clearing house' for all that is new in this field (two Glyphs, Inc. newsletters had been published by 1969)
2. Establish a symbol archive for the collection and classification of symbols[539]
3. Encourage interdisciplinary contact between scientists for the study of symbol problems and opportunities
4. Aid in the establishment of a traditional body for symbol evaluation, testing, adoption and promotion
5. Suggest worldwide efforts to "teach" glyphs as universally as the alphabet and numerals.

533 Margaret Mead, 'The Future as the Basis for Establishing a Shared Culture' *Daedalus*, 94: 1 (1965), 136.

534 Mead was a great supporter of the UN, and at the largest of her memorial services in January 1979 (following her death in November 1978), Ambassador to the UN Andrew Young presented the Presidential Medal for Freedom posthumously to Mead; accepted on her behalf by her friend Jimmy Carter. See Jane Howard, *Margaret Mead: A Life* (New York: Fawcett Columbine, 1984).

535 UNESCO (United Nations Educational Scientific and Cultural Organisation), was founded in 1945. Their mission statement was about 'Building peace in the minds of men and women'. Many of Neurath's friends had connections with UNESCO, including Arntz. Annick & Bruinsma, *Gerd Arntz Graphic Designer* p. 48.

536 Modley, 'Graphic Symbols for World-wide Communication' in *Sign Image Symbol*, p. 113.

537 Glyphs are discussed in Margaret Mead, 'The Future as the Basis for Establishing a Shared Culture', *Daedalus*, 94: 1 (1965), 135-155, and Mead & Modley, 'Communication Amongst all People Everywhere' *Natural History*, 72: 70 (1968), 56-63, which explained ideas behind Glyphs, Inc. – an unusual partnership between an anthropologist and a designer. What brought Mead and Modley together was a desire to create a universal, language-independent system of communication. They identified three ways to accomplish this: through 'gylphs' – clear unambiguous signs that would be understood by speakers of any language; a secondary spoken language, learned alongside the mother tongue, easily translated into other scripts, non-European, without political or religious bias, and prevalent worldwide, so translators would be available (Mead and Modley considered that Armenian fitted the criteria); and an invented written form of communication, not unlike 'Blissymbols' which Bliss was developing in Australia.

538 Mead makes reference to the nuclear threat in 'The Future as the Basis for Establishing a Shared Culture', which was permeating social consciousness during the mid-1960s.

539 The project invited international designers to submit glyphs 'designed to fit into a unified system in which specific symbols, shapes, or colors have a permanent meaning. A combination of two, or possibly more glyphs could be possible.' Judges for the project were to include Margaret Mead, Rudolf Modley, Mildred Constantine (of the Museum of Modern Art), Paul Rand and Masaru Katsumi. Correspondence on Glyphs, Inc. from Modley to Kneebone 1966, Icograda Archive, SS67/3.

Glyphs, Inc. also set up a competition to design new glyphs. It was proposed that entries would be exhibited at a 'World Communication Exhibit' which would generate interest in symbols from an educational perspective. Apart from competition entries, the exhibition would display examples of prehistoric symbols, the history of alphabets and numerals, glyphs designed by children, symbols used in science and in professions and a 'chamber of horrors' of misused symbols. ICSS were interested in being involved with this exhibition, thinking it a good way to obtain funds and promote their ideas in the US. (Modley became the US representative for the ICSS in 1966).[540]

'There are no universal symbols today' 1970[541]

> The road to universal symbols seems difficult. It is so because the factors which will determine success or failure are not only questions of quality and technical competence but are also questions of politics and of organization.[542]

Modley used his 1970 speech at the symposium on 'The Influence of the Map User on Map Design' in Kingston, Ontario as a platform to discuss the criteria he considered were required for universal symbol sets to function. He indicated the difficulties he was facing in trying to develop universal symbols that meant the same to all people, making the point that all symbols have to be learned, and differing graphic interpretations could led to misinterpretation. He outlined the factors needed to achieve universal symbols:

- Agreement among professional and governmental organisations in every country as to which existing symbols are 'primary candidates for standardization'. The amount of symbols should be limited and only use those intended for the general public. National work would be carried out by existing private or governmental agencies, and the country's Standards institutes

- Preparatory work for symbols would be completed by task forces of specialists

- Coordination throughout the public sector, (hospitals, rail, airlines and roads) would led to identical symbols being used throughout the national system

- Setting up a permanent international agency for the development of universal symbols, (based on distilling all national information into a set of symbols which are common to all) possibly by expanding the functions of the International Standards Organization (ISO) in Geneva

- Instigating an intensive international educational campaign to find out what makes symbols "tick" and teach everyone the new symbol system [543]

[540] Wibo Bakker, 'Pictopolitics: Icograda and the Development of Pictograms' *Iridescent,* (2012).
[541] Rudolf Modley, 'Universal Symbols and Cartography' Symposium speech on 'the Influence of the Map User on Map Design', Queen's University, Kingston, Ontario, 9 September 1970 (US Department of Health, Education & Welfare, Office of Education).
[542] Modley, 'Universal Symbols and Cartography', 6.
[543] *Ibid*., 7-8.

Modley also used the symposium to promote Glyphs, Inc.:

> Glyphs, Inc., the little organization of which I am co-chairman with anthropologist Margaret Mead, has set itself the task of promoting universal symbols. Our objective is the development of a limited number of universal symbols which, we hope, would become part and parcel of the basic symbol structure taught all over the world. Our first practical step, which we hope to accomplish soon, will be the establishment of an international symbol archive in New York – possibly with duplicate archives in Europe and Asia.[544]

Project for Creating Archives

In 1970, after his involvement with Dreyfuss' Symbol Sourcebook and using connections he had built up through Icograda, Modley devised the idea of establishing a new symbol archive, the Project for Creating Archives, which would accommodate the symbol collections of Dreyfuss, Icograda, and M. Neurath, along with those of Glyphs, Inc. He proposed that symbols be classified (using scientific means) and made available to 'serious students and organisations'.[545] Modley visited M. Neurath and Peter Kneebone in the UK, Anton Stankowski in Germany and Masaru Katsumi in Japan and received enthusiastic support for the project. He proposed setting up initial branches of the Archive in places such as Pasadena, Tokyo, London and Germany with a head office in New York. The branch offices would collect new symbols and dispatch them to New York, where once classified, new symbols would be duplicated and redistributed to the branches. Thinking it a good step forward, Modley and Mead established a Symbol Archive which mainly consisted of Dreyfuss' collection of 8,000 symbols from his Data Bank, and looked for universities and libraries who might find the project of interest. Alongside the publication of Dreyfuss' Symbol Sourcebook, Modley considered this to be a 'the first step towards the development of universal symbols' the next step being the 'initiation of a worldwide effort by scientists from different disciplines, educators, and representatives of business, consumers, and governments to agree on a limited number of concepts and specifications for the development and testing of universal symbols'.[546] Unfortunately it was yet another idealistic dream.

Handbook of Pictorial Symbols

Modley published *Handbook of Pictorial Symbols* in 1976 towards the end of his life, building on the 1940 *Pictorial Symbols* publication (containing 1000 symbols). This book featured '3,250 Examples from international sources', and comprised an introduction that discussed Neurath's principles, and a collection of pictograms amassed over fifty years. Examples of indexed symbols span work from Arntz through to Arthur, Katsumi and Aicher, and are divided into two sections, public and pictorial. Modley again used the book to promote Glyphs, Inc., and their attempts to identify common 'glyphs', or universal visual concepts, and standardise

[544] Modley, 'Universal Symbols and Cartography', 8. Modley is referring to the 1970 'Project for Creating Archives'.
[545] Ihara, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', 6.
[546] *Ibid.*, 6.

them to form a 'universal language'. The *Handbook of Pictorial Symbols* could also be said to be a pared down version of the conclusion anticipated for the Preparatory Survey, but unlike, Dreyfuss' more technically based *Symbol Sourcebook*, it forms a classification of instantly accessible commonplace western symbols drawn from the public domain. Modley intended it as a collection of symbols which served public interest, but rapidly came to the conclusion that it also had the effect of showing how many public symbols are not 'unique', do not function 'independent of language and culture', and fail to 'convey its message directly by its visual form'.[547]

Modley's ideas on universal language can be described as idealistic, the majority being logistically impossible to achieve. It was doubtful that universal symbols could be developed that 'meant the same to all people', as all symbols have to be learned to some extent and have different cultural and graphic connotations. In order to establish primary candidates for the development, standardisation and dissemination of international symbols, Modley's proposals for implementation would need the cooperation of international government organisations and agencies. It is interesting that Modley's criticism of Neurath being 'monopolistic' and unwilling to be part of a group to standardise pictograms was realised in the fact that ultimately the only group that could provide industry standards and achieve universal agreement would be an international government organisation, showing how much interest in this field had gained pace since Neurath developed Isotype in the mid 1920s.

Modley could be considered to be the elder statesman of 'Symbology'. Ultimately his ideas on standardisation and the creation of a universal picture language became more rigid than Neurath's forty years earlier. Modley's enthusiasm for the classification and standardisation of symbols continued until his death in 1976. His dogged persistence in trying to finally produce a symbol dictionary with a scientifically based classification system approached partial fulfillment through Dreyfuss' *Symbol Sourcebook* and his own *Handbook of Pictorial Symbols,* published in 1976.

Martin Krampen 'Signs & Symbols in Graphic Communication'[548]

Martin Krampen was one of the few designers/communication scientists who worked in both the US, Canada and Europe, which is why his work is so important in an international context.

[547] Modley (1970) in Ihara, 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols', 7.

[548] Martin Krampen was born in Germany in 1928, and studied (and later briefly taught) at the Hochschule für Gestaltung in Ulm. He studied psychology, philosophy and theology at the Universities of Tübingen and Heidelberg, and painting and design at the Accademia delle Belle Arti in Florence. He received his diploma at the HfG, followed by his doctorate in Communication Arts at Michigan State University. He became Assistant Professor in the Department of Graphic Arts and Psychology at the Carnegie Institute of Technology, and then went on to be Assistant Professor of Engineering (Design) and Psychology at University of Waterloo in Ontario, Canada. He has authored many books on semantics and semiotics and co-authored *Zeichensysteme Der Visuellen Kommunikation: Handbuch Für Designer, Architekten, Planer, Organisatoren* (Sign Systems of Visual Communication: Handbook for Designers, Architects, Planners and Organizers) with Otl Aicher. *The World of Signs, Communication by Pictographs* (2007) is seen by Krampen as a 'step-ahead' to the work he did with Aicher, see edited transcript of an interview with Krampen, Appendix 3, p. 341.

'Signs and Symbols in Graphic Communication' was written in 1965 for US *Design Quarterly* magazine. It presents an illustrated account of Krampen's theoretical and experimental work in graphic communication, something that in 1965, was, as the paper suggested 'not very advanced' and 'not yet a cohesive field of study'.[549] The paper made frequent references to Isotype and covered aspects of Gestalt psychology, theories of perception, semantics, the difficulties of low literacy, visual rhetoric and communication with international and technical audiences. It is clear that Krampen favoured pictograms as the way forward:

> Organisations such as the *United Nations*, and international gatherings like the World's Fairs and Olympic Games face special communications problems. Attempts to create international languages such as Esperanto have so far proved unsuccessful. Pictorial signs would appear to be more effective vehicles, but they too require the conventionalizing of non-conventional surrogates. Conventionalization in such a case means generally that representatives of various societies or nations must meet and mutually agree on a form of a pictorial sign system which becomes international.[550]

Krampen's ideas concur with Mead and Modley's aspirations for Glyphs, Inc., but Krampen's approach to the development of internationally recognised symbols is more realistic, based on designers creating signs which are modified through collective experience, and conventionalised for an international audience, rather than through idealistic schemes involving worldwide anthropological surveys.[551] In this 1965 paper, Krampen stated that 'the results [of the Preparatory Survey] are unfortunately not yet available', (although he must have been aware of the actual status of the project which ended in 1960).[552] He hoped that the project 'could led to a dictionary of graphic signs and symbols'.[553] Although Krampen's role in the Preparatory Survey was peripheral, he maintained contact with Modley and took part in projects in conjunction with Icograda (most specifically the Icograda/Ulm research project).

Krampen on Isotype

The many references Krampen makes to Isotype in 'Signs and Symbols in Graphic Communication' indicate how he saw its relevancy as a basis for new forms of international pictographic communication. He urged designers to consider the idea of a standardised picture language for international events, describing Isotype as a viable approach to build on. He considered that the Isotype principles of ordering information to allow its significance to become visually evident, communicating across language barriers,[554] using pared down symbols and omitting unnecessary detail, were still relevant in 1965.

549 Krampen, 'Signs and Symbols in Graphic Communication', 3.
550 *Ibid*., 19.
551 Krampen is describing methods that are much closer to current methods of testing symbols. See Christof Brugger, 'Advances in the International Standardisation of Public Information Symbols' *Information Design Journal*, 6: 1 (1990), 79-88.
552 See edited transcript of an interview with Krampen, Appendix 3, p. 351.
553 Krampen, 'Signs and Symbols in Graphic Communication', 22.
554 *Ibid*., 22.

Krampen believed that standardised pictographic language formed the way forward for international communication. As a member of the ICSS, he was able to promote his ideas to fellow members (including Katsumi), but in this 1965 paper, Krampen is scathing of Katsumi's Tokyo Olympic pictograms, stating that many of the service symbols are difficult to comprehend, although some of these symbols share visual similarities with the graphic language of Isotype: **(Fig. 80)**

> Many of these Japanese pictographs designating services and facilities are not all self-explanatory. Also evident in the design is a lack of concern about whether or not the object depicted is part of a common experience of all visitors and whether there is too much or too little detail for optimal comprehensibility. In general, the pictographs departed from "simplified realism" in the direction of "oversimplified stylisation".[555]



(Fig. 80)
Service pictograms from the Tokyo Olympics. Designed by K. Sugiura, I. Owatsu, I. Tomaka, M. Katsumi and numerous other Japanese graphic designers. Similarites with Isotype can be seen when symbols are combined to make new symbols (i.e. the key and case).

Through links with the University of Waterloo, Ontario (where he was lecturing) Krampen took the role of consultant to Paul Arthur, designer of Expo '67 in Montreal (a city used to dealing with dual linguistic considerations). Krampen advised Arthur to make better use of standardised pictographic language and allow Montreal to become a testing ground[556] to show how pictographic systems could aid international communication:

> But all too often designers produce an entirely new picture language instead of helping to standardize already established pictographic systems (such as ISOTYPE) […] ISOTYPE still seems to represent a basically sound starting-point. As an over-all principle, the ISOTYPES representing objects whose shape has changed (e.g., automobiles) could be modified, and only those pictographs for objects not already represented in ISOTYPE should be designed anew. [557]

555 Krampen, 'Signs and Symbols in Graphic Communication', 30.

556 Krampen conducted research at Expo '67 at Montreal with the aim of developing a scientific method to establish the stages that a designer (or researcher) has to go through to produce the elements required for a self-renewing international picture language – known as the 'Production method'. This project has been known as the Icograda/ Ulm research programme (discussed later in this section), but in a recent interview with Krampen (October 2012), Appendix 3, p. 357, Krampen throws doubt on the organisations involved in this project.

557 Krampen, 'Signs and Symbols in Graphic Communication', 23. Krampen points out that if a mandatory system for producing pictographs was instigated, then the 'average shape' resulting from photographing the most representative silhouette of an object should be used to form the pictogram. He warned that the designer should make sure that this was a rigorous, logical process, not based on any element of styling. See edited transcript of an interview with Krampen, Appendix 3, pp. 352-3.

The dissemination of Isotype principles of graphic language in Europe

This section will discuss developments in pictographic language in Europe, seen largely through the work of Martin Krampen at the Hochshule für Gestaltung (HfG) and his collaboration with Otl Aicher; and the work of the Icograda Commission for Signs and Symbols (ICSS). Krampen forms an international bridge between empirical research and academic knowledge of the principles of Isotype and the growing body of knowledge on International communication. His informed approach to the design and classification of symbols was seen as the way forward during the mid-1960s, seen through ideas coming from Otl Aicher, Tómas Maldonado and Gui Bonsiepe who were introducing science into the curriculum at the HfG, widening the perception of design, and encouraging collaboration with other disciplines. In 1965 Krampen advocated pictographic language as the way forward for international communication, encouraging designers of signing systems to use Isotype as a starting point. He was uniquely positioned to take advantage of the growing discipline of communicating with international audiences by virtue of his background as a communication scientist and designer with expertise on signs and symbols.

This review is taken from a variety of publications and papers, many from the Icograda Archive at University of Brighton, and a formal interview with Martin Krampen. It identifies implicit evidence of the principles of Isotype in the face of new initiatives in design emanating from the HfG involving a more multi-disciplinary, scientific approach to pictographic problem-solving.

The Informed designer

During the mid 1960s designers involved in communicating with international audiences were becoming aware of the availability of specific scientific research from psychologists and semanticians to inform their work.[558] Paul Arthur, the Canadian wayfinding designer summed up the emerging systematic approach to design:

> … the airports were, without question, done to a definite system. [North American designers] were brilliant… but I didn't like the way they worked. I didn't understand how you could just pull things out of your back pants pocket. To me this was far too much like the artist, and I was scathing about it.[559]

Two significant initiatives took the design of international pictographic language to a more informed level during the late 1960s and early 1970s. These were the founding of the Icograda Commission on Signs and Symbols (ICSS) in 1966, an international body that attempted to

[558] As can be evidenced by the activities of the Icograda Commission on Signs and Symbols, and the list of contributors to the Special Icograda Thirtieth Anniversary Year issue of *Print* Magazine November/December 1969. Contributors included: F.H.K. Henrion, 'Preface'; Peter Kneebone, 'Introduction: Finding the Right Exit'; Richard Carr, 'The Legibility of Signs'; R.S. Easterby, 'The Grammar of Sign Systems'; Colin Clipson,'The Uses and Abuses of Signs'; Heiner Jacob & Masaru Katsumi, 'Sign Systems for International Events'; Margaret Mead, 'Anthropology and Glyphs'; Herbert Spencer, (title illustrated using directional dingbats); Luc Vanmalderen, 'Semiotics and the Graphic Sign'; Martin Krampen, 'The Production Method in Sign Design Research'; Charles K. Bliss, 'Semantography: One Writing for One World', and W.M. De Mayo,'Bibliography'.

[559] Large, 'Communication Among All People, Everywhere', 83.

encourage consistency in international graphic language, which numbered psychologists and scientists as part of their international forum,[560] and the evolution of the curriculum at the HfG which led to the emergence of the information designer and a multi-disciplinary approach to design. Krampen can be associated with both of these initiatives.

The Hochschüle für Gestaltung (1953–1968) and the emergence of the 'Ulm model'

The HfG built a closer relationship between design, science and technology. Designers had begun to realise that the design process was being performed within an ever more complex arena, which could not be effectively solved through intuition or aesthetic considerations alone. Tómas Maldonado and Gui Bonsiepe helped to launch the concept of the Information designer or 'Ulm Model' during the mid-1960s; based on designers working with scientists, researchers, sales staff and technicians to realize design concepts by shaping them within a socially responsible environment (*Gestaltung*).[561] Design was not linked specifically with either art or technology, but to social science, and the service of human needs and actions within a social context. Otl Aicher articulated this notion:

> The classification of information into semantics, syntax, and pragmatics gave us a theoretical foundation for defining criteria of design and interpreting art as a syntactical activity.[562].

The HfG design process began to involve interdisciplinary projects with students working in extended teams. The curriculum included techniques for the collation and classification of information, mathematical logic, evaluation and analysis, operational design and research (to include areas such as transportation systems and electronics), perceptual theory and semiotics, human and social sciences, ergonomics and planning methodology.

Design was considered in an objective, scientific light, rather than from an idealistic, intuitive viewpoint. Maldonado introduced the notion of taking quantitative steps in the design process, whilst Hans Gugelot extended ideas on modular design and systematisation. These methods of working epitomise the full 'Ulm Model', which emerged between 1962–66 and represented a new balance between theory and practice and between science and design. The evolution of the HfG[563] from 1956–68 shows a college turning from a Bauhaus-influenced craft-base to an institution that favoured an interdisciplinary approach to design informed by science – in many respects mirroring developments in the design of international signing systems during the mid-

560 Professor G. Patrick Meredith, Psychologist, University of Leeds; Professor Gilbert Cohen-Seat, Institute of Filmology, Paris, and Executive Director International Scientific and Technical Centre, Rome and Martin Krampen, Assistant Professor of Design and Psychology, University of Waterloo. 'International Signs and Symbols: An Approach to the Problem' talk given at 10th Congress of the Association Typographique Internationale, UNESCO, 10 November 1967 by Peter Kneebone (chair), Appendix 1, Icograda Archive, SS67/3.

561 *Gestaltung* – socially responsible shaping of the environment. See Herbert Lindinger (ed), *Ulm Design: The Morality of Objects* (Massachusetts: MIT Press, 1991), p. 11.

562 Otl Aicher, 'Bauhaus and Ulm' Lindinger, *Ulm Design,* p. 128.

563 Lindinger, *Ulm Design*, and Rathgeb, *Otl Aicher.*

1960s, a period of transition with scientists helping to shape new thinking.[564]

The Icograda Commission on Signs and Symbols (ICSS)

The ICSS[565] was formed in April 1966 in response to the confusion caused by the expansion of projects involving public travel and information sign systems, which were often based on insufficient research and containing contradictory information. ICSS's aim was to share common knowledge on projects involving signing and coordinate research and methodology where similar design systems and principles of analysis applied. It was also their aim to establish a small set of universally agreed accessible symbols. ICSS stated that a sign must:

- Be unambiguous
- Mean the same thing to all people who will use it
- Be read quickly
- Be acted upon[566]

ICSS was chaired by UK designer and educator Peter Kneebone (assisted by Icograda President Willy De Mayo) and consisted of an International body of design professionals which included Martin Krampen (Canada and Germany), Erik Ellegard Frederiksen (Denmark), Gilbert Cohen-Seat and Roger Excoffon (France), Hans Weckerle (Germany), Willy De Mayo and G. Patrick Meredith (UK),[567] Tómas Maldonado (Italy), Masaru Katsumi (Japan), Ryszard Otreba (Poland), Josef Müller Brockmann (Switzerland), Colin Clipson, Rudolf Modley and Paul Rand (USA) and Ivan Picelj (Yugoslavia). Liaison members: ICC (International Chamber of Commerce), ICSID (International Council of Industrial Design) and UIA (International Union of Architects.

Significant projects and collaborations included:

- Icograda/Ulm Research project

564 Tómas Maldonado, (Argentine painter), Hans Gugelot (Dutch architect) and Friedrich Vordemberge-Gildewart (former member of the De Stijl group) helped to form this new initiative.

565 Principle aims of the Commission on International Signs and Symbols:

1. Act as a professional, advisory international body for the coordination and solution of this vital and complex problem of establishing national and unified sign systems in all the fields where they are needed, and so help to overcome the existing language barrier

2. Ensure the coordination of research and collaboration between all the relevant disciplines (graphic design, other forms of visual communication, social sciences, psychology, ergonomics), and all the interested organisations

3. Organise timely meetings where all matters relating to international sign and symbol systems can be discussed and agreement is reached on the introduction of such systems based on research, valid principles and a coherent vocabulary

4. To establish a secretariat, regional 'International Signs and Symbols Design' throughout the world and a research centre where all types of sign systems, in existence or still in progress can be discussed and analysed in depth, work on additional systems can be initiated and the information standardised and distributed to all interested parties, Icograda Archive, SS67/3.

566 'Special Session on International Signs + Symbols in Transport & Tourism' 1 April 1966, International Chamber of Commerce, Paris, Icograda Archive, SS67/3.

567 G. Patrick Meredith was a member of the Isotype Advisory Committee in the UK. He went on to found a Visual Education Centre at University College Exeter, and became the first lecturer in Visual Education in the UK. See Richard Heinrich, Elisabeth Nemeth, Wolfram Pichler, David Wagner (Eds.) *Image and Imaging in Philosophy, Science and the Arts: Volume 2,* p. 43. Correspondence can be found between Meredith and Neurath in the Isotype Collection during the 1940s (IC/35).

- Icograda student projects [568]
- International Committee for Breaking the Language Barrier (ICBLB).

The Icograda/Ulm research programme – 'Communication by Pictorial Signs'

This research project (originally set up on Krampen's initiative) began at Expo '67.[569] Kneebone was aware that even though the ICSS advocated scientific research, they were unsure how to take this forward into the development of new symbols. Krampen, as a communication scientist with a background in symbol research, was the ideal person to strengthen their position. It was Krampen's intention to establish how meaningful the public found pictorial signs and firmly quantify the process that a designer (or non-designer) had to go through to create a standardised model for an updatable international pictorial language.[570] The research was formed on the basis that the image content of symbols which participants produced most frequently would be the best understood (the Production method).[571] Krampen based his hypothesis on the premise that a universal set of signs for public use could only be produced if the designer was aware of the level of user knowledge. His research took the form of the distribution of a questionnaire to a sample of travellers who were asked to illustrate verbal concepts, with the aim of discovering how memorable and universal the image content of their submissions were.

Krampen's research was presented as part of the ICSS input into the Signs and Symbols session at the World Conference on Travel and Tourism in 1968. The next step would entail producing actual designs based on the image content drawn by the participants, followed by field tests, periodic retesting and design amendments. Kneebone estimated a total of $400,000 would be needed to carry out this work. But the project was rejected, as the delegates were unconvinced of the need to fund research on a subject they considered was not a big enough problem. However, ICSS did manage to persuade a dozen non-government organisations to establish an International Committee for Travel Signs and Symbols (ICTSS) that would seek to establish a coordinated approach to the development of pictograms for travellers.

Krampen continued the project by performing a similar experiment to his research at Expo '67, using air travellers in European and US airports, followed by additional tests on HfG students and foreign military personnel stationed in Ulm.[572] Krampen produced 3,000 questionnaires asking participants to draw 63 verbal expressions. He compiled a statistical analysis of findings,

568 There were three early student projects. The first was the International Symbol project discussed above, the second 'Planned Parenthood' (in collaboration with UNESCO), and the third 'Equality of Man' (Icograda's contribution to UN Human Rights Year, 1968), Icograda Archive SS67/3.

569 Icograda/Ulm Research Programme 'Communication by Pictorial Signs' paper presented by Dr Martin Krampen at the International Committee for Travel Signs and Symbols, 4 April 1968, (part of Summary Report 1966/68 from the chairman, Peter Kneebone, Icograda Archive SS67/3. See also edited transcript of an interview with Krampen (October 2012) for recollections of this project, Appendix 3, p. 357.

570 See Bakker, 'Pictopolitics: Icograda and the Development of Pictograms' for a more detailed account of the work of Icograda.

571 Krampen discusses the Production method in Appendix 3, p. 349-353.

572 See edited transcript of an interview with Krampen, Appendix 3, p. 357.

but the data collected was inconclusive, largely due to the limited sample, but it was agreed that it was 'the best that could be done until such a time that industry, governments or other international organisations are willing and able to provide funds for a comprehensive research programme'.[573] The results of the research were presented to the ICTSS in April of 1969, but no records exist, and the ICTSS never met again. (The ICTSS will be discussed later in this section).

Icograda Student Project 'An International Symbol language' 1964 (Fig. 81)

At the first Icograda Congress of Graphic Design in Zurich in September 1964, Kneebone presented the first Icograda student project, which went out to 650 graphic design schools throughout the world. The aim was to design:

> A single coherent vocabulary of symbols to cover the information outside the scope of international signs. With the contraction of the world, in terms of increased ease and scale of international travel, it is essential that simple, objective pieces of information be communicated between different peoples in a quite unequivocal, immediate and non-linguistic way.[574]

Students were asked to design a set of twenty-four symbols for verbal concepts such as telephone, emergency exit and toilet for an international audience. At this point in time the idea of designing a cohesive set of symbols for public use was a relatively new concept (apart from the development of the symbol system for roads) and the 1964 Icograda student competition preceded Katsumi's Tokyo Olympic pictograms. Judges favoured abstract entries to the more pictorial ones, concerned that pictorial symbols could appear ambiguous and highlight cultural differences rather than promoting an internationalism. (Fig. 81) Consequently, the winning student entries were abstract, highly technical, and more in line with the symbols that Maldonado and Bonsiepe had designed for Olivetti at the HfG in the early 1960s.[575] (Fig. 82) They bore no resemblance to Isotype pictograms, and would require the international traveller to thoroughly understand the new symbol system before embarking on a journey. The project was a highly successful venture drawing much attention to the work of the ICSS.

Significant examples of signs and symbol projects from the 1960s linked to ICSS[576]

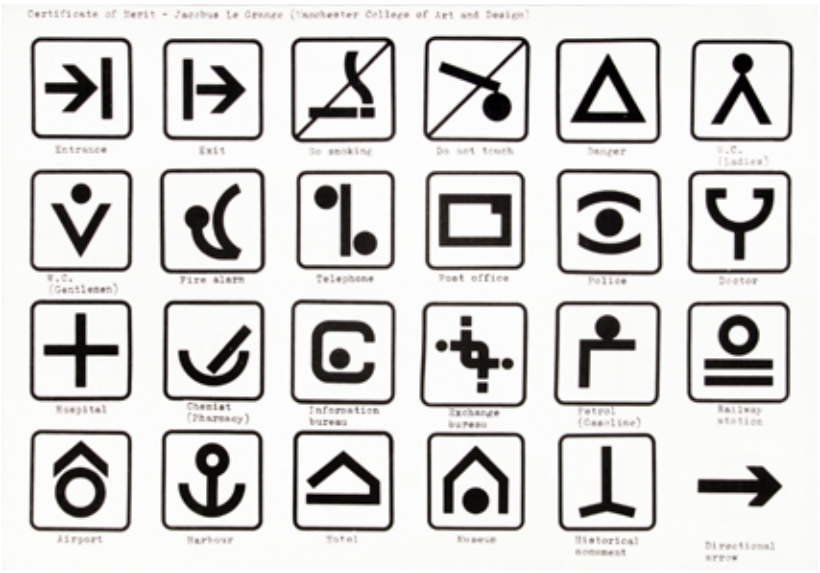
The following organisations were also pursuing projects promoting international language, and have connections with the ICSS:

[573] Letter from W.M. De Mayo to John L. Lewine (ICBLB), 25 March 1969, Icograda Archive SS67/3.

[574] Press release April/May 1965 Icograda Student Project 1, An International Symbol Language, Icograda Archive, SS67/3. Students were asked to convey twenty-four signs covering the three categories of information, direction and instruction. Content included referents such as entrance, exit, male and female toilets, telephone, doctor, warning, hospital, post office, airport, museum and hotel, and a directional arrow. Judges included Abram Games (UK), Joseph Müller Brockmann (Switzerland), Joseph Picelj (Yugoslavia) and Paul Rand (USA). Results were announced at the second Icograda Congress in Ljubljana (former Yugoslavia). Peter Kneebone had also asked Masaru Katsumi to be a judge (but he was not able to take up the role). Icograda Archive, SS67/3.

[575] Krampen, 'Signs and Symbols in Graphic Communication,' pp. 25-26.

[576] Taken from the Icograda Special Icograda Thirtieth Anniversary Year issue of *Print* Magazine November/December 1969, Icograda Archive SS67/3.



(Fig. 81)
Icograda Student project 1964.
ICOGRADA ARCHIVE



(Fig. 82)
A sign system for Olivetti data-processing machines designed by Tómas Maldonado and Gui Bonsiepe at the HfG circa 1964.

The International Committee for Breaking the Language Barrier (ICBLB)

New York based Soichi Kato founded ICBLB in 1962. ICBLB shared some of Icograda's ideals when it came to promoting international symbol development, and was affiliated with them for a time until ICBLB proved unreliable as an organisation and the link became untenable. It was ICBLB's aim to promote practical methods for facilitating communication in a multi-

lingual society.[577] Their work included the promotion of universal pictorial symbols, maps and diagrams, the standardisation of rules, forms and terminologies and the adoption of simple English vocabulary.[578] ICBLB came to Kneebone and De Mayo's attention when they received a questionnaire from Kato asking for responses about the most favourable symbol to use for 38 different referent expressions for travellers such as exit, toilet and baggage check. Respondees had to either choose from a given response or draw their own. ICBLB received only 300 responses to this questionnaire, and the results simply concluded that cooperation was required between organisations and that symbols needed to be consistent.[579]

Glyphs, Inc.

Glyphs, Inc. replaced ICBLB's as ICSS's US partner. It was also Glyphs, Inc.'s aim to produce a limited set of internationally recognised pictographic symbols, and like ICBLB, they sought to collect them by way of a competition, the 'World Communication Exhibit'. However, due to a lack of funding neither competition nor exhibition took place, but links were forged with Modley who became the US ICSS representative.

Union Internationale de Chemins de Fer (UIC) (Fig. 83)

UIC, (the International Organisation for Railway Companies in the Western World) had been attempting to produce a concise set of symbols to facilitate rail travel since 1961. Suitable symbols were selected by railway officials from competition entries. In 1965 UIC invited travel and transport groups to a conference with the aim of persuading them to use UIC symbols as an international standard for the traveller. Kneebone participated in this conference, but declared UIC's efforts unsatisfactory, visually incoherent and not wholly suitable for an international audience to understand; in short something which could only be seen as experimental. According to Bakker, it was contact with UIC and ICBLB that persuaded Kneebone and De Mayo that scientific research was required if they were ever going to achieve their aim of producing a concise, universally acceptable set of symbols for the traveller.

Blissymbols (Fig. 84)

Bliss produced *International Semantography: a Non-Alphabetical Symbol Writing Readable in All Languages* in 1949. It consisted of approximately a hundred simple abstract pictorial symbols which could be combined into words and sentences. Australian-based Charles K Bliss

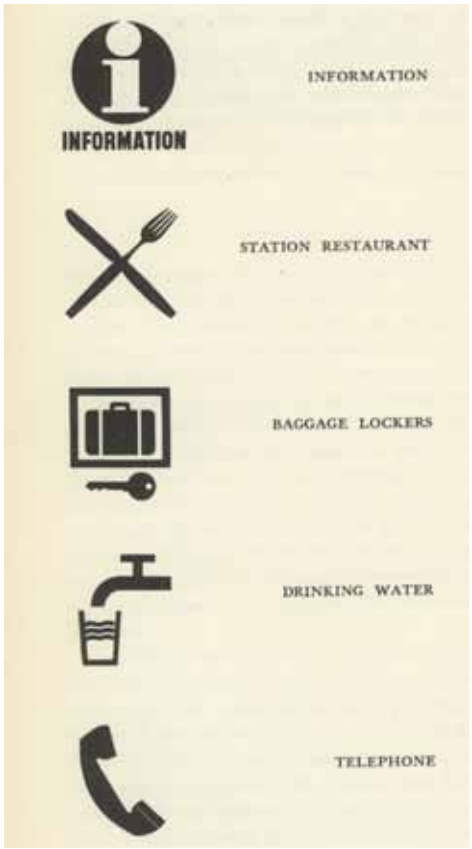
[577] Kato was considered 'amateur' by Icograda, but they were envious of ICBLB's UNESCO 'C' category status, something they had failed to achieve, Icograda Archive SS67/3.

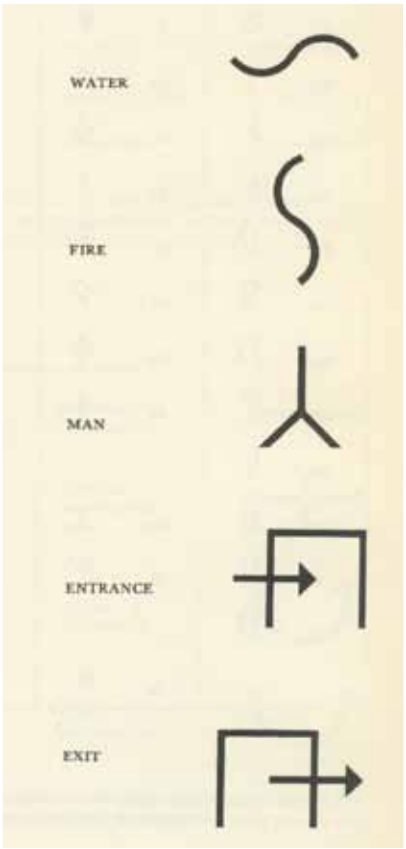
[578] Kato instigated three projects:

- International Symbol project (1965) – this project received cooperation from over 500 organisations for its worldwide survey on symbols. In order to strengthen cooperation between groups, ICBLB proposed a coordinating council, which led to the International Committee on Travel Signs and Symbols (ICTSS) being formed in 1966.
- New York Pilot project (1964) – ICBLB set up a project in collaboration with the Mayor's office of New York to help non-English speaking visitors find their way around. An example of the project's work saw the introduction of bus route diagrams at major bus stops for the first time in New York.
- Vicemundi (Visual Communication in Words) – an occasional publication in cooperation with Rochester Institute of Technology (USA), first issue 1969, Icograda Archive SS67/3.

[579] See Bakker, 'Pictopolitics: Icograda and the Development of Pictograms'.

was eager to promote his newly renamed Blissymbolics during the mid 1960s and approached Kneebone for funding for travel to the ICSS conference in Bled. Unfortunately funding was unavailable, but Kneebone did consider the worth of Blissymbols as an artificial symbol language but thought it too abstract for general use.





(Fig. 83)
left examples of UIC symbols.

(Fig. 84)
right examples of Blissymbols.
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The International Committee for Travel Signs and Symbols (ICTSS)

At the second Union Internationale de Chemins de Fer (UIC) Conference in Paris, January 1966, ICSS jointly with the International Chamber of Commerce and the ICBLB, suggested the establishment of a standardised sign system to serve all fields from transport to education, which required the minimum amount of prerequisite learning from users. The aim was to stop the proliferation of new and often contradictory signs in transport and tourism. The International Union of Official Travel Organisations (IUOTO) and International Standards Organisation (ISO) were involved along with the International Union of Architects (UIA) and the International Council of Societies of Industrial Design (ICSID). The secretariat was jointly administered by the International Chamber of Commerce (ICC) and the Aéroport de Paris, with the ISO and ICSS represented as 'expert bodies'. Members of ICTSS included leading international organisations for air, road, rail and sea transport, hotels, travel agencies, trade fairs and tourist boards. Unfortunately no agreement could be made regarding the production of a standard set of signs for the traveller and each organisation produced their own sets of

symbols, much to the annoyance of the ICSS.[580]

The work of the ICSS during the mid to late 1960s was in the main carried out by its two major activists, Peter Kneebone (chair) and Icograda President Willy De Mayo. Archive documentation provides a picture of two highly organised, diplomatic British designers who were passionate about overseeing and policing the development of a limited amount of standard, universally understood pictorial symbols to guide the international traveller. It was unfortunate that they never achieved their aim, and that large organisations went ahead and produced their own symbols sets without any coordinated effort (or adequate research) – which was ultimately the part that should have been played by the ICSS. Kneebone and De Mayo did their best to forge international links and promoted symbol-related activities at every opportunity. However, they were unable to secure funding to any great extent, and the international members (with the exception of Krampen) did not contribute greatly to the organisation due to geographic constraints, and limited travel budgets. In addition, even though the ICSS included several scientists and psychologists, they were ultimately not equipped to take design into the more science-orientated, multi-disciplinary arena emanating from the HfG that was being demonstrated by designers such as Otl Aicher, who were designing ever larger and more complex signing projects for airports, international corporations and Olympic games.

Krampen's further research on signs and symbols and work with Otl Aicher

Krampen's background as a communication scientist provided Aicher with aspects of theory on which to base his design methodology. Krampen and Aicher shared fundamental views about the construction of pictographic language and both recognised the limiting factors of language-dependent communication. This section discusses significant aspects of Krampen's research on signs and symbols from the late 1960s to the early 1970s, some conducted in collaboration with Aicher. It serves to illustrate how Krampen's ideas, informed by empirical research, semiotics, semantics, aesthetics, philosophy, linguistics, psychology and a knowledge of the principles of Isotype influenced Aichers' design thinking, ultimately leading to the designs for the 1972 Munich Olympic pictograms.

In part due to Krampen's educational experience at the HfG, he believed that a systematic approach to graphic communication should be firmly grounded in scientific principles. He fully understood the designer's dilemma of 'educated guessing', but sought to equip the designer with knowledge of the underlying theories of perceptual psychology.[581] *Gestalt* theories of

[580] UIC had been working since 1961 on what could have been the first ever a symbol set for rail travellers. Like the ICSS, UIC wanted to design symbols for a limited number of expressions. Kneebone could only comment on UIC symbols and signs as being 'experimental' and doubted whether the general public would understand them. See Bakker, 'Pictopolitics: Icograda and the Development of Pictograms' for a fullller account of the work of Icograda.

[581] One example of this is how the eye perceives the sudden change in luminosity between a white background and a silhouette or line drawing as a boundary, so imbuing it with a three-dimensional quality. Krampen, 'Signs and Symbols in Graphic Communication,' p. 8. See also Neurath's work 'On the Foundations of the History of Optics', in *Empiricism and Sociology*, pp. 101-112.

perception suggest that the brain groups sets of shapes, colours and arrangements according to similarity, and will always be drawn to the simplest shape when faced with a choice of simplicity over complexity – 'The good *Gestalt* requires relatively little information to predict or define'.[582] The pared down graphic language of Isotype fits succinctly within these parameters, asdoes Krampen's preferred method of symbol design – through photography.[583]

Krampen believed that the creation of effective universal symbols was not the job of a designer alone, but required the combined efforts of public and private organisations, industrialists, businessmen and scientists in collaboration with designers. He suggested that representatives of many nations and societies should meet and agree on the form that an international pictorial sign system should take, echoing ideas put forward by Dreyfuss, Mead, Modley, Kneebone and De Mayo. Organisations such as the UN would need to support such schemes to establish and create a system of world-wide symbols, and the final approval should come from 'the combined efforts of psychologists, linguists, educators, anthropologists, sociologists, lawyers, engineers, designers and many others'.[584]

Krampen underpinned his design conscious approach with scientific method. The following section discusses some key aspects of his research on signs and symbols which demonstrate this duality.

Classification and abstraction (Figs. 85 & 86)

In 1968, in association with Herbert W. Kapitzki from the HfG, Krampen was selected to be part of a study group[585] to develop a uniform set of pictograms for use in German and Austrian Airports. The scheme was carried out initially at the HfG and later at the Institut für Umweltgestaltung in Frankfurt am Main, (the HfG closed in 1968) and the resulting symbols were extended to all European airports. As a consequence, Krampen was also commissioned by the International Civil Aviation Organization (ICAO) to complete a survey on existing airport information signing systems,[586] for which he compiled field research on the visual perception of symbols by people from different cultural backgrounds. From his findings, Krampen was able to classify pictograms in relation to character, in relation to the objects represented, and in relation to how the user interprets them. The recommendations for the modular set of directional pictograms were based on those used by UIC and the International Air Transport Association (IATA). They are still in use in an updated form.

582 Krampen, 'Signs and Symbols in Graphic Communication,' p. 9.
583 See edited transcript of an interview with Krampen, Appendix 3, pp. 357-358.
584 Modley, 'Graphic Symbols for World-wide Communication', *Sign Image Symbol*, p. 125. In 2001, in his article on the work of Paul Arthur, Michael Large revisited the reasoning behind these ideas, as he discussed how communication design in the second half of the twentieth century was not so reliant on the form and function of modernism, but was growing more towards interdisciplinary design, forming links with the social sciences. Large, 'Communication Among All People, Everywhere', 81.
585 This research could be seen as a development of earlier experiments with the Icograda/Ulm project. Krampen's recent book (2007) *The World of Signs: Communication by Pictographs* demonstrates his long-standing interest in classification and semiotics.
586 The study group was originally instigated by the Association of German Airports (Arbeitsgemeinschaft der Deutschen Verkehrsflughäfen (ADV).



(Fig. 85)
ICAO symbols, researched and designed by Krampen. They are very similar to symbols designed with Herbert W. Kapitzki for the Association of German Airports.



(Fig. 86)
Association of German Airports symbols by Martin Krampen and Herbert W. Kapitzki.

Some of Krampen's conclusions from his research on pictograms for ICAO dealt with abstraction. He identified four guidelines:

1. Abstraction and familiarity are the main factors that influence comprehension
2. If pictograms are well known, a medium level of abstraction works best
3. If pictograms are less known, a silhouette works best
4. The ability to abstract depends on age[587]

Krampen's ICAO survey also revealed that if an action was required of a respondent, then the level of familiarity with the subject matter needed to be relatively high. Conclusions drawn from this research enabled Aicher to develop his pictographic system for Munich and Frankfurt Airport, which he worked on concurrently with the Munich Olympic pictograms. In *Otl Aicher*, Rathgeb described Aicher and Krampen's theoretical work on pictorial language based on determining the optimum degree of abstraction required for ease of comprehension, and

[587] Results of this survey were later published as 'Piktogramme und Ikonizitztätsgrade' *Semiotische Berichte*, 19 (1995), Rathgeb, *Otl Aicher*, p. 233.

ability to make the respondent act on the message given:

> With the icon-based communication system Isotype,[588] Otto Neurath had demanded a minimal level of abstraction; that is, enough realism for the user to recognize a pictogram without requiring a learning process. In contrast, Tómas Maldonado (while at the HfG) presupposed a learning process, and therefore supported a high level of abstraction, which in his view was guaranteed to avoid confusion. [...] Aicher's pictograms lie somewhere between these two positions. In addition Aicher achieved a high level of variability within the same system by connecting the formal vocabulary with a method of syntax. A central tool of Aicher's methodical approach, in particular for his set of symbols, was a design grid. This geometric aid made it possible to work with a fundamental set of clear rules for their arrangement.[589]

Krampen's collaborative work with Aicher

> It is obvious that our culture and civilisation has become so complex that no one language will suffice. In other words, we cannot make do with only one of our senses. We must learn to use sign language not as a substitute, but as a point of entry into our world.[590]

Aicher first became aware of the need for an international picture language when he visited Japan in 1959 for the Tokyo World Design Conference and experienced first hand the barrier that an alien linguistic system can form. This section explores some of the theory behind Aicher's ideas on international pictographic systems and references 'A Sign Alphabet from Otl Aicher' (1978) and Markus Rathgeb's *Otl Aicher,* which discuss the ideas that Aicher shared with Krampen and the underlying theories that inform them.

Both Krampen and Aicher were in agreement that verbal/written and pictorial language consist of content and form. In verbal language, words are used to express the object or situation and grammar forms the regulatory system to make it work together. In its pictorial equivalent, an object or situation is communicated by meaning – (semantic) and the arrangement (syntax) of the object or situation is used to turn the expression of the object or situation into a statement. However, they noted a difference between verbal and pictorial language in that the meaning in verbal language is formed through the detail of the combination of the individual letterforms, whereas in pictorial language, details combine to form an abstract image. The results of Krampen's ICAO survey had stated that an audiences' level of familiarity with the subject matter needed to be relatively high if an action was required of them, so Aicher had to be wary of the level of abstraction he used in his pictographic language.[591] In Aicher's Olympic pictograms for Munich, he employed a simple set of geometric abstract shapes (lines and

588 Isotype was never designed to be used in the context of a signing system, even though Neurath hinted at this in *International Picture Language* in relation to Isotype as a 'helping language'. pp. 17-22.
589 Rathgeb, *Otl Aicher*, p. 118.
590 'A Sign Alphabet from Otl Aicher' *Icographic*, 12 (1978), 19.
591 Rathgeb, *Otl Aicher*, p. 118.

circles) to create semantic form, allowing the maximum amount of syntactical variability. He placed these abstract shapes on a standardised orthogonal/diagonal grid to form recognisable symbols which, even though constructed from abstract forms, allowed the audience a high degree of familiarity, and fitted flexibly within the larger design scheme.

Graphemes[592]

Aicher's pictographic language was designed using 'graphemes', a lingusitic term used by Krampen and Aicher to describe small formal geometric graphic units (the visual equivalent of phonemes) which formed the logical system for the construction of Aichers' pictograms.[593] Aicher also considered that they added to the pictograms' visual objectivity, rather than the designer's individual stylistic treatment.

Graphic neutrality

While the symbols that make up the letterforms and words of verbal language can be rearranged to form endless meanings, simple pictograms have the ability to sum up and conclude, which Aicher considered a form of abstraction, a factor identified in Krampen's research as important in relation to symbol comprehension. Abstraction can led to a form of graphic neutrality and Aicher identified six forms of neutrality to try to ensure objectivity in symbol design.

- Pictorial neutrality
- Cultural neutrality
- Taboo neutrality
- Educational neutrality
- Neutrality of interpretation
- Neutrality of design [594]

Aicher considered that these factors prevented his symbols from being linked to any particular culture or style, time or place – essential factors in an attempt to create international pictographic communication.[595] Aicher saw the possibility of extending Katsumi's pictographic system for Tokyo, by giving it a grammar (graphemes) and a constant grid, enabling greater

592 Grampemes are discussed in an edited interview with Krampen, Appendix 3, p. 359.

593 This term was first used by Aicher and Krampen in *Zeichensysteme Der Visuellen Kommunikation: Handbuch Für Designer, Architekten, Planer, Organisatoren* (Berlin: Ernst & Sohn, 1977), Rathgeb, *Otl Aicher,* pp. 28-29.

594 Rathgeb, *Otl Aicher*, p. 118.

595 Robin Kinross considers that it is virtually impossible to achieve cultural neutrality, as the visual rhetoric will always contain references to the designer's cultural, historical and political bias. However, he also stated that the work produced at the HfG during the late 1950s and early 1960s represented the closest example of cultural neutrality through the formation of a 'marriage of modernism of form and appearance and highly developed theoretical interests'. Kinross goes on to call this 'the analytical approach', which continued to find expression in the complex design projects carried out by German post-World War II designers such as Aicher in work for large corporations such as Lufthansa and Braun. The Munich Olympic concept, which required an enormous amount of coordination and the rigorous application of a complex corporate identity could also be included as an example of this 'analytical approach'. However, as Kinross points out, these designs can be allied to the German post-World War II recovery, and so are not culturally neutral, even though their pared down, geometric, mechanical appearance gives the impression that they are.' See Robin Kinross, 'The Rhetoric of Neutrality', pp. 131-143 in Margolin, *Design Discourse: History Theory Criticism*.

flexibility of use. Aicher achieved this by creating the equivalent of visual nouns (pictograms) and sentences (syntax – the positioning of the pictogram within the gridded area), so giving the pictogram a context. Semantically the grid forms a formal link between the object and situation. He also used repetition of objects juxtaposed with differing objects to form new contexts (as did Neurath).

Semantics, science and systems

American philosopher Charles Morris's *Theory of Signs* [596] informed Krampen and Aicher's thinking on sign theory.[597] Morris wrote *Signs, Language and Behaviour* in 1946 in which he attempted to construct a common vocabulary of meaning, thus allowing various disciplines to communicate with each other, a concept in tune with Neurath, Morris's collaborator on *The Encyclopedia of Unified Science.* Neurath considered that an excessive use of terminology led to ambiguity and detracted from full comprehension.[598] In sympathy with these ideas, Krampen suggested that a common discourse in graphic communication was also required to maximise the effectiveness of visual communication.

The dissemination of Isotype principles of graphic language in Japan

This section will discuss developments in pictographic language in Japan, seen largely through the work of Masaru Katsumi, who actively adopted Isotype principles of graphic language in the design of the Tokyo Olympic symbols. He was a member of the ICSS and ultimately responsible for sharing ideas on pictographic language with Aicher. This review is taken from a variety of publications and papers from the Isotype Collection and the Icograda Archive.

596 Morris differentiated between a sign and a symbol. He considers that a sign is a stimulus that represents something not present, i.e. a road sign that would pre-warn the driver of a hazard. However, if the respondent were shown a symbol of a fire, they would not respond to it as they would to an actual fire, indicating that the perception of signs is inconsistent, and no single hypothesis exists about how we react to graphic signs. See Charles Morris, *Writings on the General Theory of Signs* (The Hague: Mouton & Co., 1971).

597 'One of the first books I ordered for the library of the HfG was Charles Morris's *Theory of Signs*. The classification of information into semantics, syntax and pragmatics gave us a theoretical foundation for defining criteria of design and interpreting art as a syntactical activity.' Lindinger (ed.), *Ulm Design*, p. 128. Charles Morris collaborated with Otto Neurath on *The International Encyclopedia of Unified Science*, which first appeared in 1938. Morris considered that Isotype was 'especially concerned with the importance of the visual iconic sign for education and communication.' Morris, *Writings on the General Theory of Signs*, p. 334.

598 *Ibid.*, p. 301.

Masaru Katsumi

Masaru Katsumi (1909–1983) is best known for his role as design director of the majority of graphic design projects for the 1964 Tokyo Olympic Games,[599] but he is also acknowledged for the dissemination of the principles of Isotype in Japan.[600] Japanese designers had been aware of western modernist ideas (including Isotype) filtering through from Europe post World War II, and designers such as Yusaku Kamekura (1915–1997) was fusing these ideas with the strong geometric elements found in Japanese design. During the 1950s Japanese design was making technological advancements in photography and lithography and in consequence many new design associations, exhibitions and journals were being created.[601]

In the light of such a thriving creative environment the 1959 World Design Conference was held in Tokyo, and attended by international designers such as Herbert Bayer, Saul Bass, Josef Müller Brockmann, Bruno Minari and Otl Aicher. It was here that Aicher would have first encountered designers such as Tanaka Ikko, Kamekura Yusaku and Masaru Katsumi, who were all involved in design elements for the Tokyo Olympic Games.[602]

In 1959, when Tokyo learned they were to host the 1964 Olympics, young Japanese designers were enthusiastic about trying to achieve a new national identity[603] and attempted to establish 'a more unified and internationally legible symbolic language across the country',[604] using Isotype as a starting point. Pictograms (*ekotoba*) began to be seen as having everlasting importance, leading to the development of the first set of universal pictograms to be designed in an Olympic context. The pictograms fitted in with ideas of internationalism promoted by the Olympic founder Baron de Coubertin.[605] These concepts were also complementary to the ethos behind Japanese design in the early 1960s; in 1961 the Japan Advertising Artists Club (JAAC) reported 'a shift from commercial works to public service or welfare'.[606] Design was becoming more for the benefit of the people, which was philosophically in tune with Neurath's humanitarian ideals:

599 See Jilly Traganou, 'Olympic Design and National History: The Cases of Tokyo 1964 and Beijing 2008,' *Hitotsubashi Journal of Arts and Sciences*, 50: 1 (2009), 66.

600 Katsumi, 'Towards an International Symbology – Tokyo, Osaka, Sapporo' *Graphic Design*, 42 (1971), 31-38.

601 Jeremy Aynsley, *Pioneers of Modern Graphic Design: A Complete History* (London: Octopus, 2004), p. 140.

602 Under Katsumi's direction, the largely unpaid design team for the Tokyo Olympic Games included Hara Hiromu, Kamekura Yusaka, Kôno Tadashi and Tanaka Ikko. Tanaka was involved in poster design, and Kamekura designed the corporate Identity for the Tokyo Olympic Games (he was also involved in the design of international trademarks and symbols). Aynsley, *Pioneers of Modern Graphic Design*, p. 140.

603 It is well documented that Aicher referenced Katsumi's pictograms when he designed the Munich pictograms (Traganou, 'Olympic Design and National History', 68), but there is no explicit evidence to suggest that Aicher directly referenced Isotype, although he would certainly have been very aware of it as a pictographic language. (Ian McLaren who knew Aicher as a design director and tutor confirms this in email correspondence). See also the edited transcript of an interview with Krampen, Appendix 3, p. 353.

604 Traganou, 'Olympic Design and National History', 66.

605 Baron de Coubertin (1863–1937) is considered to be the 'father of the Olympic Games'. He also designed the Olympic rings symbol.

606 Uemura Takachiyo, 'Criticism of the JAAC exhibition Idea', (1961), 4, in Traganou, 'Olympic Design and National History', 67.



(Fig. 87)
Olympic symbols for Tokyo 1964 designed by Yoshiro Yamashita and directed by Masaru Katsumi.



(Fig. 88)
Service symbols for Tokyo 1964, directed by Masaru Katsumi.

> The team saw the Olympics as an opportunity to establish a design language in Japan along the lines of Otto Neurath's concept of the Isotype, a symbolic way of presenting information via easily interpretable icons that work without written language.[607]

Yoshiro Yamashita designed the Tokyo pictograms, under Katsumi's direction. Katsumi considered them to be the pinnacle of his graphic design work for the Tokyo Olympics, and they quickly became part of Japan's 'common cultural heritage', receiving international acclaim.

Katsumi's overall design concept for Tokyo was to present Japan as a peaceful, demilitarized nation, grounded in technology, consumerism and rationalization. Japan was anxious to be accepted into the international community after eighteen years' exclusion due to their role in the Pacific during World War II.[608] Kerry William Purcell considers that Tokyo's pictographic system was the first formal sign system to be devised which 'shared the aims and ambitions of Neurath's original concept'.[609] Purcell also stated that post World War II, Neurath's ideas held 'special fascination for those designers working on the creation of international sign and information systems, especially events that attempted to unify nations, such as the Olympics'[610]

Katsumi was fully aware of the potential of Isotype as a basis for his pictographic system;[611] he and Yamashita (the graphic designer) produced 20 sports symbols and a further 39 general service information pictograms, some of which directly reflect Neurath's use of combining syntactic elements to form new symbols. **(Figs. 87 & 88)** Katsumi's pictograms consisted of an abstract representation of each sport in the form of a set of simply stylised articulated body positions depicting each sport, with rounded heads and tapering limbs, all occupying a similar amount of space within a square. It was a clever system of syntax aided by verbal layers. There is no rigid grid, but there is evidence of the beginnings of a formal 'body alphabet' as perfected by Aicher in Munich.

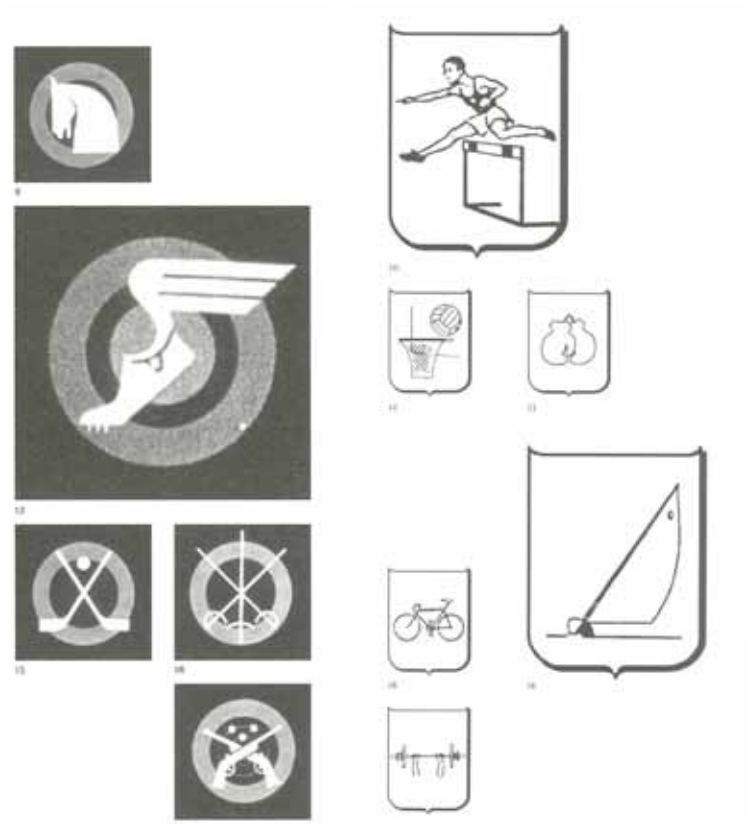
> Symbols such as international traffic signs need to be easily understood, accepted by authorities and civil citizens, and be practical. This was achieved in 1964 at the Tokyo Olympic games. Few tourists understood Japanese. Other languages were not commonly used. The Olympic committee took this problem seriously, and new designers led by Katsumi Masaru designed games symbols and other signs. I hope that these symbols will be used in the next games so that they will be polished to be the perfect universal visual language [612]

607 Traganou, 'Olympic Design and National History', 66.
608 *Ibid*., 65.
609 Kerry William Purcell, Olympic Pictograms *Grafik*, 178 (2009), 1.
610 *Ibid*., 1.
611 'Towards an International Sign Language', 2, draft of speech from 2nd Icograda general assembly and Congress, Bled, Yugoslavia 11–16 July 1966, Icograda Archive SS67/3.
612 Stanley Mason was the UK design critic for Swiss magazine *Graphis* (circa 1964), Traganou, 'Olympic Design and National History', pp. 67-68.

Section 3

Olympic pictographic language

Since 1964 Olympic pictograms have formed one of the most prominent uses of international pictographic language, and by tracing their development from Katsumi's' pictograms for Tokyo to Aicher's set for Munich in 1972, the extent of development in this field can be seen. Largely thanks to the innovative work of Katsumi, pictographic systems have become the standard method of communicating in an Olympic context. The increasing mobility of Olympic visitors and reliance on international media coverage has meant that spoken and written language has remained a barrier to communication and pictographic language is still the most viable alternative. This section will examine the evolution of Olympic pictographic systems culminating in Aicher's designs for Munich in 1972. Through Katsumi's designs for Tokyo, the dissemination of Isotype principles of graphic language can be evidenced and links between Aicher's pictograms and Isotype identified.



(Fig. 89)
far left Berlin Olympic pictograms 1936.

(Fig. 90)
left UK Olympic symbols 1948.

A brief history of Olympic pictograms

Hitler's 1936 Berlin Olympics were the first to use a pictographic system.[613] The symbols were stylistically modernist in feel, and not unlike Isotype in their graphic simplicity and use of silhouette. Bold, pared down images of sports equipment were articulated by wavy lines to

[613] http://olympic-museum.de/pictograms/symbols1936.htm.

indicate water sports, using a large 'O' as a locator for graphic consistency. **(Fig. 89)** The hastily prepared post-war symbols designed for London in 1948 took the form of a set of figurative line drawings showing athletes and sports equipment set within a crest. **(Fig. 90)** The Melbourne Games symbols from 1956 used a similar configuration, but this time reversed out of colour-coded maps of Australia to create a simple classification system. After Berlin, the next evidence of pictograms in an Olympic context appeared when Katsumi was appointed design director of the Tokyo Olympic Games in 1959, and used Isotype as a basis for his pictographic system.[614] The 1964 Tokyo pictograms (based on simplified posed body icons to represent each sport) were adapted by Katsumi for use at Expo '70 in Osaka and the 1972 Sapporo Winter Olympics, in collaboration with Aicher.[615] **(Fig. 87)**

The 1968 Mexico City Olympic pictograms were designed by Lance Wyman (USA) and Peter Murdoch (UK). They resolved the essential elements for each sport through simple brightly coloured icons of sports equipment with additional body parts and bold wavy lines to qualify the sport. They stylistically referred back to colourful pre-Hispanic cultures. It had been hoped that Katsumi's system would be used for the Mexico Olympics (he had purposefully left it copyright free), but a new, more fashionably upbeat solution combined with the introduction of a set of pictograms that expressed national characteristics was preferred, a feature which has remained prevalent in Olympic pictograms.

Aicher used Katsumi's pictographic system **(Fig. 87)** as a basis for his design for Munich in 1972, which he extended for the Winter Olympics in Montreal in 1976. However, Aicher's Olympic pictograms have never been used again,[616] although Aicher's 'geometric man' was seen in adapted form at Innsbruck (1976), Moscow (1980), Lake Placid (1980), Los Angeles (1984), Sarajevo (1984), Seoul (1988)[617] and Calgary (1988). Aicher's influence is particularly strong in Keith Bright's set of pictograms for Los Angeles in 1984; the symbols are formed from a systematic set of disjointed heads, limbs and torsos, but Bright has added a subtle suggestion

614 'The most pragmatic solution, if not the best final solution, seems to be the adoption of a visual language based on internationalism. In this meaning, visual communication is the oldest problem and at the same time most up-to-date problem. Pioneers of modern design have already made many experiments in the use of visual language. In the 1920s, Otto Neurath, Vienna, had developed a system of graphic symbols called Isotype. His wife, Marie Neurath, and his colleague Rudolf Modley, followed in his path'. Taken from 'Towards an International Sign Language', 2, draft of Katsumi's speech from 2nd ICOGRADA General Assembly and Congress, Bled, Yugoslavia 11–16 July 1966. Icograda Archive, SS67/3. See also Masaru Katsumi, 'Towards an International Symbology – Tokyo, Osaka, Sapporo' *Graphic Design*, 42 (1971), 31-38.

615 Although not in an Olympic context, according to Large, Arthur used pictograms to design the signing system system for Expo '67 in Montreal on the suggestion of Krampen (a consultant for Expo '67). But in a recent interview (October 2012) Krampen suggested that Arthur's pictographic system was already in place when he became a consultant to the project, which was 'to a large extent' influenced by Isotype. (Appendix 3, p. 356). Large suggests that Arthur used Katsumi's 1964 Olympic symbols as a precedent for his work. Large, 'Communication Among All People, Everywhere', 81.

616 The rights to Aicher's pictograms were acquired by the Canadian Olympic Committee, but due to ERCO's licensing costs, it proved more expensive to reuse them than to commission a new set. The West's boycott of the Moscow Olympics was also a preventing factor in the non-use of Aicher's pictograms.

617 The Seoul Olympic Committee wanted to reuse Buyong Hwang's pictograms for the 1986 Asian Games, but the Canadian Olympic Committee forbade it as they were deemed to be too similar to Aicher's design. Hwang designed an entirely new set with a lozenge-shaped white outline body with attached rounded end limbs.

of muscle to 'humanise' his pictograms. For the Barcelona Games (1992), designer Josep M. Trias again took Aicher's pictograms as a starting point and abandoned geometric precision for calligraphic sweep. Since then stylistic innovation and national character [618] have taken the place of geometric formalism and objectivity.

In 1975 Michael Twyman berated the irresponsibility of the constant redesign of Olympic symbols, and offered Isotype as a solution.[619]

> But though the International Organisation for Standardization has been concerned in recent years with rationalizing symbols for international use, in general, the essential message of the [Isotype] Movement that there should be standard ways of representing things has been ignored. What can be more irresponsible in this context than the redesign every four years of a new set of symbols for the Olympic Games? Some designers cannot resist inventing new symbols; and in recent Olympic Games the need for a clearly understood graphic language which is retained and reinforced through learning from one Games to the next has been ignored. [620]

Otl Aicher and the 1972 Munich Olympic pictograms [621]

> Whenever people address me as the 'father of the geometric man' they are referring to the fact that we reduced the image of man down to a strict geometrical form. This may seem to be a limitation on the possibilities of graphical representation, but it is not. Although characterising a type of sport via its form of movement is a difficult proposition anyway even without these additional graphic restrictions, we have, nevertheless, always been able to find a symbol that is instantly understandable without a great learning process – even for bizarre disciplines. At the same time as the Olympic Games, we were also working on the information system for the airport in Frankfurt where we had to design an extensive repertoire of symbols for air traffic and tourism based on similar criteria. This situation allowed us to offer a comprehensive system of symbols that is in use today throughout the whole world.[622]

618 The naturalistic Atlanta pictograms (1996) made reference to figures found on Corinthian and Attic vases, while Sydney (2000) used boomerangs for limbs. Athens (2004) again referenced figures found on Ancient Greek vases and marble statuary in a more fluid, abstract way.

619 In his 1965 paper 'Signs and Symbols in Graphic Communication' Krampen also expressed the idea of using Isotype as a starting point for designers of pictographic systems. However, in a recent interview (October 2012) Krampen stated that he changed his focus to research into semantics and semiotics after 1965. See Appendix 3, p. 354.

620 Michael Twyman, 'The Significance of Isotype,' *Graphic Communication Through ISOTYPE*, (1975), pp. 6-17, *Icographic*, 10 (1976), 2-12.

621 Otl (or Otto) Aicher was born in Ulm in 1922 and is known primarily for the design of the 1972 Munich Olympic Games concept, his role in the founding and educational development of the curriculum at the HfG in Ulm and the E5 design group that he ran in tandem with his academic activities there. Apart from his Munich Olympic work, Aicher is known for the design of many famous German corporate identities (ERCO, ZDF, FSD, Braun, and Lufthansa), the way finding systems for Frankfurt and Munich airports, and the font family 'Rotis' (1988), which is also the name he gave to his own self-sufficient community where he lived and worked from 1972 until his tragic death in 1991.

622 Otl, Aicher, www.piktogramm.de/pictoserver/pictograms/focus/otl_aicher_4742/en/en_otl_aicher_focus_1.php.

In the spring of 1966, the HfG in Ulm was contacted by representatives of the Olympic Organising Committee regarding the design of a concept for the 1972 Munich Olympic Games. The Committee were aware of the reputation of the HfG and Aicher's E5 team[623] and it was their original intention to work with them both. But fearing the imminent closure of the HfG, Aicher had resigned and transferred E5 work to Büro Aicher (the design group he founded in 1946). In 1967, Aicher was officially appointed by the National Olympic Committee (NOC) to design the visual concept for Munich, one of his responsibilities being to create a systematically structured language of pictograms to enable international visitors to easily orientate themselves around Olympic venues and obtain information without being hampered by language difficulties.

The 1972 Olympic concept involved solving and coordinating communication problems across a broad media platform. Aicher and his team of designers (employed by the NOC) constructed the overall graphic design concept behind the Munich Olympic Games, with responsibility for posters, invitations, news bulletins, wayfinding and the famous set of 21 sports pictograms.[624] The concept behind the identity was based on creating a 'rainbow' (*Die Regenbogenspiele*) theme, focusing on the neutrality of sport, promoting 'playful happiness' and using cultural events to promote internationalism.[625]

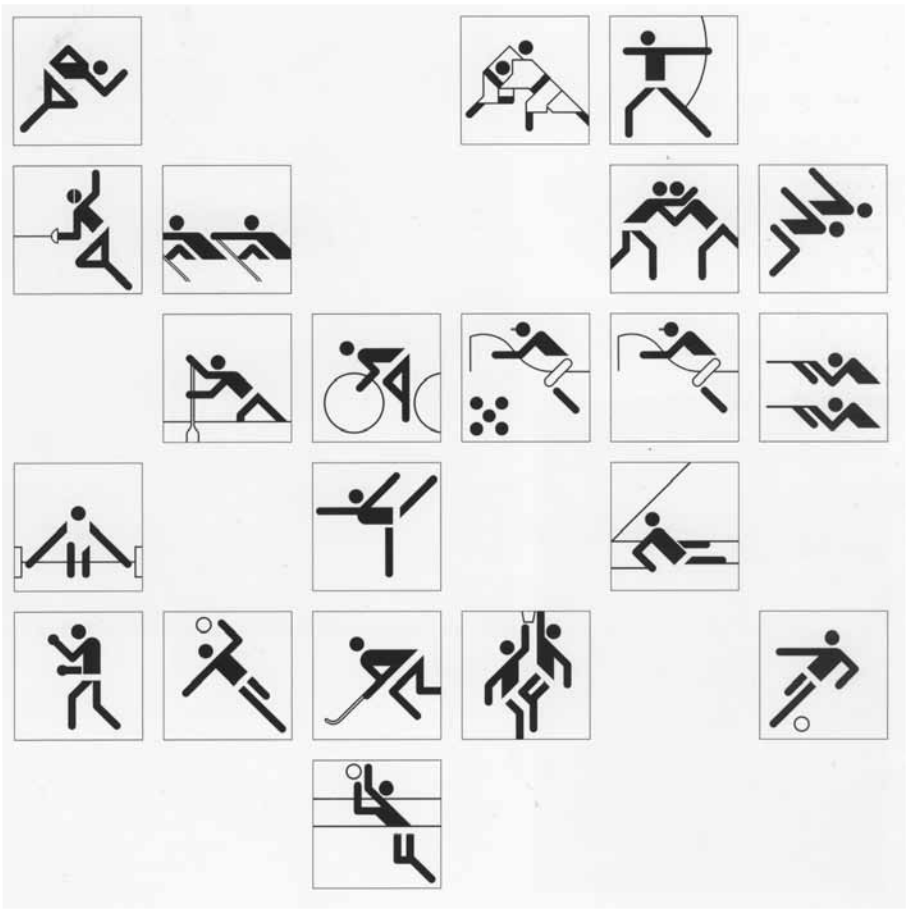
In contrast to Hitler's 1936 Olympics, Aicher wanted to locate sport within an identity that reflected what was natural and real; the landscapes of Munich linked with their cultural traditions. A system of colour-coding represented the natural qualities of the Munich landscape; the view towards the Alps from Munich appeared blue, a colour signifying connotations of youth, freshness, purity, transparency and clarity; the green of the fields represented primary messages, while orange was used to denote technical information, and silver for honours. The font chosen was Univers Light, which Aicher perceived as possessing qualities of youth, objectivity, intelligence and clarity. It was also the first typeface to include a full set of Latin characters, and have an 'aura' of system about it.[626]

623 The Entwicklungsgruppen (student development teams), functioned independently of the HfG in the form of working design groups that gave students practical design experience. They were headed by faculty members such as Aicher, Gugelot, Zeischegg and Maldonado and staffed by external designers and more experienced students. Aicher's E5 team handled the most prestigious external projects from 1957–64. Rathgeb, *Otl Aicher*, p. 55. In conversation with Ian McLaren (March 2010), he suggested that there were very few students involved in working in the Entwicklungsgruppen.

624 McLaren stated that he witnessed Aicher and Alfred Kern extending the series of pictograms to include various tourist-related symbols, which numbered 180 before Aicher died in 1991. Ian McLaren, exhibition text for 'Section 6, Case History, Symbols', 'Practical Utopia – The Design Work of Otl Aicher' Anderson Gallery, Des Moines, USA, 13 September – 30 October 2003.

625 Aicher's Olympic concept was in total contrast to Hitler's 1936 Berlin Games, which blinded the world with pomp, using images borrowed from neoclassical antiquity, coloured by the red and gold of dictatorship. Hitler put sport put in the service of political and economic interests. The positive legacy of the Berlin Olympics consisted of the torch run, the festive decoration of the town, and the use of radio as a broadcast medium.

626 This would endorse the choice of Univers as the perfect choice of font for a design concept which had to function across so many platforms. See Kinross, 'The Rhetoric of Neutrality' p. 136.



(Fig. 91)
Munich Olympic pictograms 1972.

The design of the Munich Olympic pictograms

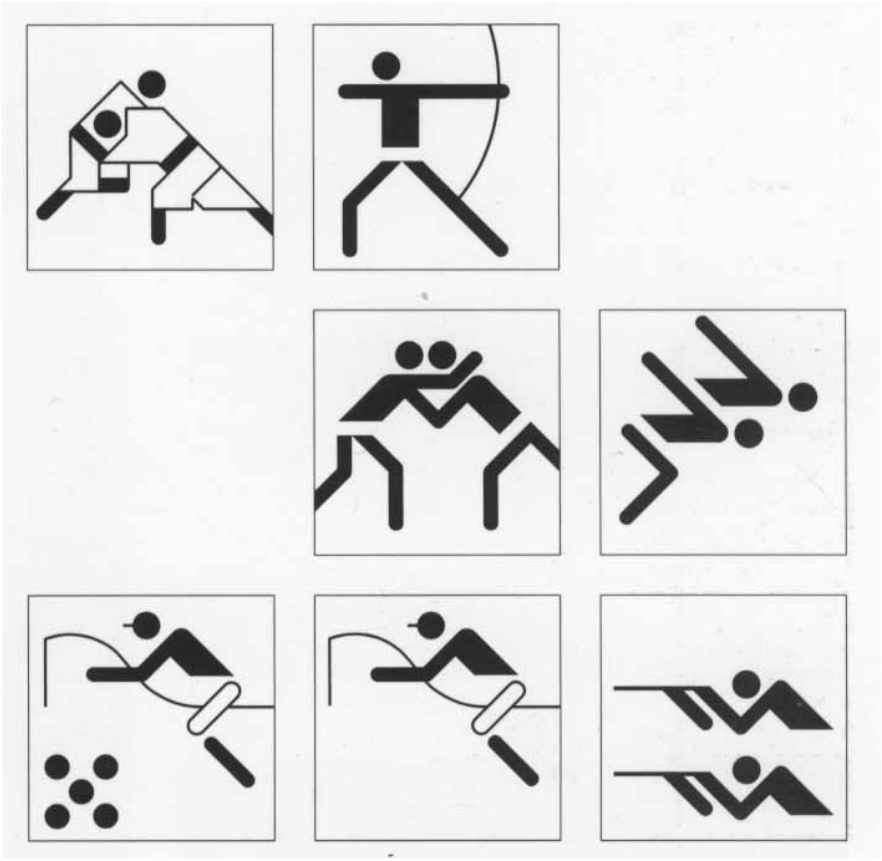
The Munich Olympic design concept took two and a half years to plan. In August 1966 Aicher spent a few days with Katsumi in Rotis discussing operational issues behind the pictographic system. Aicher used the model of the Tokyo Olympic symbols as a basis for Munich (a system he was already familiar with having reworked the symbols for the Sapporo Winter Olympics in 1972 with Katsumi). Aicher favoured the visual concept and organisational structure behind Katsumi's symbols to those produced for Mexico in 1968, which he regarded as too culturally specific. Aicher saw the need to try to achieve cultural neutrality if the pictorial system was to be fully language-independent. A successful pictographic system needed to be practical, formal, meaningful and immediate, based on the familiarity gained from an understanding of the component parts, and with the ability to be applied seamlessly across a wide media platform. When Aicher was designing the Munich pictograms, 34 languages were being spoken in Europe alone.[627]

Using Katsumi's visual language as a starting point, Aicher gave his pictograms a system and grammar based on a regulation orthogonal and diagonal grid using standardised graphic elements (circles, parallel lines, orthogonals and diagonals – graphemes) to represent the human torso, head and limbs. He repeated, reconfigured and regrouped graphemes to form a

627 http://olympic-museum.de/.

recognisable figure to represent each sport. These were placed on the strictly designed grid,[628] with consistent 45 and 90 degree angles, each taking up a similar visual space, rendered in an interchangeable colour palette. An advanced level of syntactic order enabled the pictograms to be used flexibly within the larger aesthetic picture, allowing designers the freedom to playfully combine sets of elements – demonstrating Aicher's maxims 'unity in variety' and 'design is a game with rules'.

Aicher designed the first 21 pictograms with the help of Rolf Müller, Helena Winschermann and Gerhard Joksch,[629] initially testing Katsumi's 1964 symbols to see if they could be used on a more systematic basis. According to Ian McLaren (one of the chief designers on the project), the original intention was to base the symbols on human figures, but as the project developed, this proved impossible. Joksch's original studies used wooden medical probes,[630] resembling



(Fig. 92)
Munich Olympic pictograms 1972.

628 According to Rathgeb, Josef Müller-Brockmann's *The Graphic Artist and his Design Problems* (1961) was the first book to give a brief account of a grid system in words and pictures. It was very well received at the HfG, and by Aicher and his team, who regarded the grid as fundamental in achieving the complex organizational structure required by the Munich Olympic concept, and a milestone in the evolution of visual systems. Rathgeb, *Otl Aicher*, p. 78.

629 Aicher's original instruction to Joksch was to 'start doing something with matchstick men', from an interview with Gerhard Joksch (3–5 March 2000), cited by Ian McLaren in exhibition text for 'Section 6, Case History, Symbols', 'Practical Utopia –- The Design Work of Otl Aicher' Anderson Gallery, Des Moines, USA 13 September – 30 October 2003.

630 In an informal interview with Gerhard Joksch at the HfG, (October 2012) he stated that he based his designs on the type of wooden sticks used for ice lollies.

armatures – McLaren stated that this could have led to the semicircular end detail in the depiction of the 'limbs' on the final pictograms. The figures themselves appear to be wearing underpants, which solves the problem of how the legs attach to the torso. Extra dynamism was also achieved by allowing the circular head of each figure to be placed slightly outside the strict grid structure.[631]

Like the 1964 Tokyo Olympic pictograms, Aicher's pictograms with their strict use of the grid formed a further milestone in the evolution of pictograms for use in complex international systems. As a system they demonstrated clarity, simplicity and an immediacy of comprehension by virtue of their familiarity with the audience and their integration throughout the whole graphic concept. Aicher hoped to achieve a pictographic system that was culturally neutral.[632] **(Fig. 92)**

Aicher's Olympic symbols were extended into the information system for Frankfurt Airport[633], and later Franz Josef Strauss Airport Munich, (designed between 1974 and 1991). This called for the application of pictograms on a much larger scale, including the entire infrastructure of services and facilities connected to an airport. It required an even more flexible syntax that would be seen above all other information (especially commercial considerations). A design concept such as this could only be achieved by precise classification of function and location, implemented within a flexible interchangeable system. As with the Olympic pictograms, a varied set of graphic elements (graphemes) were ordered by means of a rigid grid, which allowed the designer the flexibility to use standardised elements in a varied way.

Aicher enjoyed the notion of creating a comprehensive international sign language. He collected symbols extensively and was considering the idea of designing a language based on symbols alone, without wording (in complete contrast to Neurath's 'helping language'). For Neurath, graphic syntax would never totally replace verbal ideas, and pictures supported words, not vice versa. Aicher's vision for the future was made up of signs where written language would be entirely eliminated.[634] In the context of a specific contained environment (such as an Olympic complex) this was achievable, but when used for a wider, more complex application (such as an airport), words had to be accommodated as a secondary element to facilitate immediacy of recognition in an unfamiliar environment.

Aicher's legal battles regarding authorship and copyright of his designs for the Munich Olympic

631 From an informal interview with Gerhard Joksch at the HfG, October 2012.

632 Again, it is arguable whether this is possible to achieve, when an 'objective' approach can be seen as being representative of the German post-World War II recovery, which according to Kinross, Aicher's work so clearly encapsulates.

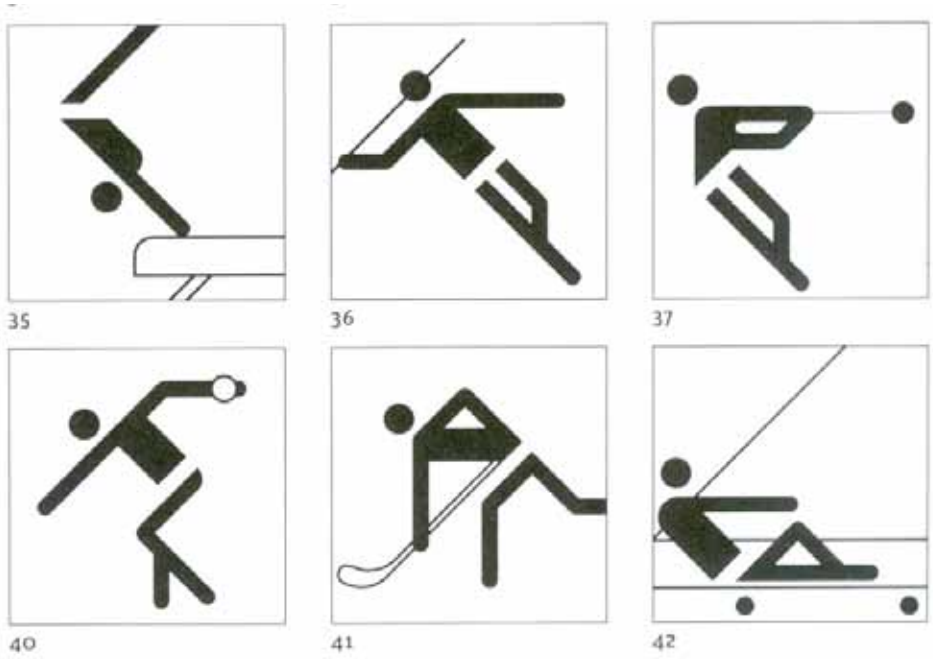
633 Frankfurt Airport wayfinding ran concurrently with the Olympic proposition. Both projects were designed using the same set of limited graphic elements (graphemes) arranged according to set rules and grids.

634 Rathgeb, *Otl Aicher*, p. 116.

pictograms went on for many years, including problems at Frankfurt and Munich airports.[635] Permission was finally granted by the Munich Olympic Committee for the pictograms to be used at the 1976 Winter Olympics in Montreal, and the system was extended to include a total of 117 symbols. In January 1976 ERCO negotiated the purchase of rights and commissioned additional examples from Aicher.[636] The pictograms were later developed by ERCO into 'a comprehensive, logical system of pictorial signs, capable of being used in a wide variety of situations'. ERCO continues to hold the licence to the present date. Unfortunately, due to licensing costs, Aicher's pictographic system has proved too costly to be reused for any Olympic gathering since Montreal.[637]

The ERCO pictographic system

> The quality of a pictogram depends on its simplicity. Regardless of design trends and fashions, ERCO's pictogram system relies on a clear and easily understandable visual language. All symbols are linguistically and culturally neutral, both in terms of their content and form, and this means that they can be used anywhere. Today a team of ERCO graphic designers and planners are continually working to further improve and develop the system; both technical innovations and the merging of international markets and cultures are taken into account when developing new pictograms [...]



(Fig. 93)
ERCO pictograms.

635 According to Joksch, co-designer of the original 21 pictographs for Munich, the copyright lay with both designers. Joksch went on to design a further 30 pictographs as part of the system. After the Munich Olympics, several organisations expressed interest in extending the pictogram set to suit their individual needs. The first was a skiing symbol, for Adolf Klinge & Co during 1972, which Aicher and Joksch worked on together. Aicher continued to agree joint ownership for the pictograms after the Olympics. In 1975, a firm of opticians commissioned a series of winter sports symbols that were again designed jointly by Aicher and Joksch. Ian McLaren exhibition text for 'Section 6, Case History, Symbols', 'Spiele: Otl Aicher's Olympic Graphic Design'.

636 Aicher sold the copyright to ERCO in 1976 on the basis that he had 100% ownership of it. This has been contested by Joksch, (who owned 50% of the copyright with Aicher) and documents exist in the HfG Archive in Ulm which substantiate this fact. Taken from an informal interview with Joksch, October 2012.

637 The Los Angeles Olympic Organising Committee were keen to reuse Aicher's symbols in 1984, but found it more economical to redesign new ones due to prohibitive licensing fees.

> ERCO's 365 most frequent pictograms presented are distributed into 10 semantic fields [...] However, the advantages of language ends where national language becomes a barrier for communication. World fairs, Olympics, train and air travel show that in international understanding, pictures can be superior.[638]

The ERCO pictographic system is based on Aicher's original grid and structure for the set of 21 pictograms that he designed for Munich in 1972, which was intended to be 'linguistically and culturally neutral'. In 1974, Aicher met Klaus J. Maack of ERCO, and negotiated the licensing of the system, initially for a series of illuminated directional signs. ERCO bought the rights to the system, which is currently available for public useage under license. The system is continually being expanded and improved, taking international considerations such as merging markets, cultural trends and technical innovations into account.[639]

Conclusion

Aicher's Olympic pictograms form the culmination of a body of pictographic work from International designers and communicators that can be traced back to the late 1950s and could be seen as having their basis in elementary work on various attempts to formulate symbol dictionary and data bank projects from the 1940s to the 1970s. As has been shown, the legacy of one of these symbol dictionary projects, the 1956–60 Preparatory Survey which included M. Neurath, Modley, Dreyfuss and Krampen has been seen to have far-reaching effects, and led to the publishing of books, papers and authored chapters on symbols by Modley, Dreyfuss and Krampen[640] and anthropological collaborations between Mead and Modley. This trail of influence was set against a backdrop of the increasing awareness of the importance of internationalism, both in attempts to promote world peace and remove the language barriers faced by the traveller, seen from both idealist and scientific perspectives. On the down-side, during the 1960s projects based on symbol classification suffered from a failure to attract significant sponsorship from international organisations (such as the UN and UNESCO), who did not acknowledge the importance of a set of universally recognised symbols beyond the design of road signs (which demonstrated an obvious need due to the danger caused by the increasing number of cars on the roads during that decade).

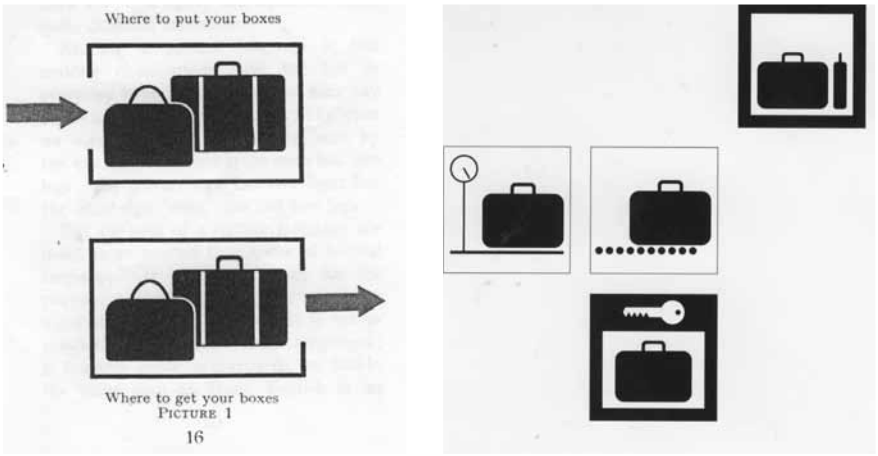
Connections have been made between the principles of Isotype and Aichers' Olympic pictograms by tracing links which run from M. Neurath, through Dreyfuss and Modley to Krampen; and then on from Krampen to Katsumi and Aicher via the HfG; the Icograda Commission on Signs and Symbols (ICSS) (who provided the premise for spreading knowledge on international signing systems amongst its international membership); and Japan's adoption of Isotype as a basis for the Tokyo Olympic submission. While it could be said that Aicher's

638 Krampen, *The World of Signs*, pp. 25-26.
639 *Ibid.*, pp. 25-33, http://www.piktogramm.de/pictoserver/homepage/homepage/start/de/de_start.php
640 Krampen, *The World of Signs*

pictograms do not stem from anything more than a tacit primary knowledge of Isotype, there is sound evidence of secondary and tertiary influence through Katsumi and Krampen. As McLaren states, Aicher was familiar with Isotype through his modernist connections, but it was Katsumi's work that provided the impetus for the design thinking for the Munich Olympic pictograms.

Martin Krampen forms the bridge between the principles of Isotype, the new informed approach to design, (seen through the Ulm Model) and Aicher's pictograms, which could not have achieved their international reputation without the body of empirical research into symbol systems that had gone before. In 1965 Krampen urged designers to consider Isotype as a starting point when designing new international wayfinding systems. He was well placed with his background as both designer and communications scientist to take the new status of the informed approach to design and research forward into the international design community.

The geometric gridded pictograms that Aicher originally developed for Munich have evolved into one of the most complete commercially available International pictographic systems designed to date. The original 21 sports pictograms have multiplied into a system[641] containing thousands of internationally recognised pictograms for a variety of language-independent uses. They could feasibly be viewed as a modern day embodiment of Neurath's International Picture Language. In many respects, ERCO's licensing of the original Munich pictograms have enabled them to achieve Lupton's 'semiotic climax' of contemporary International picture language.[642] However, it must be remembered that the Munich pictograms, (which Joksch held joint copyright over with Aicher) were not used in an Olympic context again after Montreal and the complications surrounding licensing agreements before Aicher illegally sold the rights to ERCO remain tangled.[643]



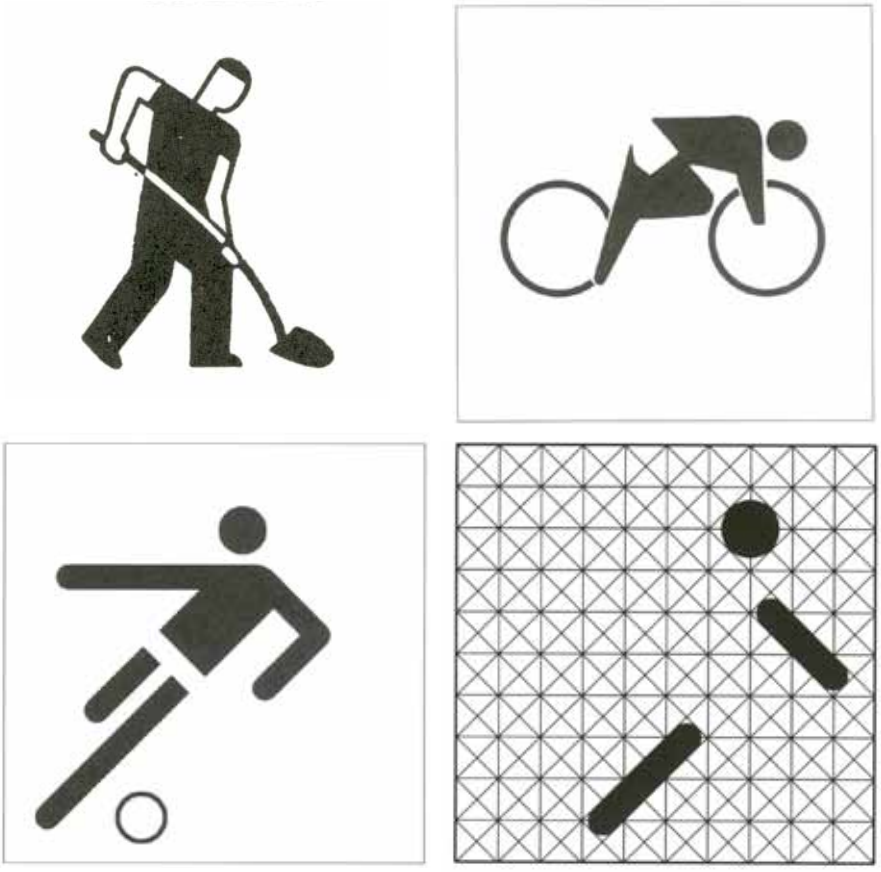
(Fig. 94)
left Comparing Neurath's picture language from *International Picture Language* with *right* Aicher's use of graphic language.

641 It must be stated that some of the more contemporary editions to ERCO's Picktogramme system do not have the same design integrity or adherence to the strict grid as Aicher's original designs for Munich.

642 'the semiotic climax of international pictures: a geometric body alphabet is deployed on a consistent grid…' Lupton & Miller, *Design Writing Research Writing on Graphic Design*, p. 43.

643 The HfG Archive contains the original copyright agreement between Joksch and Aicher, donated by Joksch in October 2012. It was uncatalogued at the time of writing (November 2012).

One of Aicher's main achievements in designing the Munich pictograms was to develop a system for formalizing structure, so freeing the language to create a variety of different meanings – 'unity in variety'. Aicher's pictograms were constructed from standard geometric elements (graphemes) combined to form individual pictograms arranged on a strict grid that could be seamlessly juxtaposed to form new syntax with the minimum effort. In Aicher's further work involving pictograms for airport signing, Rathgeb makes reference to this combination picture language, and discussed how Aicher created a common language through repetition of elements – a symbol for a suitcase combined with other elements could demonstrate different meanings or illustrate sequences of events.[644] This use of combined symbols can be compared with Neurath's combination of symbols in *International Picture Language,* [645] making them more specific. 'The units of the picture language have different senses when they are in different positions'[646]. The pictograms for 'Where to put your boxes' and 'Where to get your boxes' can be almost directly compared with Aicher's suitcase pictograms which describe different contexts and scenarios. **(Fig. 94)**



(Fig. 95)
Comparing pictograms: *top left* Isotype, *top right* Tokyo *lower left & right*, Munich.

644 Rathgeb, *Otl Aicher*, p. 114.
645 Neurath, *International Picture Language* p. 16.
646 *Ibid.*, p. 18.

Rathgeb states that Aicher and his colleagues at the HfG believed that communication shaped society and that visual communication formed the conduit for this to happen, but this seldom happened until the 1960s due to a lack of political and economic interest and investment in public information systems.[647] The fact that visual communication, through the creation of an International language could make such a difference to society and facilitate communication was one of the founding premises behind Isotype, and this may have been one of the notions which Aicher was reminded of as renewed interest in internationalism looked to Isotype as a model for pictographic systems.[648] During the 1970s, the design community was reminded of Isotype through exhibitions in Reading, Vienna and the Hague, and the work of Otto Neurath and Gerd Arntz was seen by a new generation of designers.

In 2009 Wim Jansen stated that Aicher drew 'from the Isotype example according to a grammar and simple rules'.[649] Jansen was referring to Neurath's combination of elements to form a consistent graphic syntax, and the strict rules that form the principles of Isotype. It could be said that Aicher took this graphic syntax and standardised the elements by setting them on a strict grid and constructing the individual pictograms from consistent geometric graphemes. Neurath's graphic language was not constructed from consistent geometric units, but fits seamlessly together by virtue of the graphic and operational principles that govern its ideological and physical appearance, coupled with the consistent humanistic visual language. created by Arntz based on Neurath's physicalist ideas. **(Fig. 95)**

This survey of international graphic language from the late 1950s to the 1970s has found evidence of the legacy of the Isotype principles of graphic language, and has revealed why scholars consider Aicher's pictograms to be part of this legacy. The scale of Aicher's projects demanded a systematic objective approach to the organisation of complex information. Aicher acquired skills from both mixing with designers such as Maldonado and Bonsiepe (amongst others) at the HfG, and working there as an educator (and helping to form the Ulm Model) and as an E5 team leder. The Ulm Model, provided the context for information designers such as Aicher to emerge – designers whose work is not based solely on intuition, but on sound research, testing, inter-disciplinary collaboration, evaluation and information management techniques – just as was, in a previous era, (and on a smaller scale), that of the Isotype team.

647 Rathgeb, *Otl Aicher*, p. 114.

648 Bakker claims that the 'rediscovery' of Isotype by designers and design historians during the mid 1970s drew attention away from more bureaucratic technical organisations such as Icograda, UIC, ICAO, UN and ISO. Bakker, 'Pictopolitics: Icograda and the Development of Pictograms' *Iridescent* (2012).

649 Jansen, 'Neurath, Arntz and ISOTYPE: The Legacy in Art, Design and Statistics', p. 228.

Part three

The legacy of the principles of Isotype

An assessment of the legacy of transformation, graphic argument and graphic language seen in relation to museum design, explanation design and the development of international pictographic language.

The previous three case studies have shown how Isotype has been incorporated into new bodies of work and used as a starting point by others far removed from the Isotype Institute. The principles have been articulated in adapted states within three very different areas of graphic design: museum design (evidencing transformation); explanation design (evidencing graphic argument); and international pictographic systems (evidencing graphic language). This section will summarise and conclude with the aim of illuminating the legacy of the principles in these three areas.

The first case study explained the reasons why transformation was able to function in a new context at the Natural History Museum between 1975–1991, and how Roger Miles used Isotype as the inspirational force behind Museum technology, his newly assembled tool to power exhibition design in a national museum. The second case study placed Nigel Holmes in context within the genre of explanation design and traced how the principles of graphic argument permeated into his mode of graphic argument, establishing whether the integrated picture-text principle had informed his design methodology. Finally the third case study qualified scholarly notions that Aicher's 1972 Munich Olympic pictograms were informed by Isotype principles of graphic language and revealed the pathways through which the principles were disseminated during the 1960s and early 1970s in the US, Europe and Japan. Part three will revisit conclusions drawn from the three case studies with the ultimate aim of providing a basis for discourse on more generic aspects of legacy.

The New Exhibition Scheme (NES) 1975-1991
Evidence of the principle of transformation in the Natural History Museum

> Despite the practical difficulties we experienced, I believe that museums as a whole would gain from basing their work on the structure and procedures of Otto Neurath's Isotype team. The ultimate beneficiaries would of course be their visitors.[650]

[650] Miles et al., 'Otto Neurath and the Modern Public Museum: The Case of The Natural History Museum (London)', 183-190.

Isotype provided the inspiration behind Museum technology, Miles' operating system for the production of exhibitions. He incorporated transformation into the formulation of the New Exhibition Scheme (NES), showcased by the Pilot project, the Hall of Human Biology, which opened in 1977, followed by several other phases (until his departure in 1991). Miles' brief from the Director and Trustees of the Museum was to make the galleries user-centred, and re-interpret the Museum's original 19th century mandate to educate the public. On the advice of Michael Macdonald-Ross, Miles adapted the methodological principle of transformation to suit a 1970's audience for a national museum in London. His interpretation centred on the creation of the designer/scientist transformer partnerships with an extended team built around the process of translating scientific facts into audience-friendly educational exhibits. *The Transformation Reader* documents the informing factors behind Miles' ideas for NES within the Department of Public Services (DPS) during this time. It included articles by Otto and Marie Neurath, Michael Twyman, Michael Macdonald-Ross, Rob Waller, Alma Wittlin, Brian Lewis, Robert Gagné, and Harris Shettel amongst others. Miles' diagram showing how DPS was organised also clearly indicates how he adapted Neurath's conception of transformation in the context of a national museum during the 1970s. **(Fig. 38)**

The legacy of transformation in museums

The legacy of transformation in the NHM is far-reaching. Ideas that appeared radical to the museum community during the 1970s now appear commonplace; it is unthinkable today that a museum exhibit would be designed without the close collaboration of designer and subject expert, as Miles reinforced in a recent interview.[651] Questionnaire responses from NHM transformers also clearly illustrate how important transformation was to museum professionals.[652] Transformation as a method was disseminated when internal disputes and political battles forced DPS to disband in 1991 and ex-NHM transformers populated the wider museum community taking their NES experience forward into new museological environments. The NHM has outsourced all major exhibitions since 1991, many to organisations employing ex-NHM transformers.[653]

> The work at the Natural History Museum was the basis of all I have done since, really, and I have long been grateful for it. However, while it may have been the truth it wasn't the whole truth, neither was it new. And, given that the idea spawned a whole industry, I'm constantly amazed by how often one sees 'The Rules' ignored, or as I suspect, not known.[654]

651 From an edited transcript of a formal interview with Miles. See Appendix 1, p. 266.
652 From responses to questionnaires from NHM transformers. See Appendix 1, p. 295.
653 For transformation to effectively take place, an understanding between the partners was essential. At the NHM, this was sometimes haphazard due to the personalities involved, and not all transformer partnerships enjoyed fruitful relationships and the resulting transformation was not always as erudite as it could have been. See Appendix 1, p. 276 & 295.
654 Susan Jones, Scientist transformer from an email response, October 2008.

It is worth noting that designers in the NHM transformer partnerships all came from three-dimensional design backgrounds[655] and had not been specifically trained as graphic communicators. In NES, the skills of the three-dimensional designer were seen as more relevant to the transformer partnerships than those of the graphic designer, who traditionally has a better command of communication design.[656] The design process involved designer/scientist transformer partnerships supplying visual concepts to graphic designers and illustrators (based several miles away in West London) for the production of artwork. It is interesting to compare this situation with M. Neurath's role as a transformer – Isotype exhibitions (in general) consisted of two-dimensional panels designed in set sizes to fit into standard frames. M. Neurath's 'transformations' are detailed and precise pencil sketches but, like the NHM system, required the services of a graphic designer/artworker to realise the final outcome. Educational exhibits at the NHM, particularly in the 'Hall of Human Biology', were highly ambitious in their use of three-dimensional design, but less so in graphic terms.

The legacy of transformation in a contemporary museum context lies in the methodology behind the operating systems used by museum professionals, but today it is more likely to be known as 'interpretation' and involves teams of academics, script writers, editors, audience advocates (a non-design role which ensures that exhibitions remain visitor-centred), designers (used in a more traditional role), technicians and support staff. Interpretation is most effective when editors are able to visually conceptualise academic information and vividly relay ideas to designers who can, in turn, enhance and refine the graphic outcome.[657]

Miles gave many papers and spoke widely on Museum technology from the mid 1970s to the late 1990s[658] and *The Design of Educational Exhibits* [659] was one of the first publications to discuss the design and implementation of a system for the delivery of didactic exhibitions in a

655 'The job of the partnerships was seen essentially as transforming scientific ideas into specifications for three-dimensional exhibits, hence three-dimensional designers. These specifications were then passed on to the separate Graphics section (and others such as model makers) for production. I suspect we were initially hazy about where the weight of responsibility lay for graphic interpretation (in other words, how much original input were the graphic designers to be permitted). I remember Macdonald-Ross saying that on a car production line you could spray the end-product whatever colour you liked without affecting performance, but late changes of this magnitude could easily destroy a carefully planned piece of communication. We soon learned that there needed to be a good deal of interaction between Development and Graphics sections. An essential background point is that the Graphics section was slated to move to South Ruislip (as indeed it did after 'Human Biology') so we had to find a way of working that took account of the distance between development and production (before even fax machines existed)'. (Email response from Roger Miles, 21 May 2011 to email question on why three-dimensional designers were considered the best candidates for designer transformers).

656 'When we came to set up the partnerships (which eventually numbered 6 or even 7 for 'Human Biology'), we could not find enough 3D designers in the former Exhibition section (or felt obliged to give one or more of the graphic designers a chance to work in the Development section). One of these worked on the 'Movement' section of the exhibition (skeletons etc.) but she was never happy in this role and did not stay long afterwards in the Museum'. (Email response from Roger Miles, 21 May 2011 to email question on why three-dimensional designers were considered the best candidates for designer transformers).

657 The author has first-hand experience of this situation working as the graphic designer as part of a team with ex-NHM designer transformer Mark Magidson on the 1996 NHM Exhibition 'From the Beginning'. Contact with NHM scientists was kept to a minimum.

658 See bibliography for list of papers.

659 Miles, R.S., (in collaboration with) Alt, M.B., Gosling, D.C., Lewis, B.N., and Tout, A.F., *The Design of Educational Exhibits* (London: George Allen & Unwin, 1982).

national museum context. Since then many books have been written on aspects of museology, and formative and summative evaluation has become an integral part of the development of new exhibitions. Evaluation forms one of the key legacies of the 'visitor-centred approach' developed at the NHM, which Miles considers shifted to the nearby Science Museum in the mid-1990s.

Macdonald-Ross, when interviewed, stated that all systems of communication, from Isotype to operational research and educational technology stem from basic communication strategies which he defines as 'the human organisation of learning which has been in existence for centuries'.[660] Both Neurath and Miles assembled their own versions of this notion. In much the same way that Neurath had taken elements from philosophy, sociology, pedagogy, 'education by the eye' and a whole host of other disciplines to construct Isotype,[661] Miles took aspects of Isotype and combined them with educational technology, operational research, evaluative studies, philosophy, education and cybernetics to construct Museum technology. He stated that his strategies for evaluation were based on the work of Popper and Shettel, but it must not be forgotten that Neurath originally pioneered evaluation at the G&W from 1925–34.

Macdonald-Ross put forward the idea of looking at exhibits in the NHM from an holistic viewpoint. He attempted to remove the tag of the museum being simply a repository of objects and specimens, on the basis that objects don't form the whole of the science, but science is made up of a complex mixture of interwoven objects, experiments and conceptual information. This can be directly compared to Neurath's interconnected ideas for a natural history museum, but it also led to the NHM being accused of adopting a dumbing-down process.

As has been seen in papers by Miles and Lewis, some of the methodological principles of Isotype are echoed in elements of educational technology. One such shared principle, which Miles loosely adapted from Isotype, alludes to comparison. Neurath's charts compare factual information, typically placing time on the vertical axis and magnitude on the horizontal axis. Miles' use of comparison included analogy and metaphor, which oppose Isotype's physicalist basis which dictates that objects should be clearly expressed in immediate terms. But both Miles and Janson-Smith cite the 'Cortex' exhibit as an effective example of transformation – an exhibit still present in the Hall of Human Biology after 35 years. **(Fig. 32)**. Metaphor as a method of comparison in the transformation process can be seen as an adaptation of Neurath's

660 From an edited transcript of an interview with Macdonald-Ross, Appendix 1, p. 279.

661 Neurath's concept of *Ballungen* adequately sums this up – 'congested concepts with fuzzy edges'. Neurath, *Philosophy Between Science and Politics,* p.ox.

principles to show how comparative information can be represented,[662] and remains one of the main vehicles used in the NHM for explaining complex concepts and relating them to the audience. By drawing on the audience's prerequisite knowledge, new concepts can be readily understood – one of the techniques used in educational technology.

Neurath's charts were based on impartial comparison between unbiased factual information, allowing the audience to draw their own conclusions. Exhibits found in NES also contained unbiased factual information, but their primary function was to educate and entertain. 1970s museum audiences were visually sophisticated through media exposure to the metaphor, (a staple technique used in advertising) so Miles had to try much harder to capture and retain his media-conversant audience and compete with television and the other national museums on his doorstep. In both the G&W and the NHM integrity towards information and audience was paramount. It is interesting to contemplate whether Neurath (who was strictly anti-metaphysical) would have approved of Miles' interpretation of comparison to include analogy and metaphor.

The wider legacy of transformation

This section will discuss aspects of the wider legacy of transformation beginning with an account of how transformation was adopted at the Open University and why it was also deemed relevant for the NHM. It will conclude by describing significant examples of transformation in contemporary design practice.

Michael Macdonald-Ross and the Open University

> The idea of grasping what the target audience can understand, and turning professional data into a form that is comprehensible is something Neurath did again and again, which is fundamental to what's done in good newspapers and magazines. It was also being done in the 19th century. Turning complex professional material into a form which can be understood by the ordinary person is not a new venture.[663]

Macdonald-Ross played a significant role in developing distance learning techniques at the Open University (OU) during the early 1970s and was responsible for introducing Roger Miles to transformation. Macdonald-Ross was introduced to Isotype by Michael Twyman at University

662 Isotype charts do not use metaphor or analogy to introduce new concepts based on the recognition of the familiar. Logical positivist/physicalist ideas do not allude to objects, they simple represent them in their most clear form. In 2000 Clive Richards discussed the use of graphic metaphors in diagrams, and considers that there are degrees of metaphoricity. He defines a diagram as a picturing of two relationships plotted against each other, suggesting that if relationships are spatial then the elements are being empirically compared, but if the relationships are non-spatial – it is metaphoric. 'When the relationships are non-spatial, the diagram performs as a kind of metaphoric picture […] As in spoken language there are degrees of metaphoricity – it can range from strong contrast to near similitude, where it is hardly a metaphor at all'. Clive Richards, 'Getting the Picture: Diagram Design and the Information Revolution', *Information Design Journal*, 9: 2 & 3 (2000), 87-110.

663 This section is based on Macdonald-Ross's transcript. See Appendix 1, p. 277.

of Reading while on a fact finding mission to investigate new ways to deliver university-level teaching and learning.

The Open University was founded in 1969 under Harold Wilson's Labour government, based on the vision of Michael Young (later Lord Young of Dartington). Minister of State for Education Jennie Lee was responsible for much of the planning.[664] The OU had many enemies from traditional universities, who were protective of their academic prestige and wary of the OU's new methods for delivering undergraduate courses; so the success or failure of the OU was under great scrutiny. The underlying aim for the new style university was to design a system for active distance learning which was not reliant on lecturers physically standing in front of students giving lectures.

Macdonald-Ross's background lay in working with projects concerning innovation in higher education. During the late 1960s he was part of a consultancy which included Alan Tout (an expert on production control charts and an operations research scientist) and Michael Neal (a reader in biochemistry, trained forensic scientist and management consultant). The consultancy had read the OU Planning Report written in 1968 and considered that they could formulate techniques to organise teaching from a distance. Professor Walter Perry (the first Vice Chancellor) hired the team to investigate how educational technology could be used to design academic courses and provide new ideas on how university teaching could be organised.[665] Heads of design and publishing were already in place at the embryonic OU; the design studio had been set up to design the covers of text books (rather than information content) and produce publicity material. According to Macdonald-Ross, the Head of Design hadn't fully considered how different the OU was from traditional universities or the importance of the design of distance learning material.

A system was needed to plug the gaps the OU student would miss by learning from home. Traditional universities provided many factors to facilitate learning and guard against failure: lectures, lecturers, libraries and a student cohort. The OU had none of these features and faced the strategic problem that most correspondence courses have of potentially high drop-out rates. To make up for the lack of traditional aids to learning, the OU introduced summer schools, self-help groups and a robust system of issuing feedback. Learning was made active and co-operational rather than passive. Course texts were interspersed with short activities (with feedback provided) so the student would be gradually introduced to the skill sets

664 Planning for the OU had commenced in 1965 under Minister of State for Education Jennie Lee, who set up a committee consisting of university vice-chancellors, educationalists and television broadcasters, chaired by Sir Peter Venables.

665 A further remit for Macdonald-Ross and team was the appraisal of the examination system. They introduced a new concept in marking students' work, based on an equal balance between course work and examination – an innovation at that point in university level education. The OU began in 1969 and the first students started in 1971 with four foundation courses in maths, social sciences, humanities and science. Other courses were added later.

required, giving them confidence to progress to more complex assignments and examinations. One of the major areas which Macdonald-Ross and his team looked at was consistency in the delivery of distance teaching. Because lectures did not take place in the traditional way, subject matter did not naturally interconnect. The OU needed to find a new model to design interrelated courses to deliver a seamless educational experience. To achieve consistency of approach, academics were scheduled through an industrial course unit production process. The OU were looking to employ exceptional academics, capable of communicating and writing deliverable coursework to an undefined audience and not dealing exclusively with a traditional group of students with defined academic standards. Many of the OU academics recruited from elite institutions were unable to write at the different levels required for such a diverse audience. During the early days, academics were selected for their demonstrated commitment to the aims of the University, an understanding of the communication process and the ability to apply themselves to the production of teaching material.

Macdonald-Ross considers that his main achievement at the OU was to put forward the idea of course unit teams, which he suggests were inspired by transformation. The teams were comprised of academics, a BBC producer, an editor and an educational technologist with input from the OU design department. Course team working sessions made use of typescripts with additional sample diagrams and illustrations (photocopied from source material). Discussion took place around the configuration of academic text and the criteria for assessment. Setting the text at the right level for the students was paramount, as was the organisation of data helped by the provision of typographic signposts and navigational systems.[666]

Distance Learning – the legacy of the transformer at the Open University

The OU continues to use transformation to translate academic facts into materials for distance learning. In July 2009, Professor Pam Shakespeare (Professor of Practice Based Open Learning at the OU), gave her inaugural lecture on 'Revisiting the Role of the Educational Transformer'.[667] She discussed the past, present and future of transformation at the OU and the contribution it continues to make in her department. The lecture traced the history and remit of the transformer, beginning with the Isotype transformer of the 1920s, covering aspects of M. Neurath's later work, and Macdonald-Ross and Waller's contribution to the Department of Educational Technology, Textual Communications Unit during the 1970s.[668]

666 The *Transformation Reader* shows examples of these layouts, Appendix 1, pp. 311-317.
667 http://stadium.open.ac.uk/stadia/index.php?s=1&option=past. Early evidence of how the OU used transformation can be seen in Macdonald-Ross's edited transcript. See Appendix 1, p. 286.
668 See Rob Waller, 'Notes on Transforming 1-7', Textual Communications Research Group: Open University. (1977).

Shakespeare examined practical aspects of contemporary educational transforming and the techniques used to help learners engage with course material. To facilitate entry level, learners are able to offer their own life experiences as a resource, enabling education to begin at the learner's own level, activating 'key moments of communication' and assuring that the learning curve presented is never too steep. Shakespeare echoes Neurath's axiom that 'to remember simplified facts is better than to forget accurate figures'.

Learning material continues to be produced by OU academics working with designers. Shakespeare emphasised the importance of the transformation induction process to newly recruited academics, stating that previously professors had used knowledge to distance themselves from their audience. Transformation of textual material involves exposing the skeleton of the information, and applying it to a systematic hierarchic structure. Page layouts are developed based on popular magazine-style flexible grids, consisting of (strictly) no more than 2000 words per section, with a linear structure, colour images and text inset in boxes to create variety. Clear, simply numbered headings are used with an accessible 'buffet' style menu so that learners can quickly scan the information and select the parts they wish to concentrate on.

Shakespeare believes that the place of educational transforming at the start of the 21st century is based on the role of the transformer as facilitator, orchestrator, interpreter and navigator of knowledge – retaining the position of 'trustee of the people', protecting the position of the distance learner and giving them greater access to knowledge by reaching out through practice based learning.[669] As fees for full-time university students continue to rise, practice-based learning should become a more viable alternative to traditional higher education and the importance of transformation will become increasingly evident.[670]

In 1976, Michael Macdonald-Ross and Rob Waller put forward the notion of establishing professional training for transformers, but the UK university system at that time did not promote a broad enough educational framework to support a course which combined academic, pedagogical and visualisation skills, and no formal training existed.[671] Currently, postgraduate courses on science communication exist for those wishing to work in print, broadcast, new media journalism, public relations and exhibition and design, which could in theory fulfil the need for professional transformers in the sciences.[672]

669 The lecture can be found on http://stadium.open.ac.uk/stadia/index.php?s=1&option=past.

670 Other universities are also exploring the role of the educational transformer. The London School of Hygiene and Tropical Medicine recently advertised for an 'Instructional Designer/Learning technologist' to work with academics to produce distance learning materials.

671 Macdonald-Ross & Waller, 'The Transformer' (1976).

672 An example is 'Science Communication, Translation and Languages', an MSc in Science Communication run by Imperial College London.

Other examples of contemporary transformation

> Visual SenseMaking is the activity of making sense of ambiguous complex situations through visual methods and tools including words, images, drawings, diagrams, charts graphs, etc. This involves not only visual thinking, but creating visual ordering systems.[673]

G.K. Platter and Elizabeth Pastor's[674] New York based business 'Humantific' helps the business sector to solve problems through visualisation. The company list Isotype as one of the main inspirations behind their work, specifically because they consider that it brings clarity to a world overloaded with data, and that the role of the transformer can act as a guide to defining what is important. Currently in USA 'transformation design' is an emerging business, described as 'a hybrid of business consulting and industrial design'. Platter and Pastor interact with their clients by drawing simple diagrammatic images on large white display pads (which bear some similarity to M. Neurath's 'transformations'). They are both trained designers and consider that visualising problems through diagrammatic means can offer solutions on how to solve them through more traditional business driven techniques.[675]

> The Isotype team was a forerunner of an interdisciplinary design agency. Academic specialists consulted on raw data to be turned into statistical graphics with the help of cartographers, artists and technicians; but central in this process was a figure named the 'transformer', a prototype of the modern information designer, who took raw information and edited it into draft visual form.[676]

There is also evidence that transformation in a much wider sense is also being used in the UK by interdisciplinary groups including graphic designers who take on projects with a broad social base with the aim of strengthening the ways that information designers can work within communities to solve social problems, often challenging the more traditional role of

673 www.humantific.com.

674 'For 21st century organizations creating paths through continuously changing complexity requires a different set of capabilities and tools than those from previous eras. Organizational leders working with Humantific recognize that before change happens, new seeing has to happen, new understanding has to happen, new thinking has to happen. In this context of complexity there is rising awareness that SenseMaking is the 21st century FUEL for organizational innovation. SenseMaking is making the strange familiar. In an organizational context SenseMaking is the strategic activity of making sense of ambiguous complex situations. At Humantific, we do this using visual methods and tools, including words, images, drawings, diagrams, charts. This involves not only visual thinking, but creating visual ordering systems. ChangeMaking is making the familiar change. In an organizational context ChangeMaking is the strategic activity of moving from an existing state to a co-created future state. At Humantific, we do this using hybrid methods from the emerging/converging fields of design thinking, innovation acceleration and transformation science. While every innovation cycle requires both SenseMaking and ChangeMaking the big news is that the proportions of one to the other are radically changing as challenges become more complex. On large scale innovation challenges there is often a significant degree of SenseMaking that has to be undertaken before ChangeMaking can begin. This paradigm shift is radically transforming how organizations are gearing up to overcome the Complexity Navigation Crisis and get ready for change'. Elizabeth Pastor DD4D (Data Designed for Decision-making) Paris, June 2009. In conversation, Elizabeth Pastor admitted an awareness of the principles of Isotype. At the time of writing (November 2012) Humantific are running a design competition based on trying to find a 'new' Isotype for the 21st century: http://www.humantific.com/out-of-balance-competition-launches/.

675 See http://www.time.com/time/magazine/article/0,9171,1736729,00.html#ixzz18lNBrORK.

676 Chris Burke, abstract 'Isotype Revisited', DD4D Paris 2009.

the designer. An example of this was the Design Council initiative 'RED'. Although there is no evidence that RED's work is based on Neurath's transformer, it does draw from Humantific's example and many of the principles concerning the translation of complex information into a form where it is easily accessible to an audience, and the dissemination of social information follows through.[677]

Nigel Holmes of Explanation Graphics
Evidence of the principles of graphic argument

Nigel Holmes is generous in his praise of Neurath's 'statistical accountancy', which he considers to be the real legacy of the principles of Isotype, and the 'warmth and humanity' of Arntz's drawing style. An examination of the evolution of his methods of graphic argument from the 1970s onwards has shown a gradual assimilation of many of the principles of Isotype into his work for Explanation Graphics. Holmes' more recent work is largely concerned with education and social knowledge. He is passionate about 'Information literacy' – visually explaining what numbers really stand for, and explaining social issues to a general audience in simple terms.[678] Holmes is a natural transformer, which is evident throughout his work. He has also adopted several of the other methodological principles, including arranging repeated symbols to show comparative information, and ordering information to allow its significance to become visually evident. In addition, by comparing Holmes' later work with examples of M. Neurath's earlier educational publishing work, there is sound evidence of Holmes' adoption and adaptation of the integrated picture-text principle, reinvented for a new audience, although he never mentions the Isotype Institute's post-war work.

The inclusion of pre-war Isotype graphic and operational principles in Holmes' methods of graphic argument has been evident since the late 1990s.[679] After leaving *Time* and founding Explanation Graphics, he had the freedom to develop his methods of graphic argument, which evolved into a simplified, pared-down way of working. It is obvious that he is greatly influenced by the simplicity and warmth found in Arntz's symbols, which Holmes uses to prevent computer artwork appearing mechanical as he translates drawing into artwork.

677 See 'RED paper 02 Transformation design' http://www.designcouncil.info/mt/RED/transformationdesign/TransformationDesignFinalDraft.pdf.

678 Nigel Holmes on information Design, pp. 89-92

679 *Drawing to Explain* was published in 1998, *Understanding USA* in 1999 and 'Pictograms: A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)', *Information Design Journal* in 2001. All show sound evidence of the graphic and operational principles of Isotype.

Holmes has managed to combine all roles of the transformation process, from subject expert though to artworker, by virtue of his ability to write, draw and use the computer. Thanks to the internet, he is able to become the subject expert, transform data into design and editorial and seamlessly produce electronic artwork using his existing lexicon of symbols stored on his computer, which he updates and re-uses. In many respects, Holmes' use of the computer as a means of symbol storage could be regarded as an electronic version of the Isotype symbol dictionary[680] with its pages of pasted-up symbols and corresponding lino-cut artwork. This collection of symbols could be considered as Holmes' attempt at creating a universal language, but in contrast, it actually forms the biggest fundamental difference between Holmes' and Neurath's ideas – Holmes celebrates cultural diversity and deplores homogenisation, stating that the only valid place for universal language is in the wayfinding systems found in airports; Neurath's aim with Isotype was the creation of an International Picture Language.

Like Neurath, Holmes wants his audience to grasp the idea behind the chart first and then see the detail at second glance. He admits that if you don't deliver the whole message behind the chart succinctly, it is simply illustration. This is in stark contrast to Tufte's notion of graphic argument; as he considers that information should be 'envisioned', or raised above the minimum levels of comprehension. Kinross (when reviewing Tufte's *Envisioning Information*) claimed that Tufte's arguments 'counter the reductionist, blindly positivist assumptions that have informed much information design work'.[681] This is another instance which illustrates the extreme difference between Neurath's and Tufte's approaches to graphic argument – simplicity versus complexity. Holmes aligns himself with Neurath's methodology.

Again, the use of metaphor needs to be considered; Holmes uses metaphor (often combined with humour) in his method of graphic argument. The metaphor, (as an invention) is against the physicalist basis of Isotype, but Holmes sees it as a humanising factor, to contextualise facts, and promote understanding – allowing the audience to engage with the subject matter. In contrast Tufte considers that the combination of humour and metaphor trivialises data.

Holmes cited Isotype as a strong historical influence on information design in the introductions of his 'Designer's Guide' books on diagrams, maps and pictorial symbols published during the 1980s and 90s. He has adapted Neurath's principles of graphic argument to fit a new, more sophisticated audience, combining them with other graphic conventions, but fundamentally, at the very basis of Holmes' work is his desire to explain, inform and educate, and a firm belief in the fact that the legacy of Isotype lies in statistical accountability.

680 IC 4/1, 4/2, 4/3 (from Vienna) and & 4/4 (from The Hague).

681 Robin Kinross, 'Richness against Flatness: Edward Tufte's 'Envisioning Information" (Review article), *Information Design Journal*, 6: 3 (1991), 221-28.

The wider legacy of graphic argument

This section reviews significant examples of contemporary graphic argument with the intention of seeking implicit evidence of Neurath's principles and pin-pointing the criteria that will expose evidence of their legacy in charts and diagrams.

When Neurath developed the Isotype system, diagrammatic methods for producing graphic argument were almost as extensive as they are today.[682] The work of Playfair, Descartes and other early pioneers of charting techniques were readily available in the books Neurath grew up with in his father's library and other examples could be found in charts showing battles and popular almanacs with colourful pictorial statistics.[683] The principle of repeating symbols to indicate magnitude was not new, but the development of a comprehensive system based on pictorial statistics, underpinned by philosophical, methodological and operational principles was new – making the use of repeated symbols both logical and meaningful.

The practice of designers paying homage to Isotype' is omnipresent. Holmes is aware of it, and tries to avoid it. Ubiquitous 'rows of little figures' have become an overused part of the designer's graphic toolkit – one of many charting conventions. The use of repeated symbols has demonstrated how easy it is for graphic designers to incorporate elements of the graphic and operational principles of Isotype into their work, and since the 1930s, this principle has been copied extensively, from Modley's 'Pictograph Corporation' in the US to the 'Pictorial Charts Publishing Company of London and Leicester'.[684] The City of Manchester Annual report designers during the 1950s would not even admit that they were plagiarising Isotype.[685] Homage to Isotype can even be found in the current Vienna Wirtshaftsmuseum Yearbook.[686] **(Fig. 96)**

The principle of using repeated same size symbols rather than increasing size to show magnitude prevents comparisons being made between the Isotype principles of graphic argument and Hans Rosling's 'Gapminder'. Philosophically, there are a great many similarities between Rosling and Neurath; both are concerned with explaining social facts to a general audience through statistics, but their techniques and underlying principles for doing so differ widely.[687]

682 Examples can be seen in Neurath, Eve & Burke (eds) *From Hieroglyphics to Isotype: A Visual Autobiography*.

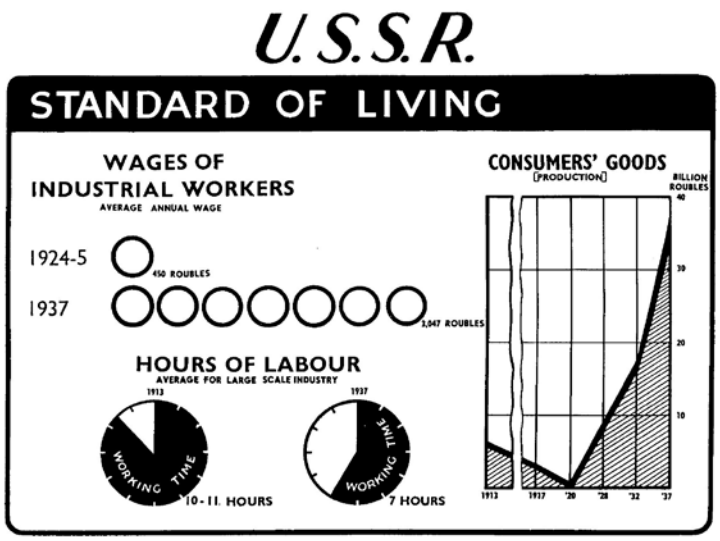
683 Dalbello M., & Spoerri A., (2006) 'Statistical Presentations from Popular Texts for the Ordinary Citizen, 1889–1914', *Library and Information Science Research*, 28, (2006), 83-109.

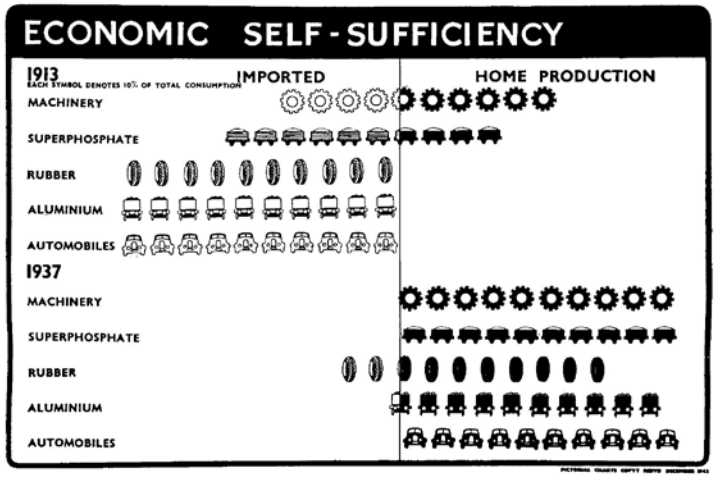
684 Examples of these charts can be found in the IC 10.2.

685 This report and correspondence surrounding the arguments between what constituted Isotype and what did not, can be found in the Isotype Collection IC 10.2.

686 Josef Docekal, Dietmar Lasinger & Gerhard Halusa, (compilation) *Survey of the Austrian Economy 2009–2010 (*Austria: Wirtschaftsmuseum, 2010), p. 11 & p. 41. It could be said that the Wirtschaftsmuseum forms the living legacy of the G&W, being based in the same location with a similar (much updated) social remit.

687 Yuri Englehart and Raul Niño Zambrano presented the paper 'Engaging Citizens with Animated Statistics' at the OECD in Paris for the conference DD4D in June 2009. They discussed the similarities between Neurath and Rosling's animated work and drew comparisons between their usage of animated statistics as a tool for social education. 'Current trends in data visualization share the spirit of Neurath's work, with regard to ideas about data accessibility, the empowerment that this access may produce and the assumed benefits of using visuals', See www.dd4d.net.







(Fig. 96)
top and centre, 'Sham' Isotype Pictorial Charts Publishing Company of London and Leicester' (1937).

below, Survey of the Austrian Economy 2009–2010 from the recent *Wirtshaftsmuseum Yearbook*.

To date, no other such well-publicised comprehensive graphic system (with social remits) has come to light. There have been no other radical new charting conventions, only modes of adapting and expressing existing methods of graphic argument through electronic means. A comparison of Lockwoods' 1969 *Diagrams* book and the 1979 *Graphis Diagrams: The Graphic Visualisation of Abstract Data* [688] shows how charts became more colourful and adventurous over a ten-year period. When Holmes protested against the over-elaborate presentation of charts at *Time* in 1996, computer software was giving designers the freedom to manipulate images and create three-dimensional effects with relative ease. Moving forward to 2008, the charts and diagrams seen in *Data Flow* and *Data Flow 2* indicate how charting has become highly sophisticated and turned into an art form. **(Fig. 97)**

> Within just a few years, the once unglamorous task of giving form to abstract data has become a favorite [sic] among designers.[689]

But if Neurath's principle of understanding the essence of the graphic argument at first glance, more detail at second glance, and the full picture at third glance (nothing more) is applied, then the majority of these charts do not conform to Isotype principles of graphic argument. The *Data Flow* books show designers attempting to manage vast amounts of information using a seemingly endless array of three-dimensional graphic tricks and techniques. But at first glance, much of the content remains a mystery.[690] These charts form the diametric opposite to Isotype charts. They are attempting to make statements about the data, but often ignoring the story behind it, and in many respects all they do is confuse. In Tufte's terms, information is 'envisioned', and the minimum level of information is raised. The following quotation from *Data Flow* attempts to justify the methodology behind the charts. It is clearly not akin to Neurath, philosophically:

> 'Simplexity – design is not just about making things simple. In fact, there is a complementary relationship between simplicity and complexity that influences design choices to produce surprising and informative data diagrams. By shaping their view on data, designers can choose to introduce a high level of complexity that allows just the right amount of contrast to drive profile, focus and definition. The choices determining

688 Arthur Lockwood, *Diagrams: A Visual Survey of Graphs, Maps, Charts and Diagrams for the Graphic Designer* (London: Studio Vista, New York: Watson-Guptill, 1969) and Walter Herdeg, (ed), *Graphis Diagrams: The Graphic Visualisation of Abstract Data* (Zurich: The Graphis Press, 1979).

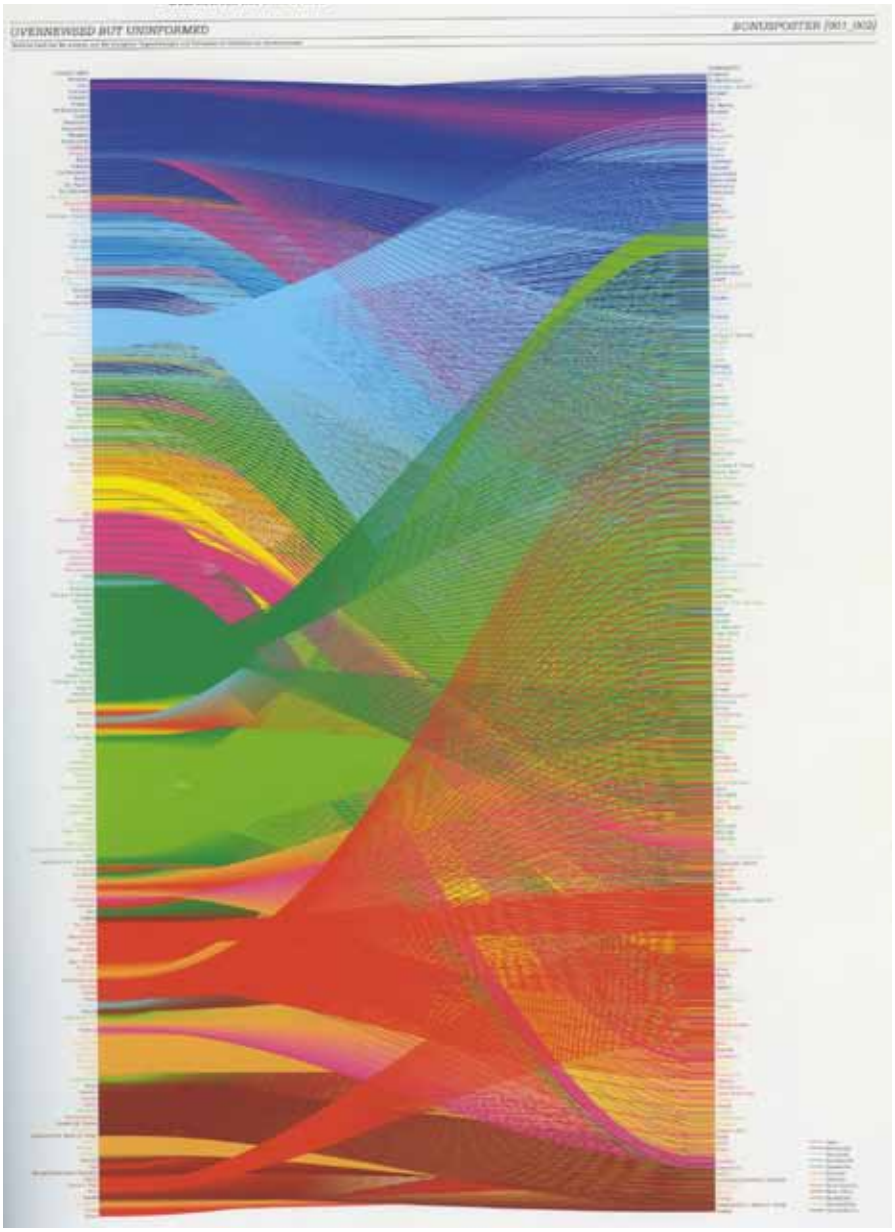
689 Robert Klanten, Sven Ehmann, Nicolas Bourquin & Thibaud Tissot, (eds.) *Data Flow 2: Visualizing Information in Graphic Design 2* (Berlin: Gestalten 2010), p. 6.

690 Per Mollerup (Swinburne University of Technology, Melbourne) is against this over-elaboration of data, and wants to see a return to 'functional simplicity': 'In a world progressively suffering from information overload, simplicity in information design becomes a quality of increasing relevance. Simplicity in visual data presentations creates clarity that facilitates good decision-making'. Mollerup thinks that over-elaborate presentations waste peoples' time, create misunderstandings and leave charts open to guesswork. On the other hand, functional simplicity leds to improved usability and utility of information, more understanding with less reading, which leds to more effective and more efficient decision-making. 'Functional simplicity in information design goes beyond raw reduction of data presentations. It involves size, variation/repetition and structure. All three dimensions of simplicity influence the amount of redundancy that creates the delicate balance between necessity and superfluity, between understanding and boredom. The measure of redundancy that is both necessary and sufficient should be determined with a view to the context and the expected culture of the intended target groups'. Taken from an abstract to the paper 'Domesticating Data' at DD4D, Paris, 2009.

> this delicate balance – called simplexity – are highly dependent on the context and audience for the resulting data presentation.[691]

Cybu Richli attempts to redress the balance, answering concerns of over-complexity of data presentation:

> Abstract and reduced visualisation can easily put distance between the viewer and the subject. Although aesthetics are taking on an increasingly important role, we must always ensure that visualisations make things easier to understand. This is the big challenge facing information designers today.[692]



(Fig. 97)
'Overnewsed but Uninformed', designed by Stefan Bräutigan, *Data Flow* Gestalten, (2006).

691 Robert Klanten, Nicolas Bourquin, Thibaud Tissot & Sven Ehmann, (eds.) *Data Flow: Visualizing Information in Graphic Design*. (Berlin: Gestalten, 2008), pp. 7-8.
692 Interview with Cybu Richli, *Data Flow*, p. 185.

Data Flow is designed for a sophisticated audience of designers, and in almost every respect, the tools used to construct the charts have overshadowed the information. In deciding how best to manage extensive amounts of data in these charts, designers have veered towards complexity over simplicity.[693]

Evidence of designers using Isotype principles of graphic argument in a responsible way can be found in the work of US designer Alice Cheng, who incorporated repeated symbols and elements from the graphic language and graphic argument of Isotype into her charts, in a socially responsible context. Diagrams showing fatalities in Iraq are a testimony to this. **(Fig. 98)** They comply with some of Neurath's principles of graphic argument in hierarchical ordering of information, educational and socially responsible aspirations – yet the diagrams still appear highly complex, the content is not immediately obvious and requires a great deal of scrutiny before the full picture emerges.

> For the past six years we've done an infographic for the op-ed page of *The New York Times* depicting the number of military and civilian fatalities in Iraq and now Afghanistan. Initially limited to the first two weeks of the year the data now includes the entire month of January and uses icons to represent a one-to-one ratio for each individual. Inspired by the visual language of Otto Neurath, icons represent each type of military fatality and cause of death and are organized chronologically […] it's rare one feels a sense of public service doing graphic design. We felt it here.'[694]

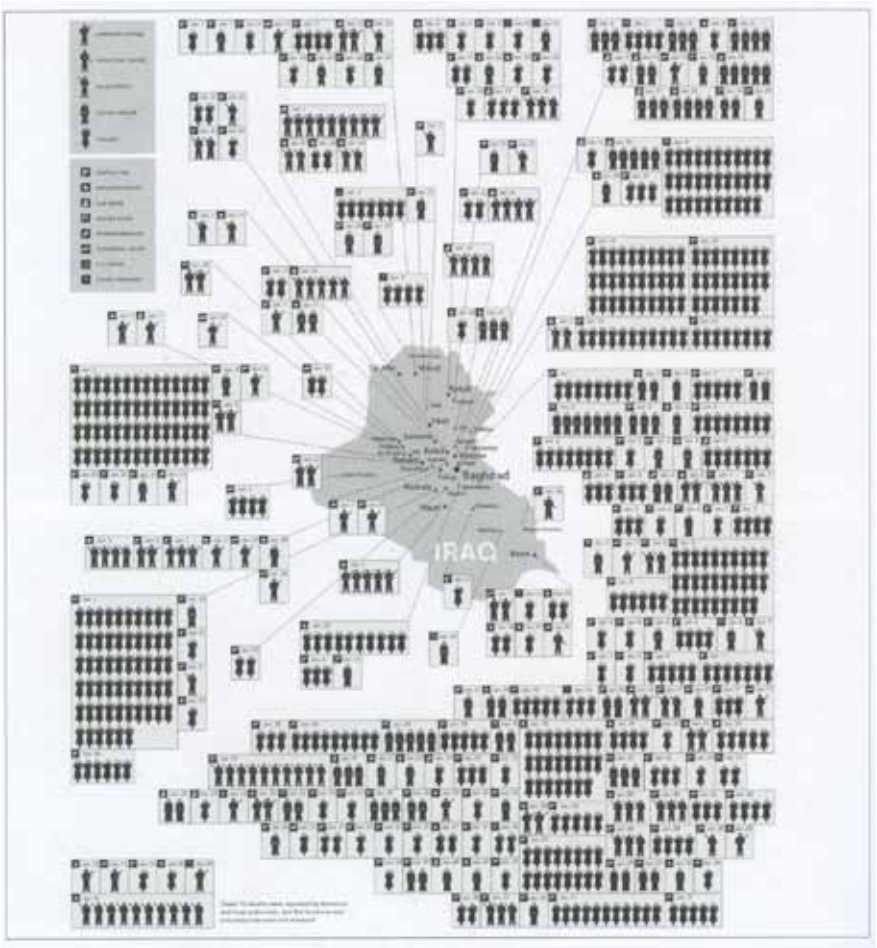
The theory behind the Isotype principles of graphic argument can often be misunderstood. In Cyprus in 2010, Maaike van Neck, Maria da Gandra and Madeleine Moret [695] discussed Neurath's ideas on logical positivism, alongside their own ideas on post-positivism in information design. To illustrate their theoretical work, they presented a diagram based on conflict in the Middle East, using the technique of triangulation.[696] Sides of a triangle were used to measure the degree of conflict in each of three Middle East nations over many months. This plainly stated, factual information complies with positivist principles, accurately showing the extent of military activity from the three nations on a month-to-month basis. The monthly diagrams were then arranged together in consecutive order. But changes in data month on month were slight, so no story emerged, and the overall image presented little more than a wallpaper-like backdrop.

693 David McCandless, *Information is Beautiful* (London: Collins, 2009). In some respects, this book seeks to redress the balance of complexity over simplicity, but the resulting set of trivial diagrams, although in the main obvious at first glance, can only be regarded as frivolous.

694 Alice Cheng on information design. www.mgmtdesign.com/work.html?id=1,11,29.

695 'Fog & conflict: A post-positivist approach to information design', Lending Grace to Language Conference, 4th International Conference on Typography and Visual Communication Department of Design and Multimedia, University of Nicosia, Cyprus 15-19 June 2010.

696 Use of multiple measures and observations.



(Fig. 98)
'31 Days in Iraq', designed by Alice Cheung (2006).

This project was based on the idea that socially constructed information is political and biased and that the design process can add bias. Van Neck et al's charts were unbiased and rigorously constructed, adhering to positivist principles, but leave the audience unable to draw succinct conclusions without intense scrutiny. The resulting diagrams were more akin to Tufte's modus operandi. All facts are presented, and it is up to the viewer to 'envision' the information.

One wonders how diagrams from *Data Flow*, Cheung and van Neck et al would have appeared had a transformer been involved in portraying the story behind the facts. The difference between these charts and Isotype charts lies in the transformation of the initial information. The 'Trustee of the people' decided which facts most accurately gave the best overall summation and constructed the charts with this in mind. In effect they were responsibly suggesting how the audience should interpret information. This could be considered as adding bias (an accusation directed at Neurath's work by Chizlett). In such an instance, the transformer's integrity had to be impeccable to avoid bias. Tufte and van Neck et al. prefer to present the information pragmatically (in van Neck et al's case faithfully, according to positivist theory). It is true that far more complex facts can be obtained from this information, but it is arguable whether it invites further exploration.

The legacy of the principles of graphic argument lies in the presentation of simple, straightforward information, which only appears this way because the transformer has made it so. However, the way in which contemporary audiences view examples of Isotype does not always allow for such simple messages to shine through, without the underlying peripheral historical messages signalling a bygone era. Brian Mills in 1987 accurately summed this up when discussing the impact of Isotype in the context of Adprint books:

> It must be admitted, however, that to a present-day audience, accustomed to a constant bombardment of sophisticated media graphics, Isotype's designs can appear static and redundant […] Our modern global village, illuminated by a technology only barely imagined by Neurath and his team, no longer demands the sort of printed quantitative information which Isotype was at such pains to provide.[697]

Otl Aicher's Olympic 1972 pictograms
Evidence of the principles of graphic language

> Aicher has done more than any other designer towards the development of a comprehensive internationally understood set of symbols.[698]

Aicher's Olympic pictograms form the culmination of a body of work from international designers and communicators that can be traced back through to the early 1960s and could be said to have their basis in elementary work on signs and symbols produced for the Preparatory Survey for a Study of Communication through Graphic Symbols from 1956–60 by M. Neurath, Modley, Dreyfuss and Krampen. In the early 1960s, little attention was paid to the design of public signing systems; it was an area of work considered to be of little economic or political importance (the exception being the design of road signs). The body of work that sprung from the Preparatory Survey, combined with improving economic conditions, changed that. The legacy of the Preparatory Survey has been shown to be far-reaching and led to an extensive body of research and writing on signs and symbols from Modley, Dreyfuss, Krampen and Aicher.

Krampen's input into the Preparatory Survey was particularly relevant, as he provided the link between Isotype and Aicher. Increased activity in the field of international graphic language during the 1960s and early 1970s was set against a backdrop of an increasing awareness of internationalism borne through idealism and affluence. Attempts at language-independent communication during this time led to designers realising that the way forward was through pictograms, and in response Neurath's ready-made system was promoted during the mid 1960s by Modley, Dreyfuss and Krampen as a basis for future work. Like Neurath, Aicher and his contemporaries who were engaged in work of this nature believed that 'communication

697 Brian Mills, 'Designed and produced by… Some notes on the Story of Adprint' *Antiquarian Book Monthly Review*, 13 (1986), 368-373.
698 Ian McLaren, 'Otl Aicher: A Practical Utopian' *Baseline Magazine*, 26 (1998), 40.

shaped society, and visual communication directed social behaviour and action'.[699] It could hardly be said that Aicher's pictograms visually resemble Isotype, but if Katsumi's Tokyo pictograms are seen as the interim stage, then the visual similarities are more obvious. Otherwise, it is a large step from Arntz's humanistic lino-cut artwork to the geometric precision of Aicher's pictograms. **(Fig 95)** Aicher's pictograms, based on sound research (sometimes in collaboration with Krampen), psychology, semantics and visual perception led to the Munich symbols achieving a degree of neutrality and abstraction. This allowed them to function in an international context, standardised by virtue of the rigid grid which gave them the flexibility to be constantly adapted, embodying Aicher's maxim 'unity in variety'.

The legacy of Aicher's graphic language

Perhaps the most important point about Aicher's Olympic pictograms is that they formed the basis of an attempt at a truly *international* pictographic system, which in turn has influenced other wider systems of public signing, including the majority of other four-yearly Olympic concepts – which used Aicher's work as a basis to overlay nationalistic layers. No other set of Olympic pictograms has got as close to achieving the apparent cultural neutrality of Aicher's, and cultural specificity has now superseded attempts at cultural neutrality in an Olympic context.

Through the involvement of ERCO, Aicher's original 21 sports pictograms have multiplied into a system containing thousands of pictograms based on a variety of subjects and language-independent uses, licensed for international use. They can feasibly be viewed as a modern day equivalent of Isotype – the ultimate universal language. The ERCO 'Piktogramme' system is flexible enough for adaptations to be made, thanks to the underlying grid and geometric regulations for its use. **(Fig. 93)** New symbols can be created by other designers that fit seamlessly into the set. The Piktogramme system can function without words, which is where it differs from Isotype, but can be qualified by words if necessary.[700] ERCO's licensing of Aicher's original pictograms[701] have enabled them to achieve Lupton's 'semiotic climax' of contemporary international picture language. [702] The Piktogramme system is constantly expanded and adapted to fit new international markets and changes in technology, but due to its simplicity and geometric construction remains as culturally neutral as it is possible to achieve.

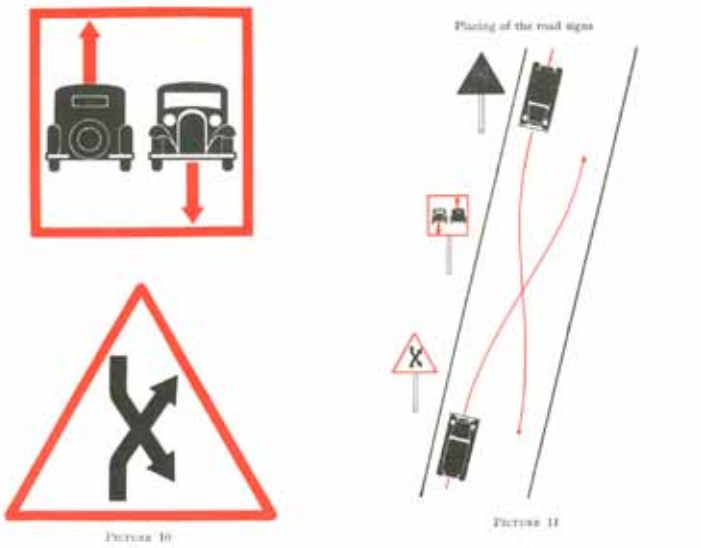
The wider legacy of graphic language

> ISOTYPE's impact on contemporary information design is evident in the abundant application of internationally recognized icons. While Neurath's utopian vision for a

699 Rathgeb, *Otl Aicher*, p. 114.
700 Aicher considered that text and arrows formed secondary elements to be added to the pictograms if required. Rathgeb, *Otl Aicher*, p. 107.
701 The copyright of the pictograms was originally equally split between Gerhard Joksch and Otl Aicher.
702 '…the semiotic climax of international pictures: a geometric body alphabet is deployed on a consistent grid…' Lupton, *Design Writing Research: Writing on Graphic Design*, p. 43.

> universally adopted language never came to complete fruition, many of the symbols that we see in airports, museums, and public transport have their origins in this idea.[703]
>
> The influence continues to be felt today in such things as road signs and international symbols on office equipment and machinery.[704]
>
> The fundamental principles of road safety signs remain largely unchanged from Neurath's version.[705]

It would appear that designers consider the legacy of Isotype principles of graphic language lies in the design of public information symbols. *International Picture Language* (1936) shows illustrations of how Neurath envisaged signs 'where the rule to keep to the right is changed into the rule to keep to the left'.[706] **(Fig. 99)** It could be said that these signs bear some similarity to contemporary British road signs, but, as Margaret Calvert states, Isotype did not form the inspiration behind them.[707] Nigel Holmes has suggested that Paul Mijksenaar referenced Isotype for his airport signage,[708] which he discussed in his 1997 book *Visual Function: An Introduction to Information Design:*



(Fig. 99)
Neurath's ideas for road signs *International Picture Language*, (1936).

703 Jenn O'Grady & Ken O'Grady, *The Information Design Handbook*, 2008), pp. 34-35.
704 Eric K. Meyer, *Designing Infographics* (USA: Hayden Books, 1997), p. 16.
705 David Crow, *Left to Right: The Cultural Shift from Words to Pictures* (Switzerland: Ava Publishing, 2006), p. 74.
706 Neurath, *International Picture Language*, p. 37.
707 Kinross includes a page in *The Transformer* on the Kinneir Calvert design for UK road signs (1957–67), in which he discusses the wider influence of the principles of Isotype. However, in conversation with Margaret Calvert (14. 9.11) she states that there was no intended connection with Isotype, either with the design of the system or the figurative pictograms, particularly in relation to the triangular warning signs for deer and horses, which were based on Eadweard Muybridge's photographic recordings of animals in movement. Calvert also stated that the use of geometric shapes for classification was taken from the Geneva Protocol on Road Signs and Signals of 1949.
708 Paul Mijksenaar designed the signage systems for JFK and Schiphol Airports and recently was involved in designing an updated system for Frankfurt Airport.

> The Isotype method may very well become one of the factors that will help to bring about a civilisation where all people share a common culture and where the gulf between educated and uneducated will be bridged.[709]

Mijksenaar's work is in a similar vein to the ERCO Piktogramme system, as are systems for Deutsche Bahn AG (German Railways), Berlin Transport Services Berliner Verkehrsbetriebe (BVG), Düsseldorf Airport, Zurich Airport and Swiss Post,[710] all of which attempt to attain cultural neutrality and a similar degree of abstraction to that found in Aicher's pictograms.

Since the 1960s, designers have experimented with combinations of pictograms with or without words to try to achieve better international communication. Isotype was designed to work with both word and image as an integral system (although the image always 'helped' the word): 'All pictures are part of a unit: they are using the same language'.[711] The ERCO Piktogramme system is designed to stand alone and be accessible without words, but can work with words as a secondary qualifying element. In 1965, Masaru Katsumi was concerned with how international signing systems would function when world writing systems were so different. He favoured a 'step-by-step' approach, with trials of international writing systems running in parallel until one world-wide system could finally emerge:

> But I think we should not expect to be settled on an international system at once. We should be satisfied for a while to adopt two or three international systems parallely, [sic] and to increase the same symbols gradually, and, at last, to perfect a complete international system.[712]

In 1998, Paul Arthur (the Canadian wayfinding designer who had used Isotype-inspired pictograms for the signing system for Expo '67 in Montreal) developed his own standardised international pictographic language – the 'Picto'grapficSystems'. He found that the effectiveness of purely visual communication had many limitations, and was later forced to modify his Canadian National Standard Z321 to include type. During the 1980s and 90s, Arthur had designed wayfinding systems for the Canadian Electrical Association (CEA) and Parks Canada.[713] Through these experiences, and in collaboration with wayfinding and testing experts, he became increasingly aware of the need for an international standardised language for use in wayfinding systems. He established pictographic standards nationally (the Canadian National Standard, Z321), and 'Picto'grapficSystems' (developed in 1998)[714] was sold to

709 Mijksenaar, *Visual Function: An Introduction to Information Design* (New York: Princeton Architectural Press (1997) p. 30, quoting Neurath (1940) from *De Moderne Mensch Ontstaat: Een Reportage van Vreugde en Vrees.* Mijksenaar is also a contributor to Annink & Bruinsma, *Lovely Language: Words Divide, Images Unite*.

710 See Rayan Abdullah & Roger Hübner, *Pictograms, Icons & Signs: A Guide to Information Graphics* (London: Thames & Hudson, 2006).

711 Neurath, *International Picture Language*, p. 28.

712 Masaru Katsumi, 'On Problems of International Symbology' (speech made at Vision 65 Conference Southern Illinois University, 21 October 1965), p. 4, Icograda Archive SS67/3.

713 See Large, 'Communication Among All People, Everywhere', 86.

714 This system probably developed from 'Picto'grapfics', mentioned in *Handbook of Pictorial Symbols*, copyright Paul Arthur of VisuCom Ltd., Toronto.

national parks in the US, and made available for worldwide use.[715] (It is not known whether 'Picto'grapficSystems' is still in use).

Arthur found that his images did not communicate without words. However, he established the way forward by stating that if words were simple they could give context to the image. He did not believe that a pictograph alone could solve the problem of mis-communication.

> We found that the standard wasn't being used because those pictures weren't worth a thousand words… there are in fact, very few pictographic images that can stand on their own and be recognised by 67–75 percent of people. The ones that can are toilets, telephones, and certain things to do with food. There is only about 20–25. We have text signs which are entirely text, signs with text and symbols, and a very few with no text at all. The "no smoking" sign and the "no entry" sign need no words. The need for text does not mean that the whole idea of using pictographs to get around the idea of illiteracy is self-defeating. First the words must be simple, grade 6 level. Then the context will help you.[716]

Isotype was designed as a 'helping language'; images enhanced the meaning of words, rather than images being made more comprehensible by the addition of words. Although, it must be said that in Isotype both words and image combined to form a unified statement, and when it came to language dependent communication, images were able to reveal vital clues. Neurath knew that pictures alone could not get the full message across:

> What we have to do with here, however, is a picture language which is not able to give the story by itself, but only with the help of the words of a normal language.[717]

Arthur also realised that the idea of an international pictographic language without words posed a highly complex problem that could not be solved by the designer alone. He considered that technology democratised design, by giving common universal access, but that multi-cultural trends made the construction of a universal language difficult to achieve.[718]

[715] Arthur designed a development and testing process to produce universal signs, by first establishing hazards, and then creating image content descriptors. The resulting symbols were tested on sixteen hundred people before publication. Arthur stated that he found it almost impossible to create a gender-neutral figure for these symbols – Arthur's pictographic people do not have the humanity of Isotype, and bear some resemblance to Neurath's original pre-Arntz 1925 symbols with circles for heads. Although Canadian National Standard Z321 was adopted in 1977, modified in 1994, and further modified with the addition of text in 1996, Arthur found that the effectiveness of purely visual communication had many limitations. On Krampen's suggestion (Krampen was a consultant for Expo '67 in Montreal), Arthur made extensive use of pictograms and cited Masaru Katsumi's 1964 Olympic symbols as a precedent for his work. Examples of Paul Arthur's work can be seen at http://www.ccca.ca/designers/work_detail.html?languagePref=en&mkey=58423&title=Paul+Arthur+and+Associates+self-promotional+brochure%2C+%5Bp.+15%5D&designer=Paul+Arthur+&link_id=5216.

[716] Large, 'Communication Among All People, Everywhere: Paul Arthur and the Maturing of Design', 89. It would also be fair to say that the road signs and symbols related to international travel could be added to this list of recognisable signs.

[717] Neurath, *International Picture Language* p. 16.

[718] Large, 'Communication Among All People, Everywhere: Paul Arthur and the Maturing of Design', 90.

Modley's comment towards the end of his life warned against the exclusive use of pictograms because of a lack of universal understanding, and suggested caution and care if all language was to be omitted. This again reinforces the efficacy of Isotype as a system that has achieved a balance between word and image:

> In sum, there are limitations on the use of pictographic symbols. The best proof of this is that our successful, permanent and universal symbols are almost exclusively "arbitrary" symbols whose meaning is accepted by convention, this shouldn't keep us from using pictographic symbols where they have clear advantages. It should teach us to be careful in their use.[719]

The First International Standard on Public Information Symbols IS0 7001[720]

During the 1970s Icograda tried hard to draw attention to the confusion caused by the lack of international standardisation in public signage. They had hoped that a specialised inter-governmental United Nations agency would be formed to look into the problem:

> Our overpopulated, machine-laden, labyrinthine society is in danger of being set irretrievably to an accompaniment of bad *musique concrete* made of arbitrarily discordant signs. Without them you may lose your way.[721]

This was not to be, but in 1973 the first international standard 'Public Information Symbols' ISO 7001[722] appeared. It was restricted to signs with verbal image content, based on the results of psychological testing for 'appropriateness', 'ranking', 'recognition' and 'matching'. Symbols which represented international, cultural and technological differences were omitted from the standard, as research was insufficient in those areas. 1SO 7001 covered 13 areas, dealing with standard image contents, functions and fields of application. Some are based on research by Martin Krampen from the late 1960s.

> ISO 7001:2007, Graphical symbols – Public information symbols, provides a method of communicating public information through a collection of symbols designed for use in buildings and other places, and for services used by the public, regardless of country or culture […] ISO 7001:2007 is intended to be used by all ISO technical committees which require information symbols in their industry for communicating to the public and, with its associated standard on safety signs (ISO 7010), is intended to ensure that there is one internationally used symbol for each message. [723]

719 Modley, 'Isotype in the USA' *Icographic*, 10 (1976), 19.
720 Peter Simlinger, 'Designing Public Information Symbols' *Information Design Journal*, 1 (1980), 182-190.
721 Peter Kneebone, guest editor of special ICOGRADA *Print* magazine 1969 issue devoted to signs and symbols as quoted in Peter Simlinger, 'Designing Public Information Symbols' *Information Design Journal*, 1 (1980), 182-190.
722 Simlinger, 'Designing Public Information Symbols', p. 182.
723 Published by ISO. See www.iso.org/iso/home.htm

The standard aimed to present information to the general public in the most concise manner possible. ISO 7001 is updated periodically to include more signs. It currently covers 79 public information symbols for public facilities, transport, tourism, culture and heritage, sporting activities, commercial facilities and public behaviour (excluding public safety). Emphasis is placed on accessibility. ISO signs are designed to work without type, which could be seen as a barrier, and make the sign language-dependent.

A salutary reminder of the relative effectiveness of these symbols suggested that the application of testing procedures did not guarantee positive results, which depended on the competence of the participating designers, initial contributions and creative response to results of investigations, careful execution of tests and the sensitive evaluation of results.[724] Even now, standardisation is dependent on the integrity of the panel of designers testing the symbols, and the quality of symbols put forward to be tested. A set of standardised, culturally significant symbols is still almost impossible to achieve, but one based on lesser factors common to all (such as transport) is much easier to translate into a standardised common experience.

The simplicity of the graphic language of Isotype has also been animated and extended into new areas by Yoonsun Joo, Alice Creischer and Andreas Siekmann and Derk and Gert Dumbar.[725] In 2005 Yoonsun Joo launched Asotype, the 'Animated System of Typographic Picture Education'. Isotype was animated, enabling it to perform an action, so extending the visual language from a noun to a verb.[726] In a travel situation, Asotype differentiates between departures and arrivals through animated planes, and shows when it is safe to cross the road.[727] It is clear that there is a place for these simple animated symbols in airports and signage projects, and they do appear to be able to function without words, as the animation works in their place. In 2007 Derk and Gert Dumbar launched a pilot set of disaster pictograms, which they named 'A Safe Place'. They were designed as a method of communication between aid workers and victims of disasters. The designers hoped that they would form the start of a universal picture language to be used worldwide during natural disasters, conflict, epidemics and terrorist attacks.[728]

724 See Jeremy J. Foster 'Evaluating the Effectiveness of Public Information Symbols' *Information Design Journal*, (1994), 7: 3, 183-202 for methods used to evaluate symbols.

725 See Annink & Bruinsma, *Lovely Language: Words Divide Images Unite* (Rotterdam: Veenman Publishers, 2008), pp. 125-174 for examples of Isotype-inspired graphic language and graphic argument.

726 www.asotype.com.

727 Krampen also animated Aicher's Olympic Pictograms in his 2009 book and CD. See Krampen, et al., *The World of Signs: Communication by Pictographs*.

728 Ed Annink & Max Bruinsma, *Lovely Language: Words Divide Images Unite* (Rotterdam: Veenman Publishers, 2008), pp. 207-209. www.stroom.nl/activiteiten/tentoonstelling.php?t_id=5420847.

The ultimate legacy of the principles of Isotype

To conclude as to what precisely constitutes the legacy of the principles of Isotype, seen through the context of this thesis, the reader should be drawn to three specific areas that fundamentally define whether the influence of the principles of Isotype exists in a contemporary context:

- Immediacy of comprehension
- Avoidance of metaphor
- Educational transformation

These areas all correspond to the methodological principles of Isotype, but are to some extent underpinned by the philosophical principles relating to education, physicalist theories and the dissemination of social knowledge. Neurath's methodological principles built the facilitating bridge between the philosophical ideas that form the basis to Isotype and their graphic realisation. In a contemporary context, the graphic style of Isotype can be seen as an historical phenomenon with connotations of socialism, sobriety, austerity and hope following World War II.[729] This can be contrasted strongly with the sophistication of the contemporary audience's knowledge of graphic techniques through media exposure and the wide availability of graphic software – in which almost any computer-literate person can create charts in a variety of styles. Taking this fact into account, it becomes obvious why the graphic and operational principles of Isotype can only be considered as an addition to the graphic designer's toolkit, or a sober 'style' to use if the design task dictates. Neurath was well aware of Isotype becoming stylistically dated, but Kinross maintains that the best Isotype symbols can still provide models for today's designers:[730]

> Certainly the Isotype signs are dependent on their times like all these old sign-languages. Later times will see what their special qualities are and what the conditions were which made them.[731]

Philosophically, Isotype was designed for a time when social education was desperately needed and Neurath was able to promote Isotype with the full knowledge that the principles were applied with trust and fitness for purpose. This integrity of approach to both audience and information is still valid, and in terms of the physicalist basis to Isotype, integrity, if simplistically applied, precludes the need for metaphor.

Immediacy of comprehension

> At the first look you see the most important points, at the second, the less important points, at the third, the details, at the fourth, nothing more – if you see more, the

729 As can be seen by the tone of the animated Isotype man in the 1946 film made by Rotha 'Land of Promise', where the animated Isotype symbol shows the way to solving social problems see 'Land of Promise: The British Documentary Movement 1930–1950' (DVD, BFIVD756).

730 Robin Kinross, 'The Work of Otto Neurath in Visual Communication,' *Fundamenta Scientiae*, 5: 2 (1984), 193

731 Neurath, *International Picture Language*, p. 106.

teaching-picture is bad.[732]

The first area where the legacy of the methodological principles of Isotype can be found in contemporary work refers to Neurath's principle of ordering information to allow its significance to become visually evident.[733] Clear graphic argument allows for immediate comprehension and supporting details are not buried in multiple layers of complex graphic language which the viewer has to decipher. Today's graphic information is sophisticated, complex and requires the viewer to be familiar with the mode of graphic language and argument before comprehension is possible. *Data Flow* demonstrates this very well – graphic information for other graphic designers – in some respects emulating the 1960s 'closed shop' of museum curators who only communicated with other curators, and the OU professor hiding behind his academic knowledge. As Neurath stated, 'Less is more'.[734]

Hidden behind the simplicity of the graphic argument of Isotype is the rigour of the transformer (or meticulous information designer) who carefully orders the information to make it immediately accessible – doing the hard work so the audience doesn't have to, and allowing them to simply deduce facts for themselves and form their own opinions based on well-constructed, unbiased, visually significant graphic argument.

Avoidance of metaphor

The second area where the legacy of the methodological principles of Isotype can be found in contemporary work is in the avoidance of metaphor, and the use of graphic argument that does not explain one complex concept using the analogy of a more familiar concept. Metaphor and analogy are perhaps the most overused tools in the contemporary designer's and educational technologist's repertoire. Use of metaphor (as has been seen in Holmes' work and in the NHM) can be amusing, clever, memorable and persuasive. It can promote understanding through association, but it is strictly against the physicalist principles of Isotype. This is one reason why Isotype is viewed in an historical context rather than being visually acceptable to a contemporary audience – it is too simplistic and straightforward, and we expect more of it. As has been seen through the work of both Miles and Holmes, adaptations to the principles of Isotype have included the addition of metaphor.

732 Neurath, *International Picture Language*, p. 27.

733 Rudolf Modley, 'Language in Pictures: The Development and Uses of Pictorial Statistics' *PM Magazine*, 4: 1(1937), 25-30. In 1937, Modley reduced Neurath's form of graphic argument to the use of three principles: use of pictograms to show subject matter; use of repeated symbols to show magnitude; and use of compressed data with all excess detail removed, to show the story to be portrayed as simply as possible.

734 Neurath, *International Picture Language*, p. 66.

Educational transformation

The third, and probably most enduring legacy of the methodological principles of Isotype can be found in transformation in a museum or educational context. The use of transformation perpetuates at the OU through distance learning. The transformation process is by far the most logical way to create educational exhibits, seen through the joint visual conclusions reached through the meeting of minds of a skilled graphic communicator and a subject expert. In many respects transformation cannot be seen as the sole reserve of Isotype, as it belongs to one of the fundamental core forms of communication, including educational technology, programmed learning and operational research. Transformation has enhanced the notion of the designer working within a multi-disciplinary team, sharing specialist communication and problem-solving skills with a raft of other professional disciplines, facilitating a depth of enquiry that a graphic designer in a more traditional setting would not be able to achieve. Seen in this slightly adapted form, transformation is enabling designers to approach their work from a more integrated, systematic, socially responsible perspective, as can be seen in the examples of Humantific and RED.

In the widest sense, the continuing relevance and resonance of the combined principles of Isotype – transformation, graphic argument and graphic language – comprise the basic components of communication design. The real legacy remains as a complete system of design principles that forms the backbone to design education. If we can ignore the pastiche of rows of repeated figures, but still appreciate fundamentally why the male and female W.C. signs are recognised with such immediacy, then perhaps lessons can continue to be learned about Isotype as a living system of graphic communication.

Bibliography

Abdullah, R., & Hübner, R., *Pictograms Icons & Signs: A Guide to Information Graphics* (London: Thames & Hudson, 2006).
Aicher, O., 'A Sign Alphabet from Otl Aicher', *Icographic,* 12 (1978), 19-27.
Aicher, O., & Krampen M., *Zeichensysteme (der Visuellen Kommunikation)* (Munich: Alexander Koch Verlag, 1980).
Aicher, O., *Analogous and Digital* (Berlin: Ernst & Sohn, 1994).
Alt, M.B., 'Four Years of Visitor Surveys at the British Museum (Natural History) 1976-79', *Museums Journal,* 80: 1 (1980), 10-19.
Annink, E., & Bruinsma M., *Lovely Language Words Divide Images Unite* (Rotterdam: Veenman Publishers, 2008).
Annink, E., & Bruinsma, M., (eds) *Gerd Arntz Graphic Designer* (Rotterdam: 010 Publishers, 2010).
Ashwin, C., 'Review of Handbook of Pictorial Symbols' *Leonardo,* 12: 4 (1979), 343-344.
Aynsley, J., *Pioneers of Modern Graphic Design: A Complete History* (London: Octopus, 2004).
Aynsley, J., 'Press Cologne, 1928 Exhibitions and Publications Design in the Weimar Period', Design Issues, 10: 3 (1984).
Bakker, W., 'Pictopolitics: Icograda and the Development of Pictograms', *Iridescent,* (2012).
Bayer, H., *Herbert Bayer* (New York: Reinhold; London: Studio Vista, 1967).
Belcher, M.G., (convener) 'The Role of the Designer in the Museum' *Museums Journal,* 70: 2 (1970), 63-66.
Belcher, M.G., (compiled by) 'Second Design Conference' *Museums Journal,* 72: 2 (1972), 58-62.
Belcher, M.G., 'A Decade of Museum Design and Interpretation: A Personal View' *Museums Journal,* 83:1 (1983), 53-60.
Bessa, P., 'Skittish Skirts and Scanty Silhouettes' *Visible Language,* 42: 2 (2008), 119-141.
Biderman, A.D., 'The Playfair Enigma: the Development of the Schematic Representation of Statistics' *Information Design Journal,* 6: 1 (1990), 3-25.
Bresnahan, K., '"An Unused Esperanto": Internationalism and Pictographic Design, 1930-70' *Design and Culture,* 3: 1 (2011), 5-24.
Brinton, W.C., *Graphic Methods for Presenting Facts* (New York: The Engineering Magazine Company, 1920).
British Museum (Natural History), *Annual Report 1978-79* (London: British Museum (Natural History), 1979).
British Museum (Natural History) Department of Public Services, *Transformation Reader* (Second Edition, 1979).
Brugger, C., 'Advances in the International Standardisation of Public Information Symbols' *Information Design Journal*, 6:1 (1990), 79-88.
Buchheit, M., 'Nigel Holmes… Simplifying the Complex' *In the Spotlight,* 2: 1 (2004).
Burke, C., *Paul Renner the Art of Typography* (UK: Hyphen Press, 1998).
Carter, E.J., & Goldfinger E., *The County of London Plan* (London: Penguin Books, 1945).
Cartwright, N., Cat, J., Fleck, L., & Uebel, T.E., *Otto Neurath: Philosophy Between Science and Politics* (Cambridge: Cambridge University Press, 1996).
Charles, L., & Giraud, Y., 'Economics for the Masses: The Visual Display of Economic Knowledge in the United States (1921-1945) (EconomiX, University of Reimes and THEMA, University of Cergy, (draft), 2010).
Chizlett, C., 'Damned Lie and Statistics. Otto Neurath and Soviet Progaganda in the 1930s' *Visible Language*, 26: 3-4 (1992), 298-321.
Clarke, G.C.S., and Miles, R.S., 'The Natural History Museum and the Public' *Biologist* 27: 2 (1980), 81-85.
Clarke, G.C.S., 'Evolving an Exhibition on Evolution' *Museums Journal,* 81: 3 (1981), 147-151.
Comenius, J.A., *Orbis Pictus* (Breinigsville, PA USA: Kessinger (reprint), 2010).
Costigan-Eaves, P., 'Some Observations on the Design of William Playfair's Line Graphics' *Information Design Journal*, 6: 1 (1990), 27-44.
Crawley, C.R., 'From Charts to Glyphs: Rudolf Modley's Contribution to Visual Communication' (Society for Technical Communication: HighBeam Research, 1994).
Crow, D., *Left to Right: The Cultural Shift from Words to Picture* (Switzerland: Ava Publishing, 2006), pp. 58-87.
Dalbello, M., & Shaw, M., *Visible Writings: Cultures, Forms Readings* (New Brunswick: Rutgers University Press, 2011), pp. 151-175.
Dalbello, M. & Spoerri, A., 'Statistical Presentations from Popular Texts for the Ordinary Citizen, 1889-1914' *Library and Information Science Research*, 28 (2006), 83-109.
Danilov, V.J., 'America's Contemporary Science Museums' *Museums Journal*, 75: 4 (1976), 145-148.
Daru, M., 'The Culture of Quantitative Graphicacy' *Information Design Journal*, 5: 3 (1989), 191-208.
Densley, M., 'Specialist Session: Report of the Group of Designers/Interpreters in Museums' *Museums Journal*, 78: 3 (1978), 131.
Docekal, J., Lasinger, D., Halusa, G., (complilation) *Survey of the Austrian Economy 2009-2010* (Austria: Wirtschaftsmuseum, 2009).
Doughty, P. S., 'Britain before Man – A Review' *Museums Journal,* 78: 2 (1978), 54-56.
Dreyfuss, H., 'Speaking in a Thousand Tongues' *The Conference Board Record*, 4: 3 (1969), 16-20.
Dreyfuss, H., *Symbol Sourcebook, An Authoritative Guide to International Graphic Symbols* (New York: John Wiley & Sons, 1984).
Driver, D., (compiled by) *The Art of Radio Times* (London: BBC Publications, 1981).

Duggan, T., 'The Shapes of Things to Come? Reflections on a Visit to the Hall of 'Human Biology', South Kensington' *Museums Journal*, 78: 1 (1978), 5-6.
Ecco, U., *The Search For The Perfect Language* (London: Fontana, 1997).
Emerson, J., *Visualizing Information for Advocacy: An Introduction to information Design* (India: Tactical Technology Collective, 2008).
Evans, H., *Pictures on a Page Photo-Journalism, Graphics and Picture Editing* (London and New York: Pimlico, 1978).
Eve, M., 'Isotype in Trouble, 1946-1948. Modern Typography in Britain: Graphic Design, Politics, and Society' *Typography Papers,* 8 (2009), 129-134.
Eve, M., & Burke, C., (eds), *From Hieroglyphics to Isotype: A Visual Autobiography* (London: Hyphen Press, 2010).
Faludi, A., 'What's Positivism Anyway? Otto Neurath and the Planners' (University of Amsterdam, 1987).
Fifield, R., 'Heritage Displaymanship' *New Scientist,* (3 February 1977), p. 293.
Florence, L.S., *Our Private Lives* (London, Toronto, Bombay, Sydney: George G. Harrap, 1944).
Foster, J.J., (1990) 'Standardizing Public Information Symbols: Proposals for a Simper Procedure' *Information Design Journal,* 6: 2 (1990), 161-68.
Foster, J.J., 'Evaluating the Effectiveness of Public Information Symbols' *Information Design Journal,* 7: 3 (1990), 183-202.
Gagné, R.M., *The Conditions of Learning* (New York, London, Sydney: Holt, Rinehart and Winston, 1977).
Gatacre, E.V., 'The Limits of Professional Design' *Museums Journal*, 76: 3 (1976), 93-99.
Greenaway, F., 'National Museums' *Museums Journal*, 83: 2 (1983), 7-12.
Griggs, S.A., & Alt, M.B., 'Visitors to the British Museum (Natural History) in 1980 and 1981' *Museums Journal*, 82:3 (1982), 149-155.
Grimwade, J, 'Entrevistainterviewnigelholmes' *Malofiej*, *Society of News Design Spain* (2003).
Gosling, D., 'Man's Place in Evolution: a New Exhibition at the British Museum (Natural History)' *Museums Journal*, 80: 2 (1980), 66-69.
Gruber, H., *Red Vienna Experiment in Working-Class Culture 1919-1934* (New York, Oxford: Oxford University Press, 1991).
Hacohen, M.H., *Karl Popper; the Formative Years 1902-1945; Politics and Philosophy in Interwar Vienna* (Cambridge: Cambridge University Press 2000).
Harrison, M., *Museums and Galleries* (London: Routledge & Kegan Paul, 1973).
Hartmann, F., 'Visualizing Social Facts: Otto Neurath's ISOTYPE Project' (Rayward Book, Indb (2007), 279-293.
Hebditch, M., 'Briefing the Designer' *Museums Journal*, 70:2 (1970), 67-68.
Heinrich, R., Nemeth, E., Pichler, W., & Wagner, D., (eds.) *Image and Imaging in Philosophy, Science and the Arts: Volume 2* (UK: Gazelle Books Services Limited, 2011).
Henning, M., *Museums, Media and Cultural Theory* (Maidenhead UK: Open University Press, 2006), pp. 75-82.
Henning, M., 'The Pig in the Bath' *Radical Philosophy*, 145 (2007), 11-19.
Herdeg, W., (ed) *Graphis Diagrams: The Graphic Visualisation of Abstract Data* (Zurich: The Graphis Press, 1979).
Hogben, L., *Interglossa* (Harmondsworth UK & New York: Penguin Books, 1942).
Hogben, L., *From Cave Painting to Comic Strip* (Max Parrish & Co: London, 1949).
Heller, S., *Nigel Holmes on Information Design (Working Biographies Series)* (New York: Jorge Pinto Books, 2006).
Holmes, N., *Designer's Guide to Creating Charts & Diagrams* (New York: Watson Guptill, 1984).
Holmes, N., *Designing Pictorial Symbols* (New York: Watson Guptill, 1985).
Holmes, N., *Pictorial Maps: History, Design, Ideas, Sources* (USA & London: The Herbert Press, 1991).
Holmes, N., *The Best in Diagrammatic Graphics* (Switzerland: Quarto Publishing, 1993).
Holmes, N., *Drawing to Explain: The Gap between Drawing and Seeing* (Nigel Holmes, 1998).
Holmes, N., 'Pictograms: A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)' *Information Design Journal,* 10: 2 (2000), 133-143.
Holmes, N., '*Pictograms A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)* (CT USA: Nigel Holmes, 2003).
Holmes, N., 'The Art of Presenting, An Informative Series' No.7' (CT USA: Nigel Holmes Explanation Graphics, 2006).
Holmes, N., *Red Hat* (CT USA: Nigel Holmes, 2008).
Holmes, N., (designer) 'The Citizen's Guide to the Airwaves: A Graphic Depiction of the Uses – and the Misuses of the Radio Frequency Spectrum' (USA: New America Foundation Spectrum Policy Program, (2002).
Holmes, N., 'The Good Sheet' (USA: Good Worldwide Inc., 006, October 16-22 2008).
Honderich, T., *The Oxford Companion to Philosophy (Second Edition)* (Oxford, New York: Oxford University Press, 2005).
Howard, J., *Margaret Mead; a Life* (New York: Fawcett Columbine, 1984).
Huff, D., *How to Lie with Statistics* (UK and New York: Pelican Victor Gollancz, 1973).
ICOGRADA ,'An International Sign Language Starts Badly' (reprint) (*Design Magazine*: London, 1965).
International Institute for Information Design 'Data Designed for Decisions: Connect' (Vienna: IIID, 2009).
Ihara, H., 'Otto Neurath's Atlas "Society and Economy": Design, Contents, and Context' (International Association of Societies of Design Research: The Hong Kong Polytechnic University, 2007).
Ihara, H., 'Rigor and Relevance in the International Picture language: Rudolf Modley's Criticism against Otto Neurath and his Activity in the Context of the Rise of the "Americanization of Neurath method', (Proceedings of IASDR2009, 2009).

Ihara, H., 'Rudolf Modley's Contribution to the Standardization of Graphic Symbols' (Proceedings of IASDR2011, 2011).

Jansen, W., 'Neurath, Arntz and ISOTYPE: The Legacy in Art, Design and Statistics' *Journal of Design History,* 22: 3 (2009), 227-238.
Johnston, W.M., *The Austrian Mind An Intellectual and Social History 1848–1938* (Berkely, Los Angeles London: University of California, 2000).
Jones, P., 'Design 1.0, 2.0, 3.0, 4.0: The Rise of Visual SenseMaking' (New York: NextDesign Ledership Institute, 2009).
Kolakowski, L., *Positivist Philosophy from Hume to the Vienna Circle* (Harmondsworth: Penguin, 1972).
Kepes, G., (ed) *Sign Image Symbol* (New York: George Braziller, Inc., 1966).
Kinross, R., 'Design in Central-European London: Interactions Between Emigrés and Natives in the 1940s' *Typography Papers,* 8 (2009), 105-112.
Kinross, R., (translated and with interventions by) Neurath M, 'Isotype: The Work of the Transformer', IC 7.1b.
Kinross, R., 'Otto Neurath's Contribution to Visual Communication 1925-1945: The History, Graphic Language and Theory of Isotype' (unpublished Mphil thesis, University of Reading, 1979).
Kinross, R., 'On the Influence of Isotype' *Information Design Journal,* 2: 2 (1981), 122-130.
Kinross, R., 'The Work of Otto Neurath in Visual Communication' *Fundamenta Scientiae*, 5: 2 (1984), 185-199.
Kinross, R., (review), 'Richness against Flatness: Edward Tufte's 'Envisioning Information," *Information Design Journal*, 6: 3 (1991), 221-28.
Kinross, R., 'Obituary Marie Neurath' *Information Design Journal,* 5: 1 (1986), 69-71.
Kinross, R., 'Blind Eyes, Innuendo and the Politics of Design: A Reply to Clive Chizlett' *Visible Language,* 28: 1 (1994), 68-76.
Katsumi, M., 'Towards an International Symbology – Tokyo, Osaka, Sapporo' *Graphic Design,* 42 (1971), 31-38.
Klanten, R., Bourquin N., Tissot T., Ehmann S., (eds.) *Data Flow: Visualizing Information in Graphic Design* (Berlin: Gestalten, 2008).
Klanten, R., Ehmann S., Bourquin N., Tissot T., (eds.) *Data Flow: Visualizing Information in Graphic Design 2* (Berlin: Gestalten, 2010).
Koch, R., *The Book of Signs* (New York: Dover Publications, 1955).
Kraeutler, H., 'Otto Neurath – Museum and Exhibition Work: Spaces (Designed) for Communication'. (unpublished doctoral thesis, University of Leicester, 2003).
Kraeutler, H., 'Otto Neurath. Educational Concepts of the Progressivists in Vienna of the 1920s and Museum Work' *Arkiv, Samhälle och Forskning*, 2 (2008).
Kraeutler, H., *Otto Neurath. Museum and Exhibition Work Spaces (Designed) for Communication* (Frankfurt, Berlin, Brussels, New York, Oxford, Vienna: Peter Lang, 2008)
Krampen, M., 'An Approach to Classification of Graphic Symbols' (New York: The Fund for the Advancement of Education, (Ford Foundation), 1959).
Krampen, M., 'Signs & Symbols in Graphic Communication' *Design Quarterly* 62 (1965), 1-31.
Krampen, M., (eds) *Design and Planning* (Ontario, Canada: University of Waterloo, 1965).
Krampen, M., Götte M., & Kneidl M., *The World of Signs: Communication by Pictographs* (Germany: Avedition GmbH, 2007).
Lambert, D., 'Wolfgang Foges and the New Illustrated Book in Britain: Adprint, Rathbone Books, and Aldus Books' *Typography Papers,* 8 (2009), 113-128.
Large, M., 'Communication Among All People, Everywhere: Paul Arthur and the Maturing of Design' *Design Issues,* 17: 2 (2001), 81-90.
Lewis, B. N., 'The Museum as an Educational Facility' *Museums Journal,* 80: 3 (1980), 151-155.
Lindinger, H., (ed.) *Ulm Design The Morality of Object*s (Massachusetts: MIT Press, 1991).
Lockwood, A., *Diagrams: A Visual Survey of Graphs, Maps, Charts and Diagrams for the Graphic Designer* (London: Studio Vista; New York: Watson-Guptill, 1969).
Lupton, E., 'Reading Isotype' *Design Issues*, 3: 2 (1986), 47-58.
Lupton, E., & Miller A., *Design Writing Research: Writing on Graphic Design* (London: Phaidon, 1999).
Macdonald-Ross, M., & Waller, R. H., 'The Transformer' *Penrose Annual,* 69, (1976), 141-52.
Macdonald-Ross, M., & Waller, R. H., 'The Transformer Revisited' *Information Design Journal* 9: 2 & 3 (2000), 177-193.
Magee, B., & Kermode, F,. (ed), *Popper* (Glasgow: William Collins, 1973).
Margolin, V., (ed), *Design Discourse: History Theory Criticism* (Chicago: University of Chicago Press, 1989).
McCandless, D., *Information is Beautiful* (London: Collins, 2009).
McLaren, I., 'Otl Aicher: A Practical Utopian' *Baseline Magazine,* 29 (1998), 33-40.
Mead, M., 'The Future as the Basis for Establishing a Shared Culture' *Daedalus,* 94: 1 (1965), 135-155.
Mead, M., & Modley R., 'Communication Amongst all People Everywhere' *Natural History,* 72: 7 (1968), 56-63.
Mertens, F., *An Idealist in The Hague: Otto Neurath's Years in Exile* (The Hague, Holland: Municipality of The Hague, 2007).
Meyer, E.K., *Designing Infographics* (USA: Hayden Books, 1997).
Mijksenaar, P., *Visual Function: An Introduction to Information Design* (New York: Princeton Architectural Press, 1997).
Millison, E.G., 'How to Use Pictorial Statistics' (Reviewed work), *Journal of the American Statistical Association*, 33:202 (1938), 489-490.

Miles, R.S., and Alt M.B., 'British Museum (Natural History): A New Approach to the Visiting Public' *Museums Journal,* 78: 4 (1979), 158-162.
Miles, R.S., 'Introducing Ecology at the British Museum (Natural History)' *Museums Journal*, 79: 1 (1979), 23-26.
Miles, R.S., & Tout, A.F., 'Outline of a Technology for Effective Science Exhibits' *Special Papers in Palaeontology,* 22 (1979), 209-224.
Miles, R.S., 'Information as an Experience: Exploitation of a Museum's Resources' *The Library Association*, (1981), 112-118.
Miles, R.S., (in collaboration with) Alt, M.B., Gosling D.C., Lewis B.N., & Tout A.F., *The Design of Educational Exhibits* (London: George Allen & Unwin, 1982).
Miles, R.S., 'Lessons in Human Biology' Testing a Theory of Exhibition Design' *The International Journal of Museum Management and Curatorship,* 5 (1986), 227-240.
Miles, R.S., 'Museums and Public Culture: A Context for Communicating Science' *The Chicago Academy of Sciences*, (1988), 157-169.
Miles, R.S., 'Too Many Cooks Boil the Wroth – Exhibits, Teams, Evaluation' *Visitor Studies,* 5 (1993), 58-70.
Miles, R.S., Nemeth E., & Stadler F., (eds.), 'Otto Neurath and the Modern Public Museum: The Case of The Natural History Museum (London)' *Encyclopedia and Utopia*, (The Netherlands: Kluwer Academic Publishers, 1996), pp. 183-190.
Miles, R.S., & Alt, M.B., 'British Museum (Natural History): A New Approach to the Visiting Public' *Museums Journal,* 78: 4 (1978), 158-162.
Miles, R.S., 'Introducing Ecology at the British Museum (Natural History)' *Museums Journal*, 79: 1 (1979), 23-26.
Miles, R.S., 'Otto Neurath and the Modern Public Museum: The Case of The Natural History Museum (London)' *Museums Journal*, 79: 1 (1996), 23-26.
Miles, R.S., 'A Natural History Museum in Transition: Reflections on Visitor Studies in Practice' *Visitor Studies,* 10: 2 (2007), 129-135.
Miles, R.S.,'Origins of the New Exhibition Scheme and its Pilot Exhibition ('Human Biology')' Unpublished paper, 22 August 2008.
Mills, B., 'Designed and Produced by…Some Notes on the Story of Adprint' *Antiquarian Book Monthly Review,* 13 (1986), 368-373.
Modley, R., *How to Use Pictorial Statistics* (New York: Harper & Brothers, 1937).
Modley, R., 'Language in Pictures: The Development and Uses of Pictorial Statistics' *PM*, 4: 1(1937), pp. 25-30.
Modley, R., 'Pictographs Today and Tomorrow' *The Public Opinion Quarterly*, 4 (1937), 659-664.
Modley, R., & Lowenstein, D., (in collaboration with) Jahnel F., and Levit N., *Pictographs and Graphs. How to Make and Use them* (New York: Harper & Brothers, 1952).
Modley, R., 'The Challenge of Symbology' (The Fund for the Advancement of Education, 1959).
Modley, R., 'Is Writing Obsolete?' *Print,* January/February (1960), 80-84.
Modley, R., 'Universal Symbols and Cartography' Symposium speech on the Influence of the Map User on Map Design, Queen's University, Kingston Ontario, 9 September 1970 (US Department of Health, Education & Welfare, Office of Education).
Modley, R., (assisted by) Myres, W. R., *Handbook of Pictorial Symbols 3,250 Examples from International Sources* (New York: Dover, 1976).
Modley, R., 'Isotype in the USA' *Icographic* 12 (1978), 11-15.
Modley, R., (ed) *1100 Pictorial Symbols* (New York: Dover; Boston USA: D Reidel, 2007).
Morris, C., *Writings on the General Theory of Signs* (The Hague: Mouton & Co, 1971).
Morrison, P., & Morrison P., & Office of C. & R. Eames, *Powers of Ten: About the Relative Size of Things in the Universe* (New York: Scientific American Library, 1982).
Mulhall, M.G., *Mulhall's Dictionary of Statistics* (facsimile) (London: George Routledge and Sons, 1884).
Müller-Brockmann, J., *The Graphic Artist and his Design Problems* (Teufen: Niggli, 1961).
Nemeth, E., & Stadler, F., (eds), *Encyclopedia and Utopia: The Work of Otto Neurath (1882-1945)*, (The Netherlands: Kluwer Academic Publishers, 1996).
Neurath, M., 'Isotype' *Instructional Science*, 3 (1974), 127-150.
Neurath, M., *If You Could See Inside* (New York: Chanticleer Press Inc, 1949).
Neurath, M., *Railways under London* (London: Max Parrish, 1948).
Neurath, M., *They Lived Like This In Ancient Peru* (New York: Franklin Watts Inc., 1966).
Neurath, M., *Wiener Methode and Isotype: My Apprenticeship and Partnership with Otto Neurath* (1986) Isotype Collection 7.1b
Neurath, M., & Kinross, R., *The Transformer: Principles of Making Isotype Charts* (London: Hyphen Press, 2009).
Neurath, M., 'What I remember', (unpublished manuscript), 'told and written down for Henk Mulder', (1980), revised 1982; translated by Robin Kinross and approved by Marie Neurath' (1984).
Neurath, O., 'Das Sachbild' *Die Form*, (1930).
Neurath, O., 'Museums of the Future' *Survey Graphic*, 22 (1933), 458-463.
Neurath, O., *International Picture Language, The First Rules of ISOTYPE* (London: Kegan Paul, 1936).
Neurath, O., *BASIC by ISOTYPE* (London: Kegan Paul, 1937).
Neurath, O., *Modern Man in the Making* (New York: Alfred A. Knopf, 1939).

Neurath, O., & Rotha, P., (introduction), 'From Hieroglyphics to Isotypes' *Future Books,* 3 (1946), 92-101.
Neurath, O., Carnap, R., & Morris, C., (eds), *International Encyclopedia of Unified Science Volume 1.* (Chicago: University of Chicago Press, 1955).
Neurath, O., Neurath, Neurath, M., & Cohen, R.S., (eds), *Empiricism and Sociology* (Dordrecht, Holland: Reidel, 1973).
Neurath, P., 'Recollections of the Beginnings of Pictorial Statistics and ISOTYPE' *Fundamenta Scientiae*, 5: 2 (1984), 201-208.
Nyíri, K., 'From Texts to Pictures: The New Unity of Science' *Visual Learning Lab,* (2003), 45-67.
O'Grady, J. & O'Grady, K., *The Information Design Handbook* (Ohio: How Books, 2008).
Olgyay, N., 'Development & Testing of the IIID Safety Symbols System' *Information Design Journal*, 10:2 (2000), 107-114.
Oxford University Press, *The Oxford-Duden Pictorial English Dictionary* (Oxford: Oxford University Press, 1981).
Playfair, W., *The Commercial and Political Atlas and Statistical Breviary* (facsimile) (New York: Cambridge University Press, 2005).
Pendle, G., 'Otto Neurath's Universal Silhouettes' *Cabinet Magazine,* 24 (2006), 72-74.
Popper, K., *Unended Quest an Intellectual Autobiography* (London and New York: Routledge, 1974).
Pope-Hennessy, J., 'Design in Museums' *Journal of the Royal Society of Arts,* 123 (1975), 717-727.
Purcell, K.W., 'Olympic Pictograms' *Grafik,* 178 (2009) 1-2.
Rathgeb, M., 'The Early Work of Otl Aicher' Visual Design for the Volkshochschule Ulm' *Baseline Magazine,* 31 (2000), 17-24.
Rathgeb, M., 'Otl Aicher: Design as a Method of Action' (unpublished doctoral thesis, University of Reading, 2002).
Rathgeb, M., *Otl Aicher* (London, New York: Phaiden, 2006).
Reiter, M., & Sandomir, R., (eds), *The Enlightened Bracketologist: The Final Four of Everything* (New York: Bloomsbury, 2007).
Richards, C., (2000) 'Getting the Picture: Diagram Design and the Information Revolution' *Information Design Journal,* 9: 2 & 3, 87-110.
Shettel, H., 'Introduction to "A Natural History Museum in Transition: Reflections on Visitor Studies in Practice": A History Lesson' *Visitor Studies,* 10: 2 (2007), 127-128.
Shanken, A.M., 'The Uncharted Kahn: The Visuality of Planning and Promotion in the 1930s and 1940s *Art Bulletin*, 88: 2 (2006), 310-327.
Simlinger, P., 'Designing Public Information Symbols' *Information Design Journal*, 1 (1980), 182-190.
Singer, P., *Marx: A Very Short Introduction* (Oxford: Oxford University Press, 2000).
Smith, R., 'Terminological Inexactitudes: Image Functions in Graphic Communication.' *Information Design Journal,* 4: 3 (1986), 199-205.
Sollors, W., (ed.) *Multilingual America* (New York & London: New York University Press, 1998).
Spencer, H., *Pioneers of Modern Typography* (London:Lund Humphries, 1969).
Stansfield, G., 'Origin of Species – An Exhibition About Charles Darwin's Theory of Evolution at the Natural History Museum. A Review' *Museums Journal,* 81: 4 (1982), 234-235.
Stansfield, G., & Johnson W., 'Museums and Interpretive Techniques: An interim Report' *Museums Journal,* 75: 2 (1975), 71-74.
Tschichold, J., (translated by) McLean R., *The New Typography* (Berkley, Los Angeles, London: University of California Press, 1998).
Traganou, J., 'Olympic Design and National History: The Cases of Tokyo 1964 and Beijing 2008' *Hitotsubashi Journal of Arts and Sciences,* 50: 1 (2009), 65-79.
Tresise, G., 'The Story of the Earth at the Geological Museum' *Museums Journal,* 73: 2 (1973), 71-72.
Tufte, E., *Envisioning information* (Cheshire, CT: Graphics Press, 1990).
Tufte, E., *Visual Explanations Images and Quantities, Evidence and Narrative* (Cheshire, CT: Graphics Press, 1997).
Tufte, E., *The Visual Display of Quantative Information* (Cheshire, CT: Graphics Press, 2001).
Tufte, E., *Beautiful Evidence* (Cheshire, CT: Graphics Press, 2006).
Twyman, M., 'The Significance of Isotype' *Graphic Communication Through ISOTYPE.'* (University of Reading, 1975), pp. 6-17; also in *Icographic* 10 (1976), 2-12.
Twyman M, 'Isotype and the University of Reading' (1981), IC 7.1b.
Tynan, A.M., 'Man's Place in Evolution – A Review' *Museums Journal,* 80: 4 (1981), 197.
University of Reading, *Graphic Communication through ISOTYPE* (University of Reading, 1975).
University of Reading, *International Picture Language* (University of Reading, 1980).
Vossoughian, N., 'The Language of the World Museum: Otto Neurath, Paul Otlet, Le Corbusier' *Transnational Associations,* 1: 2 (2003), 82-93.
Vossoughian, N., *Otto Neurath The Language of the Global Polis* (Rotterdam: Nai Publishers, 2008).
Wainer, H., *Graphic Discovery: A Trout in the Milk and Other Visual Adventures* (Princeton and Oxford: Princeton University Press, 2005).
Walden, T.A., (chair) 'Session 1: The Next Decade' *Museums Journal,* 70: 3 (1970), 101-104.
Waller, R., 'Notes on Transforming 1-7' Textual Communications Research Group, Open University, 1977).
Wittlin, A.S., *Museums In Search of a Usable Future* (Cambridge Massachusetts & London: MIT, 1970).
Wildbur, P., & Burke, M., *Information Graphics Innovative Solutions in Contemporary Design* (London: Thames & Hudson, 2001).
Wurman, R.S., *Information Anxiety* (New York: Bantam Books, 1989).

Wurman, R.S., *Understanding USA* (Newport, RI: TED Conferences Inc., 1999).
Yazdani, M., & Barker P., (eds.) *Iconic Communication* (Bristol UK: Intellect Ltd, 2000).

Journal references

'Special International Signs and Symbols Icograda Thirtieth Anniversary Year' *Print*, 23: 4 (1969)

Films/animated sequences

Holmes, N., 'A Very Short Film about Wit and Humour in Information Graphics' (shown at DD4D Paris, 2009).
Holmes, N., Ted X, film describing the relative sizes of the US surplus and debt
www.nigelholmes.com/motion/index.htm# *(November 2012)*
Holmes, N., 'GOOD: Vampire Energy' *Good Magazine* www.youtube.com/watch?v=zgZfry82LC4 *(November 2012)*
Rotha, P., 'Land of Promise' 'Land of Promise: The British Documentary Movement 1930-1950' (DVD, BFIVD756).
http://vimeo.com/3650004 Nigel Holmes – SND NYC meetup *(November 2012)*

Web references

www.asotype.com *(November 2012)*
www.ccca.ca/designers/work_detail.html?languagePref=en&mkey=58423&title=Paul+Arthur+and+Associates+self-promotional+brochure%2C+%5Bp.+15%5D&designer=Paul+Arthur+&link_id=5216. *(November 2012)*
www.datascope.be/sog/SOG-Chapter6.pdf *(November 2012)*
www.designcouncil.info/mt/RED/transformationdesign/TransformationDesignFinalDraft.pdf *(November 2012)*
www.dd4d.net *(November 2012)*
www.diagramgroup.com *(November 2012)*
http://gapminder.org *(November 2012)*
www.good.is/everyone *(November 2012)*
www.hhmi.org/news/geis.html *(November 2012)*
www.humantific.com *(November 2012)*
www.humantific.com/out-of-balance-competition-launches/ *(November 2012)*
www.hyphenpress.co.uk *(November 2012)*
http://infographics.eu/?p=programmaIC09 *(November 2012)*
www.iso.org/iso/home *(November 2012)*
www.iso.org/iso/pressrelease.htm?refid=Ref1097 *(November 2012)*
www.isotyperevisited.org *(November 2012)*
www.isotyperevisited.org/2009/09/tips-for-tots-1944-otto-and-marie-neurath.html *(November 2012)*
kerrywilliampurcell.tumblr.com/post/2500521898/olympic-pictograms-published-in-grafik-178-2009. *(November 2012)*
html www.kapitzki.de/en/content/ *(November 2012)*
www.mgmtdesign.com/work.html?id=1,11,29 *(November 2012)*
www.nigelholmes.com *(November 2012)*
www.oecd.org/gov/regional/statisticsindicators/explorer *(November 2012)*
http://olympicstudies.uab.es/pdf/wp082_eng.pdf
http://olympic-museum.de/ *(November 2012)*
http://olympic-museum.de/pictograms/symbols1936.htm *(November 2012)*
www.omniglot.com/writing/blissymbolics.htm *(November 2012)*
www.piktogramm.de/pictoserver/homepage/homepage/start/de/de_start.php *(November 2012)*
www.piktogramm.de/pictoserver/pictograms/focus/otl_aicher_4742/en/en_otl_aicher_focus_1.php *(November 2012)*
www.robwaller.org/Waller_NotesTransforming.pdf *(November 2012)*
http://stadium.open.ac.uk/stadia/index.php?s=1&option=past *(November 2012)*
www.stroom.nl/activiteiten/tentoonstelling.php?t_id=5420847 *(November 2012)*
www.tamabi.ac.jp/soumu/gai/hojo/seika/2002/kyoudou-ota.pdf*(November 2012)*
www.time.com/time/magazine/article/0,9171,1736729,00.html#ixzz18lNBrORK *(November 2012)*
http://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XI-B-3&chapter=11&lang=en.*(November 2012)*
www.visualopolis.com *(November 2012)*
http://en.wikipedia.org/wiki/Geon_(psychology) *(November 2012)*
www4.worldbank.org/afr/ssatp/Resources/HTML/legal_review/Annexes/Annexes%20II/Annex%20II-19.pdf *(November 2012)*
http://www.wurman.com/rsw/ *(November 2012)*
www.youtube.com/watch?v=0fKBhvDjuy0 *(November 2012)*

Interviews recorded with transcripts *(deposited in the University of Reading Sound and Film Archive)*
Michael Macdonald-Ross, (former Educational technologist, Open University, 1970s)
interviewed in Reading, 25 June 2008.
Ron Nash, (former head of Exhibition Maintenance, Natural History Museum, 1975-1987)
interviewed in Tenterden, Kent, 18 August 2008.
Dr Roger S. Miles, (former Head of Department of Public Services, Natural History Museum 1975-1991)
interviewed in London, 1 September 2008.
Nigel Holmes, (information designer, Explanation Graphics, New York
interviewed in Zeist, Holland, 22 March 2009.
Bruce Robertson, (information designer, Diagram Group, London
interviewed in London, 7 July 2009.
Dr Martin Krampen, (semiotician and design research scientist)
interviewed in Ulm, 22 October 2012.

Informal Interviews
Dr Ian McLaren, (designer, working with Otl Aicher, 1972 Munich Olympics)
interviewed in Hadlow, Kent, 16 March 2010.
Prof Michael Twyman, University of Reading,
interviewed in Reading, November 2007.
Gerhard Joksch, (graphic designer of 1972 Munich Olympic pictograms),
interviewed at the Hochschule für Gestaltung in Ulm, 22 October 2012.

Interviews in response to questions by email/telephone
Dierdre Janson-Smith, (scientist transformer), Natural History Museum 1970s–1980s
Alan Ward, (designer transformer), Natural History Museum late 1970s–1980s
Richard Meakin, (designer transformer), Natural History Museum mid 1970s
David Gosling, (Head of Design), Natural History Museum 1970s-1990s
Susan Jones, (scientist transformer), Natural History Museum late 1970s–1980s
Mark Magidson, (designer transformer), Natural History Museum 1980s

General Appendix

Otto Neurath – a brief history of his life

1882	Born in Vienna to Wilhelm Neurath and Gertrud Kaempfert.
1902	Wilhelm Neurath dies, Otto graduated from secondary school and went to study mathematics at University of Vienna, but later switched to economics history and philosophy, finally transferring to Friedrich-Wilhelms-Universität Berlin on the recommendation of Ferdinand Tönnies. Met Philipp Frank, Hans Hahn, Olga Hahn and Anna Schapire.
1904	Published essay on monetary interest in antiquity.
1906	Awarded doctorate from School of Philosophy, Friedrich-Wilhelms-Universität Berlin with the highest possible honours. Wrote scholarly dissertation on the history of ancient economies (with emphasis on Egypt). Edited a new edition of Marlow's *Faust*. Returned to Vienna and became assistant teacher at the *Neue Wiener Handelsakademie*, (New Vienna Academy of Commerce) teaching economics and history, also working as a scientific author until military service.
1907	Married Anna Schapire.
1910	Published two volume reader on economics with Schapire containing passages from Plato to Marx. Published textbook on economics (approved as teaching text for higher business schools in 1911).
1907–1914	Appointed Professor of Political Economy at Neue Wiener Handelsakademie.
1911	Birth of son Paul, death of Anna.
1912	Married Olga Hahn.
1912	Balkan war began, and ended in 1913 with Bulgaria, Serbia, Greece and Montenegro triumphing over Turkey. Disputes over the distribution of land from former Turkey prompted a second war in which Bulgaria lost Macedonia to Serbia and Greece, a prelude to World War I.
1912–13	Became member of Social Policy Association (no evidence of party political involvement). Received one year stipend from Carnegie Endowment for International Peace to examine theories of war economy in Eastern Europe and the Balkan States and conduct empirical comparative studies investigating how economies operate under the stress of war. Made two journeys to the Balkans and wrote a series of newspaper reports on war economy, concluding that war may occasionally improve a population's standard of living.
1913–16	Wrote philosophical pieces on foundationalism in epistemology and the structure of science.
1914	Start of World War I, drafted to Eastern Front as part of general mobilisation positioned in Reserve Provisions Unit, also responsible for technical projects at Communications Headquarters in Vienna.

1915–16 Promoted and decorated for excellence in battle. Served as Rations and Provisions officer at Second Army Service Corps in Podkomiec and Radzwillow. Suggested that the foundation of Department for War Economy should record and learn from the successes and failures of war.

1916 Transferred to Scientific Commission for War Economics in Department of War Ministry and promoted to Head of General War and Army Economics. Appointed Director of Museum on War Economy, Leipzig, (founded by representative bodies of German business: the German Trade, Agricultural and Business Associations) with the aim of commemorating the economic achievements of World War I, and the dissemination of knowledge and research on war economy. Worked for 14 days a month in Leipzig, 14 in Vienna. This appointment marked the beginnings of trials in the visualization of statistics and social facts.

1917 Qualified as university lecturer at Heidelberg University. Habilitation 1917-18, but never took up post, recorded as being on leave.

1918 Army service ended, received highest commendation for war service – mainly for scientific work and pioneering studies of war economics. Lived in Dresden and commuted to Leipzig.

1918 German revolution (which started in North German ports) spread south though strikes, armed rebellion and demonstrations. Emperor Wilhelm II resigned followed by King Ludwig III of Bavaria. Kurt Eisner proclaimed the Bavarian Republic on 8 November, in his role as President of the Workers' and Soldiers' Council in Munich. The Council appointed Eisner as Prime Minister. German Republic proclaimed in Berlin following the resignation of Wilhelm II. The Museum for War Economy in Leipzig collapsed amidst the general breakdown. Fierce discussions between political groups led to fighting. Wolfgang Schumann, ex general secretary of Leipzig Museum convinced Otto to join Social Democratic Party and formulate plan for a comprehensive socialisation of the economy. Otto had difficulty deciding on this course of action as he had habilitation at Heidelberg University and Olga was against political involvement.

1919 Travelled to Munich and discussed economic programme and its political realisation with Eisner and Jaffé (Finance Minister). Mainly through the enthusiasm of Social Democrat Trade Minister Josef Simon, Otto was invited to create, lead and put into action a Central Planning Office for Bavaria, where he created the first working units for economic central planning. Began to work on plans for full socialisation and lectured at mass meetings. Published leaflets in Munich. Emerged as empowering public speaker, being particularly well received by mining communities of Southern Saxony. Short lived exercise – communists, independent socialists and anarchists proclaimed Bavaria a soviet republic, so Social Democrats fled. Neurath stayed on and declared allegiance to the new system. In the ensuing civil war, Neurath

arrested and tried for high treason by bourgeois for apparent allegiance to the Soviet Republic. Made a prisoner by pre-Hitler fascist hordes, and in danger of execution. Austrian government effected his exchange to Austria, but banned from entering Germany until 1926. Lectureship at Heidelberg University ceased. Neurath returned to Vienna.

1919–1924 Active participation in housing and allotment movement in Vienna. Became general secretary of Housing Co-operative and founds Museum for Housing and Town Planning.

1923 Developed embryonic ideas for the Vienna Method for use in newly founded Museum of Housing and Town Planning in Vienna, instigated to tackle health and social problems after the conquest of Austria in 1914–18 war.

1924 Met Marie Reidemeister.

1925 Hugo Brietner grants Neurath funding to set up the Social and Economic Museum in Vienna (G&W) Reidemeister joins staff and starts to translate statistics into pictorial statistics. First graphical display was prepared for a Viennese Hygiene exhibition in May/June, commissioned by City of Vienna, Unions and Viennese Council for Workmen and White Collar Workers, which together with City Council and social security insurance funds, paid for most of the running costs of the G&W.

1926 Neurath allowed back to Germany and participated in GESOLEI (*Gesundheit, Soziale Fürsoge und Leibesübung*) exhibition in Düsseldorf, (on health, social insurance and gymnastics), commissioned by City of Vienna and social security insurance companies, displayed in the Austria House where Neurath met Gerd Arntz who begins to work for G&W on a freelance basis. Illustrator Erwin Bernath, bookbinder Josef Scheer and graphic designer Bruno Zuckermann (along with several others) join staff. G&W produces displayboards for the International Urban Development Exhibition in Vienna. Neurath invited to reopening of Bauhaus in Dessau, the first of many invitations to lecture and take part in discussions there.

1927 Main hall in New Town Hall (Neue Rathaus) given to G&W to be used as a permanent exhibition, designed by Josef Frank. The museum housed a permanent display which dealt with world economy, Germany and Austria, the Labour movement, population and local topics concerning Vienna. Old premises at Parkring remodelled and reopened as branch of the G&W. Commission to design 'Vienna and the Viennese' exhibition at Burgenland Fair in Eisenstadt. Other commissions from abroad follow, including a display for a youth exhibition in Amsterdam and Berlin, a hygiene exhibition in Calau. The Vienna Method is proclaimed an international success.

1928 Gerd Arntz joins team on a full time basis in Vienna.

1928 First coloured picture book *Die bunte Welt.*

1928 First trip to England with Marie Reidemeister.

1929	Designed atlas Gesellschaft und Wirtschaft at request of Leipzip publisher. Vienna Circle manifesto appears.
1930	Worked with Hygiene-museum in Dresden.
1930s	Used Vienna Method for charts for the International Congress of Modern Architects (CIAM).
1931–34	Set up studios in Moscow (Izostat) to train Russian artists in pictorial statistics.
1933	Founded International Foundation for Visual Education in The Hague.
1934	February, crisis in Vienna. Neurath denounced by police as a Communist, organised transfer of Institute and family to political exile in The Hague.
1934	Founded Mundaneum Institute in The Hague. Collaborated with Paul Otlet. Founded the Unity of Science Movement.
1936	*International Picture Language* published. Visits Chicago and presents plans for publication of *Encyclopedia for Unified Science* to University of Chicago Press in collaboration with Charles Morris.
1937	Renamed International Institute for the Unity of Science, formed executive committee with Frank and Morris. *Basic by Isotype* published.
1937–42	Work in New York with National Tuberculosis Association.
1937	Death of Olga, the Vienna method becomes known by the acronym Isotype, coined by Reidemeister after inspiration from BASIC English. Arntz designs the new logo.
1936	'Around Rembrandt' and 'This Rolling Wheel' exhibitions in The Hague department store De Bijenkorf.
1939	*Modern Man in the Making* published.
1940	10 May, shooting heard in The Hague. 13 May Rotterdam burns, flight from The Hague to UK with Reidemeister. Escape from Scheveningen on 'Seaman's Hope' the official lifeboat of the Province of South Holland. Picked up by British boat, landed Dover, Neurath as 'enemy alien' interned in Pentonville, Reidemeister interned in Fulham then Holloway. Both later interned on the Isle of Man.
1941	Married Reidemeister on 26 February in Oxford. Founded Isotype Institute in Oxford. Start of collaboration with Paul Rotha on film projects.
1941–1945	Resided in Oxford.
1945	Lectured at All Souls College, Oxford on Logical Empiricism.
1945	Invited to Bilston work on Housing project. Died on 22 December in Oxford.

Red Vienna – a brief history

Vienna had historically been one of the most vibrant intellectual and artistic capitals of Europe, but suffered at the onset of World War 1 with the subsequent collapse of the Habsburg monarchy and the exodus of intellectual talent to Berlin. The middle classes were plunged into poverty by hyper-inflation and the discovery that War Bonds were now worthless. It was the time for the working classes to come to the fore. Vienna was proclaimed a republic on 12 November 1918 and at elections of 4 May 1919, when universal suffrage came to Vienna, the Social Democratic Party gained an absolute majority and Jakob Reumann was elected as the first Social Democratic mayor.

The city had many problems; it was full of refugees and former soldiers. The food supply for the inflated population was difficult to maintain, flats were overcrowded, and diseases such as tuberculosis, Spanish flu and syphilis raged. But this was seen as an opportunity for the Social Democrats to modernise and develop the city and attempt to create an experiment in working class culture.

> The Socialist party's attempt to create a comprehensive proletarian counterculture was not an experiment in a formal, methodological sense of positing a hypothesis, extending and texting it in practice, and evaluating its results. Its experimental quality lay in the daring attempt to explore the unknown – the blending of culture and politics through a complicated network of organizations aiming at transforming the working class. Even though the cultural project did not follow a blueprint but rather evolved on the basis of experience in daily practice, it flowed from a central belief in Austromarxist theory that culture could play a significant role in the class struggle. [...] Unlike other versions of Marxism, it promised a foretaste of the socialist utopia of the future in the present by locating the beginning of the great transformation leading to a new socialist humanity within capitaist society itself, before the ultimate revolution.[735]

Through extensive reforms in municipal housing, education, public health and social welfare, the Social Democratic party attempted to transform the minds and cultural lives of Viennese citizens and turn them into better party members. Helmut Gruber describes this Austromarxist perspective as a 'revolution in the soul of man'[736] – an idealistic experiment in municipal socialism, some measures being of a highly personal, paternalistic and puritanical nature; encouraging abstinence from tobacco, alcohol and sex without marriage. These measures were put in place to encourage a healthy socialist mind and body. Other initiatives saw an increase in schools, libraries and sports facilities and measures to help the role of women role in society.

Very unfortunately, the leaders failed to understand how the minds of the working classes functioned, and some measures, such as encouraging the working classes to listen to 'elevated'

735 Gruber, *Red Vienna* p. 5.
736 *Ibid.*, p. 6.

types of music and art (and avoid popular kitsch) were seen as draconian. Party members failed to see that the majority of workers wanted to relax when they were not working, rather than be educated.

The Social Democratic party in conjunction with the trade unions held firm control of Vienna, but this power-hold did not extend over the rest of Austria, where the Christian Social party and its allies held power. Austria was divided into two camps, the Social Democratic-run capital and some scattered industrial areas; and the farming and catholic provinces (the catholic church was diametrically opposed to socialism). The disequilibrium between Marxist Vienna and the clerical countryside was the dominating motif of Austrian politics until the rise of Hitler. Vienna was socialist, anti-clerical, and as a municipality, fairly rich. The hinterland was poor, backward, conservative, Roman Catholic and jealous of Vienna's higher standard of living.

On 15 July 1927 politically frustrated masses stormed the Palace of Justice and set it alight. Eighty-five workers were killed by police, who shot at the crowds . According to Gruber, this unrising represented a turning point in the progress of the Social Democrat's cultural programme; culture was superseded by politics as an instrument of class struggle and democratic election gave way to violence on the streets.[737]

Economically, post-war Vienna was unstable and unemployment remained high from 1925–30, reaching a third of the working population by 1933, many of whom were on the brink of poverty. The Social Democrats idea to tax the rich to pay for the extensive social programme did not significantly alter the harsh economic conditions of the workers. Trade Union membership declined and it was significant that the work place had been left out of reforms that had touched almost every other part of Viennese citizen's lives.

In March 1933 Chancellor Engelbert Dollfuss suspended parliament which had the effect of removing the constitutional safeguards from the working classes in Austria. Between 12 and 17 February 1934 a small minority of Austrian workers rose up to protect their democratic rights against Chancellor Engelbert Dollfuss' repressive, fascist government. It was in response to the gradual subjugation of the working classes in Austria, but was seen as a last desperate act which would see the end of socialism, paving the way for fascist expansion.

[737] Gruber, *Red Vienna* p. 10.

The Social and Economic Museum Vienna

Otto Neurath's 1925 Mission statement for the G&W, translated by Wendy Turkington

The Social and Economic Museum Vienna

Sections

Work and Organisation Public Health Housing & Urban Development

Objective/Task

To answer questions about society/community interaction of man through exhibitions, presentations, films and publications.

Tables and Examples

General outline of the key sections through an easily understandable pictographic writing system, that is used as international symbols, e.g. as 'labels' for categories in statistical tables

Properties

Defined description	Not clearly defined description
More objects (=)	More objects (=)
More symbols	Large symbols
Schematic likeness	'Natural' likeness
e.g. Cars	e.g. Cars
Germany 100.000	Germany 100.000
France 300.000	France 300.000
Columns of symbols	Squares and cubes
Easily compared	Very difficult to compare
e.g. zinc production	e.g. zinc production
Most accurately defined diagram of symbols needing minimal explanation	Emphasis through headcount e.g. 1 figure = 1000 people

Colours

Colours as fundamental differentiation

Men dark	Children green	Background distinct/recognised
Women bright	Old people grey	place relevant to depicted person, e.g. groups of people; children in the country on green background; children in town on grey background

Technique

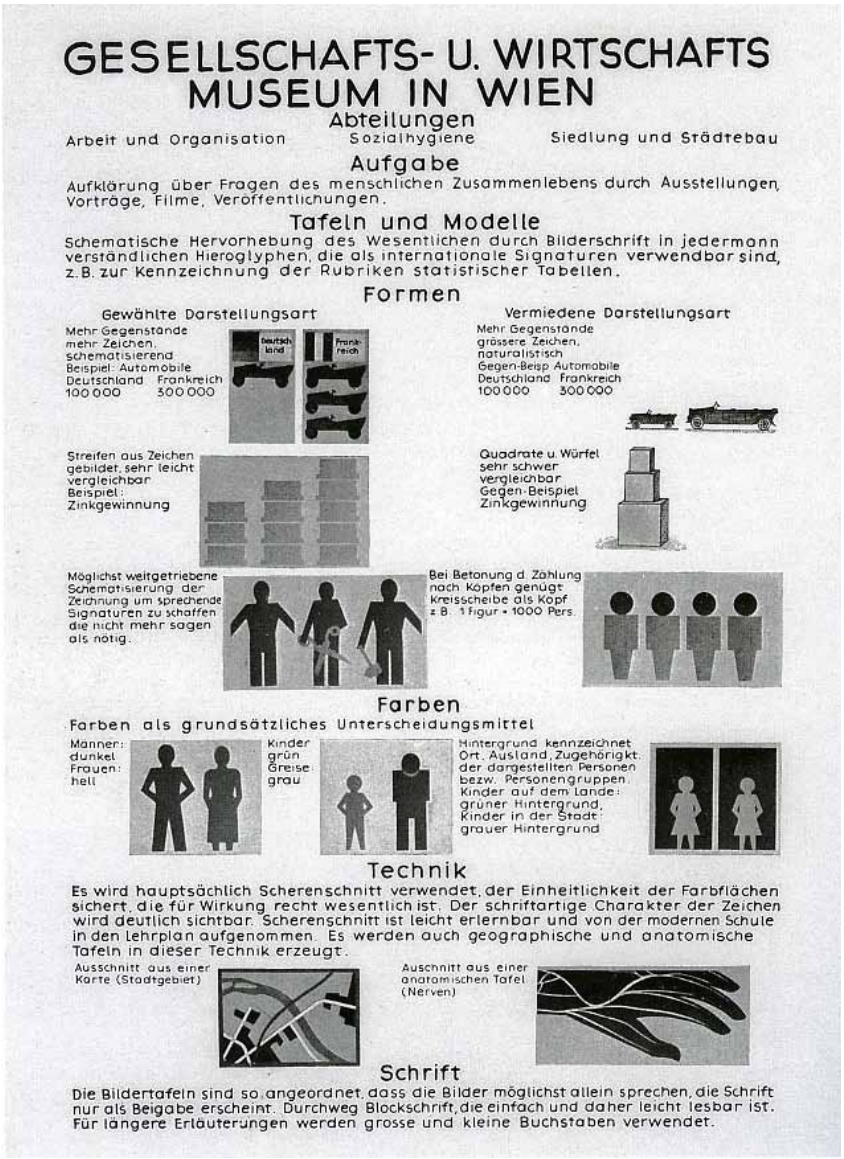
Predominantly implemented in silhouette and essential to standardize the coloured area. The typeface on the sign clearly visible. The silhouette is easily recognised and included within the modern school curriculum. Geographical and anatomical tables can also be produced in this way.

Detail of a map (city district)

Detail of an anatomical table (nerves)

Typeface

The pictographs are organised so that they stand alone and are easily interpreted and the text appears only as supplementary information. Capitals are simple and easy to read. For more detailed explanation, larger and smaller characters are used.



An explanation of early principles from the G&W (1925). ISOTYPE COLLECTION

Appendix 1

CASE STUDY 1 Transformation
The Natural History Museum in London

Edited transcripts of formal interviews with Dr Roger Miles, Michael Macdonald-Ross and Ron Nash, and responses to questionnaires from NHM transformers

Interview with Dr Roger Miles

1 September 2008
Head of the NHM Department of Public Services from 1975-1994
Location: the Library of the Natural History Museum, London

Dr Roger Miles was responsible for formulating, 'Museum technology' a technique used to power the Natural History Museum's 'New Exhibition Scheme', during the 1970s and 1980s. The inspiration behind this scheme was the Isotype principle of transformation.

What was your involvement with the Natural History Museum?
I came to the Museum, transferred from the Royal Scottish Museum in Edinburgh on 3 September 1968. At that time I was a palaeontologist working on fossil fishes, a curator and a researcher. In November 1971, as Head of Department I became secretary of a panel that the Director set up to explore the redevelopment of the biology-based galleries. Without any previous experience either of exhibitions or secretarial duties, I stuck at that work and my subsequent involvement in exhibitions stemmed entirely from that panel.

When the panel produced a number of reports, and the scheme was slowly getting off ground, the Director decided he needed more of my time. So on 1 July 1973, I was made assistant to the Director, seconded from the Department of Palaeontology, and I never went back. I guess that was a sort of probation because the Museum was planning to set up a new department to carry out the 'New Exhibition Scheme' as the project become called. On 1 January 1975, I became the first head of the new Department of Public Services. I remained Head of that Department (although it did change its name later to Exhibitions and Education in September 1994, when I retired from the museum).

How did you first hear about Isotype and the transformer?
The Museum got in contact with Michael Macdonald-Ross from the Institute of Educational Technology at the Open University. I think we got in touch with him because the Director had contracted a biologist from the Open University [Beryl Crooks] who came and talked to the Museum's Trustees. She mentioned the Institute of Educational Technology and how this new discipline was helping them to plan courses at the OU. She must have put us in touch either with the Institute or the Director, Michael Macdonald-Ross.[738]

You thought that the idea of distance learning was appropriate to the museum?
Yes I think it clearly was, although a certain amount of face-to-face teaching went on in the Education Section, which clearly was not relevant to exhibitions; in fact we later decided it

[738] Macdonald-Ross did not hold the post of Director.

wasn't relevant in dealing with school parties. Face-to-face teaching was not much help to us, so we needed distance-teaching skills information techniques. Michael Macdonald-Ross was persuaded to give a lecture to the Scientific Office Association in the Museum that arranged guest lectures about once every two weeks. He spoke about Isotype and other things (that must have been in late 1973 or early 1974). I'm sure that was my first mention of Isotype. I remember Michael Macdonald Ross was clutching a paperback edition of one of Otto Neurath's books when he came.[739] In 1975 there was the exhibition at Reading organised by Michael Twyman – by that time the Department of Public Services (DPS) had been born. I arranged for everyone to get on a bus and go to the exhibition. Michael Twyman gave us a lecture, and we saw the exhibition. There was a book published to go with the exhibition, [the facsimile reprint of *International Picture Language*] but also free handouts at every section, all colour coded, which where very useful subsequently – aide memoires of the exhibition. Those were the two key events in introducing Isotype to us.

What impressed you about Isotype, how did you think it was relevant to what you were doing?
I think the initial impression would be of the graphic design – the clarity and the desire to communicate clearly. And then from that, looking into the system. We learnt about transformers, which became the key concept for us. The transformer is someone who is working on behalf of the audience and intermediary, someone who mediates between the experts and the lay audience you're trying to communicate with. It seems strange, you would think haven't museums always been doing that? And I think manifestly not when you look at the work that had been done. Often, exhibitions, mounted by subject specialists, not only missed museum planners' work, but were for a specialist to show other specialists that they were fully up-to-date with their subject. No thought was given to the audience at all.

How did learning about the concept of the transformer effect the way you were working on producing the New Exhibition Scheme [NES]?
Before the Department of Public Services [DPS] was formed, there was a traditional exhibition section, and the curators would produce the specimens and the text. They would go in standard cases, and it was the designers' job essentially to make it look nice. There can't have been much more to it than that. We needed to gear ourselves up for this major project to communicate with an audience. It's a long story how we came from starting to plan the 'New Exhibition Scheme' [NES] and concentrating purely on the subject matter, to realising it was more about communication than it was about biology. That was the key, shifting from being subject-matter oriented to visitor-oriented, and asking what do we need to do to function as transformers in the museum? Neurath's is a very 'topped-down' system – it's Neurath who gets the information from the specialist and then tells people what to do, but in a national museum, particularly where the curators are the power breakers – you could not work such a system. You need to take care of more things, and more of people's sensibilities. So our key thought was in transformation; we are going to have to give equal weight to the science and the design; and transformation should be carried out by a partnership of equals, a scientist and a three-dimensional designer.

You were not doing that before Macdonald-Ross gave his lecture?
No and we weren't doing it immediately afterwards. That was a system that evolved, and this is where Alan Tout comes in.

[739] Miles later confirmed this was *Empiricism and Sociology*, Otto Neurath, Marie Neurath and Robert S Cohen, (eds), *Empiricism and Sociology* (Dordrecht, Holland: Reidel, 1973).

Alan Tout came in on the recommendation of Macdonald-Ross?
Yes, Macdonald-Ross had written to the Director, essentially saying "You are faced with logistical and management problems that you have never faced before". Because NES was a pilot scheme it had to be done quickly, and we were just starting off. Our first exhibition was 1100 square metres – an enormous exhibition.

This was part of 'The Hall of Human Biology'?[740]
Yes. You must realise that the last exhibition of that size was done using the old system by an external designer who had been appointed to work with the Palaeontology Department.[741] It was the Fossil Mammal gallery, that was much the same size as 'Human Biology' – a bit smaller, say 1000 square metres and had taken eleven years to do. I don't think Macdonald-Ross knew that, but he realised we had a logistical problem. He recommended Alan Tout, who at that time was working as an occupational researcher for Plessey's consultancy department. And Alan came in. Earlier in his career Alan had devised a project control system for the setting up of the Open University. But what he did for us went much further than that. First of all, he had to know what he was scheduling, so he had to look at the content and the structure of what we were planning to do in 'Human Biology', and find units which would form the basis of a scheduling system. He had to see what resources we had to actually implement the plans. Part of that was looking at who was going to do the design. Alan had been at Reading [the 1975 Isotype exhibition] with us, and knew about Isotype, and much of the thinking and decision-making was done in conversation between myself and Alan and some of the other people who were working with me.

Was Alan a member of staff at the museum at that point?
No, we hired him as a consultant. He was working at Plessey, and later left and became a freelance worker, and we employed him for much of the time. Alan Tout started working for the NHM in November 1974 so, I don't think he was at Macdonald-Ross's lecture, but he certainly came with us to Reading on the bus.

Mac's lecture was in 1974?
That was either late 1973 or early 1974. Alan Tout started November 1974, and wrote a series of 'working papers'. I think the first half dozen were critical, and in one of those (which are in the archives), you'll find a discussion of setting up these 'development' or 'transformer' partnerships. Over the years, (between 1974 and 1980), Alan wrote 60 working papers. The first half dozen are crucial, I don't think the others really added to much in the long term.

The key people were Alan Tout and Michael Macdonald-Ross?
Yes, in different ways, Macdonald-Ross, made the key suggestion to call in Alan Tout, and thereafter it was Alan Tout. In 1974 (via Alan Tout) we got in touch with Brian Lewis, Professor of Institutional Science in the Institute of Educational Technology [Open University]. He was a very good influence but not with respect to Isotype, and not quite so much in the practical sense as Alan Tout was.

740 'The Hall of Human Biology' (as it was to become known), was the first exhibition to be designed as part of the NHM's New Exhibition Scheme (NES).
741 Miles is referring to the system where the curator instructs the designer to simply make exhibits look attractive.

Was the concept of the transformer the vehicle that influenced the thinking behind the formulation of the Exhibition Scheme?
Yes, it was one of three things that were practically significant. The first came from Karl Popper, a philosopher of science who applied his philosophy to practical matters. Everyday politics was one of his great themes, and the practice of 'trial and error', which we decided to use to develop the exhibition scheme. That is why all through my time in the museum, evaluation was so important to our work. We didn't think we could jump straight to the correct solution, you had to put the exhibits out, evaluate them, see how they were working and then make the changes – that was the great theoretical basis for our work. That was reflected in setting up the department because we had an Evaluation Section, which I think was probably unique in the world at that stage.[742] We were certainly pioneers of evaluation in British museums. The Americans were rather ahead of us, but certainly in Britain, we were the first. So that was the first influence – and it was theoretical – it provided the framework.

The second was educational technology, which in those days before PC's meant programmed learning[743] and from that we got the basic rules of communication, which were later very elegantly stated in that paper by Macdonald-Ross and Waller.[744] That was practical that told us what to do when designing exhibitions. So we had a theoretical and a practical basis from those two first sources of influence.

The third comes from Otto Neurath's Isotype. The two things we got from that were first, team organisation – the idea of the transformer; and secondly, the idea of mediating between the specialist and working for the public. There were certain practical influences in setting up the team, but I think on the whole, I would describe the influence of Isotype as inspirational. So we had a theoretical basis in Popper. Educational technology gave us some tools to use and then Isotype was inspirational. To complete the list, there was Frank Oppenheimer who I met in the Exploratorium in San Francisco. He was 'trial and error' but he didn't work in a traditional museum, he worked in a 'string and ceiling wax' set up in a science centre – very informal. He could put exhibits out, see how they worked and replace them or change them. So he was actually doing the small-scale trial and error that Popper would have approved of, rather than our huge efforts, but Frank Oppenheimer was a great inspiration – but not on a practical level because his set up was so different from ours.

What do you remember about the 'pilot scheme'?
In those days, Frank Claringball was still Director and was very keen on communication. I gave a lecture to the museum about the New Exhibition Scheme (NES) fairly early on and rashly promised that we would keep people informed and produce a 'little display'. We called it an 'Open Day'. We had six 'development partnerships'. They each set up a small display of their work– 'DPS, Public Services Open Day', 6 April 1976, just about a year before we opened the exhibition. We were well on with our planning and knew what we were doing by that stage.

What was the reaction to this?
I don't think there was a strong reaction. There was no reaction against it, (that came later), when they realised it was so different from the traditional galleries.

742 Evaluative techniques to determine the relative success of exhibition charts was first practised by Neurath and his team at the G&W in Vienna from the late 1920s to 1934.
743 Programmed learning delivers information to learners in small manageable steps, which they can take at their own pace and receive immediate feedback.
744 Michael Macdonald-Ross & Rob Waller, 'The Transformer' *Penrose Annual,* 69, (1976), 141-52.

I've found plans in the Archive...
Yes, I doubt there were photographs. I could give you the names of people who were involved.[745]

It was really a pilot scheme for just one day?[746]
Yes, just one afternoon, or just one day, it was just 'string and ceiling wax'.

But you took it forward into 'The Hall of Human Biology'?
Yes, it was mock-ups of exhibits, largely designed in a room of 203 square metres.

Was it was well visited?
I seem to remember so.

Was the design team structure directly influenced by Isotype?
Yes, directly inspired by it and educational technology, the practical, the theoretical, the inspirational and the trial-and-error.

When I went through the Archive there is very little mention of anything to do with Isotype.
It's an inspiration, what I didn't see in the Archives was a design guide. Later on we wrote the *Transformation Reader*, which was directly inspired by Open University course readers. It contains edited extracts from articles in books, and an edited version of Marie Neurath's paper,[747] the one she wrote later in life. The design guide was done early on (Alan Tout said we needed it) – I don't think it's very readable. It doesn't say much about Isotype, but the *Transformation Reader* certainly does.

I didn't see anything on transformation in the Archives?
That went on later.

The systems for designing information, were in place before this?
It was a typical change, curators, designers, plus at the end, the exhibition, and an Education Section. The Education Section was essential if these exhibits were to mean anything to anyone, they needed interpreting after that, because they had been done by experts for experts.

Was the Educational Section absorbed into the Exhibition Section?
The New Exhibition Scheme group took over from the old Exhibition Section. I had the job of bringing these all together to make one department, which meant a lot of unpleasant reorganization. But the first merger on 1 January 1975 was the New Exhibition Scheme group with the Exhibition Section, making up the Department of Public Services. The Education Section was brought in about 6 months later.

745 Miles mentioned several of the scientists and designers involved in the transformation partnerships: David Gosling, Alan Ward and Nigel Hazelden (designers), Dick Vane Wright, Brian Rosen, Richard Lane (now Head of Science at the NHM), Brenda Walpole, Dierdre Janson Smith (all scientists). Several of these individuals have contributed responses through informal email and telephone interviews.

746 The 'pilot scheme' referred to should not be confused with the 'Pilot project', which became the 'Hall of Human Biology'.

747 *Transformation Reader* (Second Edition 1979) contains extracts from Marie Neurath, 'Isotype'*, Instructional Science*, Michael Twyman, 'The Significance of Isotype' *Graphic Communication through Isotype*, (University of Reading,1975), along with extracts from Neurath, *International Picture Language,* 'The First Rules of Isotype'. This is discussed in detail in Case Study 1, pp 94-101. Selected pages are also shown in Appendix 1, pp. 311-317.

Why did Claringbull decide that he needed to turn the 'circus of stuffed animals' (I think you might have said that) into something that was for the visitor?
You'll get the long answer for that from the history of the museum that was published in 1981. But in brief, his predecessor as Director[748] had wanted to turn the museum into a research institute. He got the museum transferred from its existing Government funding, to the Research Council. So the museum became one part of the Research Council, and that improved a lot of the science. It brought more money and status. When he had done that, he retired. Frank Claringbull (a neurologist) came in and the Trustees wanted him to do something about the public galleries. He had been in the Museum for over 30 years and knew it very well, but he didn't pretend to know what needed to be done in the galleries. He had two ideas which really guided our work, one was that everything was at too high an intellectual level (and that was easy to see in the Museum's publications for the general public, but it was true also in the galleries), the other was that all of the subject matter consisted of stuffed animals; a stuffed zoo was old fashioned, out-of-date. Biology had moved on enormously and Claringbull thought that the gallery should reflect biology as it was then. And so these were our two guiding ideas. But Claringbull was appointed with a remit from the Trustees to do something about the public galleries.

Would you consider that the principles of Isotype are still used at the museum today or do you think that they have been absorbed or evolved into a new system of conveying information to the public?
I don't know the exhibitions mounted since I've left, apart from a trip round the Earth Galleries when they opened. But from what I hear I doubt they've heard of Isotype, because they haven't heard of evaluation. I gather the practicalities of evaluation have been recently 'rediscovered'. That's a huge change from when we were the pioneers, and teachers of evaluation in Britain. So they've forgotten that, and probably forgotten all about Isotype. What I hope is that the notion of designing for the public, of mediating between the specialist and the public has survived and has spread through museums. But that might have come about anyway through changes in societies. We are living in different societies to that of the 50s and 60s.

You were probably the first museum to do what you did.
Yes I think we were.

You took a trip round America and Australia, I've seen the report…
I went from January to February 1976 – it was about 6 weeks, and that was far too late to influence 'Human Biology'. That was mostly designed and in production by then and installation had started. I came back, wrote that report and gave a talk to the Department. I tried to pass on anything I learnt and of course it influenced me – particularly on the subject of evaluation in practice.

Is that when you heard of the Exploratorium or did you know about that before?
It was on my list to visit. I met Frank Oppenheimer out there, a wonderful man, adored by all of his staff. If you look at sources of information, the best ones came from published papers in the States – literature by Harry Shettel, who had looked at programmed learning and educational technology and had taken out the principals. He had essentially set out the principles that Macdonald-Ross and Waller were dealing with rather later. The Americans

[748] Terence Charles Stuart Morrison-Scott was Director of NHM between 1960 and 1968. He had previously been Director of the Science Museum from 1956 to 1960.

were bolder about talking about Behavioural psychology, whereas to Macdonald-Ross and Waller, behavioural psychology was a bête noir – not to be mentioned. That was one source of information about educational technology and programmed learning. Another source came from Alan Tout, (but these papers were mostly from Harry Shettel). The other source was a book by James Gardner on design. The only connection with James Gardner was the exhibition he had designed in the Geological Museum. That was probably the first narrative multi-media exhibition in South Kensington, probably in Britain.

'The Story of The Earth'?
Yes. Some of our Trustees couldn't distinguish between that exhibition and our one. But interestingly a party of French people (who were planning 'La Villette'[749] in Paris) visited, and they all felt that you could immediately see a big difference between James Gardner's work and ours; his exhibition was still much more academic, it hadn't been transformed.

I interviewed James Gardner years ago about Isotype.
No, he wouldn't do it. His book had useful stuff about layout, at which we weren't conspicuously successful in 'Human Biology'. But I think you have got to see the theory from behavioural psychology that was applied in programmed learning to see that what they are really talking about are the basic principals of communication that are as old as mankind.

Which probably Neurath tapped in to?
Yes, Neurath, as far as I know did no evaluation.[750] Exhibits were put up and weren't changed, but maybe that was just circumstances. He made the key decisions and I'm not sure the designer had much input after that. It was a one-way system – top down. When they did discuss things between start and finish, it was the meeting of minds as to what the end results should be finally. But we just don't know how they worked in practice.

He had sound political convictions about educating people.
We avoided that, I hope we avoided it. Certainly with the evaluation and critical appraisals – they were knocking paternalism out of the water.

But Neurath's political climate was a lot more black and white...
The Vienna Circle was centred on Inductionist philosophy. It was as popular as Deductionist philosophy, two opposing approaches.[751]

Going back to when you were charged with making the new vision happen, what were your initial thoughts on how you were going to achieve this revolutionary role?
My seconded scientists (who worked with me on 'Human Biology') all came from the Palaeontology Department. They were very comfortable with the subject matter, so we produced a listed document. We first produced a 10-page outline and that was used to get authority to go ahead from the Trustees. Then we developed it into a 104-page outline and then we redeveloped it as a 143-page outline, with lots of behavioural objectives in it.

749 A 'hands-on' science museum.
750 There is evidence that evaluation of exhibits did go on at the G&W. In *The Transformer*, p. 25, Marie Neurath discusses how she took school classes around the G&W and through conversations with children, was able to 'notice when a chart was not easy enough to understand and this taught us, the producers, something'.
751 Induction/Deduction *The Oxford Companion to Philosophy* p. 194, defines deduction as 'A species of argument or inference where from a given set of premises the conclusion must follow'. The same book p. 432, describes an inductive inference as something that 'can be characterized as one whose conclusion, while not following deductively from its premises, is in some way supported by them or rendered plausible in the light of them.'

That was done with the help of Beryl Crooks, who was seconded from the Open University for 6 months from the Institute of Educational Technology. She was seconded to help us while Mac [Macdonald-Ross] had gone off to California for 6 months. We had this huge document that Beryl Crooks helped us produce and I remember Mac coming back. I met him at the back door and I remember saying 'thank God you're back, we need help!' Because it wasn't clear how we were going to go forward with that huge document. You could have given it to the designer, as in the old days and let them get on with it. In fact I think we had done that and it was clearly not going to work.

This was before Mac told you about Isotype?
That's when he wrote his letter, either he realised or we explained the problem and we sat down and talked about where we go from here, he was horrified with what Beryl Crook had done for us. We had developed this huge document with all of these behavioural objectives.[752] One of the things Alan Tout did when he took the job was to look at this document and say 'do you realise you have got 1000 plus behavioural objectives for the poor visitors to get through the exhibition, and you expect them to learn all of this? It's just crazy'. So to answer your question, my secondees from the Palaeontology Department working at the exhibition, had concentrated very much on the subject matter – and it was wonderful to have a chance to learn all this new stuff.

You got a little bit too deep into biology?
Well, I've always said, since the brief for an exhibition is not a text-book, this doesn't need to be, the important things are a storyline to get the structure. Your aims or your objectives are always the teaching points, so you know what you're dealing with and all the constants, whether those are people, or materials, or time.

Based on a budget?
And skills as well, it's no good specifying something you can't build and maintain.

You pointed out in your papers about how it was essential that you had people in-house that built the interactives and maintained them
The shortest feedback loop possible. Then they build, and they are maintained. When Alan came on board he was anti-evaluation because he said you've got this pilot scheme, all you can do is your best in the time available. Now we were able to fit in a little formative evaluation, but on the whole we decided that we would treat the whole exhibition as an experiment in the sense that we would put it out, and see what happened and then adjust it.

You ask about the principles of Isotype which are still in use, I think our idea of mediating probably survives. They probably survive in Dierdre Janson-Smith and Brenda Walpole, two obvious cases. Deirdre occasionally does work in the Museum. Brenda has probably worked in the Science Museum and I would think she retains something. When I left the Museum one of the jobs I did – one I enjoyed very much, was monitoring some science centre projects being funded by the Welcome Trust. One of them was the 'Life Centre' in Newcastle-upon-Tyne. But I would say nothing of Isotype was seen in that exhibition, absolutely nothing.

[752] Miles' definition of a behavioural objective is that 'the visitor will know X and will be able to correctly answer eight out of ten questions in a multiple-choice examination'.

Do you retain Isotype as one of your principles in terms of the design of exhibitions?
Yes, and in communication generally – clarity in communication. Try to know whom you're writing for and why.

I never saw any evidence of the visual side of it at all.
No, I wouldn't use Isotype charts.[753] But in the Conversatione room one appeared... and I hated it because it was not good. In a paper by Macdonald-Ross and Waller they produced an Isotype chart, and quickly discovered it's not as easy as it looks, it needs a lot of thought.[754]

I saw job applications in the archives. I was trying to find transformers, but you had changed the wording…
I did over the years its all part of communicating with other people. It is no good using words they're not going to understand, the one I favoured towards the end, particularly when we were working with external companies was 'researcher' because, I felt that was a job these people were doing which was transferable to other media. Whether written, audio-visual, research or television. They're called researchers in television and that's essentially what we were looking for.

It was fascinating to see the sort of people coming forward from your adverts and how well qualified they all were. You were very fussy about who you were going to have for your transformers.
We got some very good people in the first batch – Deirdre Janson-Smith and Brenda Walpole.

Over all, would you consider that Isotype has had a positive effect on museum design today or has it had any effect?
That's almost asking what has been the influence of the New Exhibition Scheme?

I think it is, yes.
It's hard for me to judge that, but I hope it's had an influence. I know our use of evaluation has, but I hope our design did. It's very difficult to separate that influence from changes in society as a whole. We opened our exhibitions in '75. [1977]. Democratisation in society had been going since the 60's and museums were changing and the number of visitors was going up and they were becoming more accessable. I hope it has.

Interview with Ron Nash

17 August 2008
Head of the Exhibitions Installation and Maintenance, DPS, Natural History Museum
1975-1987
Location: Highbank, Wittersham, Kent

How did you react when you first heard of the plan for the New Exhibition Scheme, and how did it differ from what you were use to?
My first reaction was total awe. It was completely different from any other view of how exhibitions are designed and produced. Before, comparatively it was a hit and miss, haphazard affair, where people got involved and un-involved and things meandered on for years to

753 There is sound evidence that charts similar in form to Isotype were used within the NHM, as illustrated within this case study.
754 Macdonald-Ross & Waller, 'The Transformer'.

produce an exhibition – selection, design and production. Roger Miles introduced to us a system that was both organised and had an underlying solid philosophy attached to the exhibition design. I had never come across an approach of that nature. Anybody that expects to turn around 1000 square metres of exhibition in a national museum in something like eighteen months, as far as I was concerned, was stark-staring mad, but it was perfectly obvious that he stood a very good chance of achieving that. He brought in a systems analyst, from Plessey, [Alan Tout] to work on the production side, and design production was really the key to how the combination of partnership of scientist-designer, and graphics (and all other aspects of the exhibition) were going to work. And I was struck down! Most of my colleagues at the time were rather appalled! Everybody thought they knew exactly how exhibitions were designed, and consequently were rather resistant. Whereas, to me, it really did seem a wonderful way of looking at exhibitions, with the thought of turning round many exhibitions over five to six years. Afterall, the projective life span of each exhibition was no more than seven years (it didn't work out like that), but never-the-less, at the time that was a figure that was mooted. I decided I would go along with the suggestions because the more I thought about it the more exciting I found it. And that's really how I reacted to it.

Why do you think that there was a need to devise a new exhibition scheme?
I can't remember the exact reasoning behind Roger Miles' ideas – why he wanted to produce exhibitions of that type, he obviously felt the museum needed it. The overall previous approach to exhibitions hadn't changed very much since the late 1930's – very two-dimensional and specimen-orientated, whereas in fact, Roger felt that the museums should be more didactic and should be available to a much wider cross-section of the visiting public.

What was your role within the New Exhibition Scheme?
I didn't have a role to start with at all. I was at that moment in charge of temporary exhibitions and maintenance. I kept the galleries up to scratch as far as the exhibitions were concerned, and had a small team of people that designed and produced very small exhibitions and temporary exhibitions in the museum. My first introduction, in reality to the exhibitions was the 'Pilot scheme'. When I got involved in putting it together, it was very simple. But there was a lot of conflict among the staff at the time, and soon after many people started to resign.

Why did they do that?
Well in all fairness, the chap in charge of the exhibition section [Michael Belcher] as it was then, felt that his nose had been put out of joint by Roger coming in, and taking control – which is understandable. He [Belcher], was getting a much more demeaning role than being Head of Exhibition Section. By the end it had been increased to a full-blown museum department, with five-times the staff, to say took nothing of the people from outside such as system analysts and people from Plessey [Tout].

Do you remember going round the Pilot scheme?
I can't remember an awful lot about it. I can remember the large photographs and things like that. It was very successful in prodding people into the direction that Roger Miles wanted them to go in for the production system.

And you could evaluate it?
Yes, he [Miles] was very keen on evaluation. He said he was going to evaluate the exhibitions and do market research on the people coming into the museums, we all said, including me, 'we know who comes into the museum, we know what they get out of it'; he proved we were

totally and utterly wrong in every possible way. We had to change our view on who came in the door, why they came in, how long they stayed, and whether they looked at an exhibition or not. So there were a lot of people making some very big changes in their existence in the museum at that time.

A totally revolutionary way of looking at museums...
It was revolutionary. I looked around and made enquiries, and no other national museums, or anybody else had gone down this route. As you know we got some very poor reviews in the media, from people who felt reactionary about how the museum was becoming popularist and trying to appeal to a wider range of participant.

I think there was a criticism in Museums Journal, and at one of the conferences in Birmingham or Edinburgh, Roger Miles was booed off stage at one point!
I can well believe that they were very frightened of the approach, and they were worried about the impact on them, whether they would have to follow suit. Anyway they did quite a good job in convincing everybody that they didn't want to go down that route.

Too much work!
Exactly, it's only within the last 10 years that a lot of museums have actually turned to him.

I suppose if you need to have a whole new department installed to make it possible…
It was costly. But at the time, the Director [Claringbull] said he wanted to leave his mark on the exhibitions when he retired – and he did – he got Roger in to shake up the exhibitions!

Where did he hear about Roger?
Roger was working in the museum on fossil fish.

You visited the University of Reading to see the exhibition on Isotype in 1975. Can you remember anything about it?
If I remember correctly, I looked it up, as a subject. I had heard the word bandied about in the exhibition. But bearing in mind that my role at that stage wasn't even certain – that I would actually never be positively involved in the New Exhibition Scheme (except within the overall installation and maintenance and temporary exhibitions), I didn't know an awful lot about it at all. I can remember the word "pictogram" kept cropping up. And the talk itself was rather meandering, it wasn't really very dynamic, but it did made me realise how useful that approach can be to get the maximum amount of information to the maximum amount of people in a very simple way. There was a talk and a seminar afterwards, so I guess a lot of people where rather struck dumb on the subject that day. Most of our seminars were quite lively, but that one wasn't.

And you also went round the exhibition?
Yes, I went round the exhibition. I think a lot of it I had already seen in illustration form in a book, or a couple of books I had glanced at in the museum library on the subject.

In museum terms, Isotype brought forward the idea of the designer working with the academic, and translating the information – but presumably, they were doing that before hand?
They were already doing that, but I never associated that with Isotype. It was a very logical way to produce an exhibition, but there are inherent problems in those partnerships and it was obvious that some worked better than others. And the scientists in my view were inclined to be

more pushy than the designers – which in a lot of ways was the wrong way round.

I think for the principles of Isotype to work, the academic and the designer have to have a real meeting of minds.
And that's rarely the case if you put people together.

Could you detect any influence of Isotype in the way that the New Exhibition Scheme progressed after you all went to Reading?
I didn't think anything altered from that trip to Reading, but I may not have realised it. Once we got into the 'Hall of Human Biology' I was into a world where I had no idea of what I was doing!

I don't think many people did, that's why it's changed so much!
I sometimes goggle at the fact that I did it, because I had no experience. All I was asked to do was to see the exhibits in. The job formed itself from there onwards. It got bigger and bigger and bigger and I got more and more involved. But at the time it was quite a horrifying experience. I was submerged in trying to make it work and succeed. At the end of the day I was going to be part responsible to be there for the thing to open! By Shirley Williams if I remember rightly, and it was quite terrifying at times! I loved it, every minute of it.

But you must have realised that you had a success on you hands?
I felt reasonably successful at the end, more than I ever did with any other exhibition. Mainly because there was nothing to compare it with, and what the success would be, other than it was working, and it was all there on the day.

Obviously the public spoke for themselves and said it was a huge success.
The public spoke, but don't ever forget the chap in charge of the Wellcome Institute called it a "lewd offal shop," and there was an awful lot of adverse comments in the press. But the public loved it and it was hugely successful with them, it probably still is… It was opened in 1976 [actually 1977] and it was there for 7 years – but it's still there now. Which is most of its projective life.

It's been changed constantly, re-evaluated and re-evaluated.
It was, once again an eye opener. Because to put cameras in an exhibition and have a team of people interviewing customers going in and seeing how much they learned; and spying on them all the way round, was quite novel and productive. The information from that changed all our exhibitions from then on.

It's made quite a change from what Roger described as a "circus of stuffed animals".
It was based on a minimum of information, unless you where steeped in that subject. And then most of the people that were steeped in that subject didn't go in because they had got the information they wanted elsewhere. I didn't know that at the time. I thought it was used by all sorts of people.

My first adult visit to the Natural History Museum was specifically to see the 'Hall of Human Biology' and that would have been about 1979. I probably wouldn't have thought of going at that point, as I thought it was where the kids went to see the stuffed animals.
As I did, as a child, just after the war. I used to go and see the stuffed animals and birds, you did get quite a bit of information from them, even if it's only about the sizing. You're not always aware in books where it says a tiger is 6 feet long, if you haven't been to see a tiger in

the zoo that is. You know it, when you see it. And the blue whale is always an eye-opener, – even though it's the wrong shape!
Thank you very much

Interview with Michael McDonald-Ross

25 June 2008
Head of Educational Technology at the Open University 1970s
Location: Department of Typography and Graphic Communication,
University of Reading

Michael Macdonald-Ross helped develop distance learning techniques at the Open University during the early 1970s. He has been cited as being responsible for introducing Dr Roger Miles to transformation.

How did you first hear about Isotype?
I am fairly sure that was from the University of Reading, Department of Typography and Graphic Communication. The Open University had started, and I was looking round for ideas that might be helpful. I met Michael Twyman and a lot of things followed on from that. I had seen one or two of the publications, but had not really realised what it was all about, so the key person who introduced me to it was probably Michael Twyman, and my involvement with the Open University was that I was part of a small consultancy that helped the first Vice Chancellor [Professor Walter Perry] to clarify his ideas about how university teaching should be organised. This involved three people – Alan Tout (an expert in production control charts and operations research scientist), Michael Neal (a reader in biochemistry at the University of London and also a trained forensic scientist who later became a management consultant) and me, much the youngest of the three.

For a few years I worked on projects that involved innovation in (mostly) higher education. We had other members of the consultancy who had a background in industrial training and so on. The Open University was an educational enterprise and we read the Planning Report before it was actually started. The Planning Report had been written in 1968 and was published as a Green Paper. When the University was launched it had a Royal Charter, it also had a Vice Chancellor [Professor Walter Perry]. The Vice Chancellor hired a number of staff before we actually got started. We wrote to him and said that we seen his Planning Report, and the idea of organising teaching at a distance and we had some ideas that could be helpful. He hired us to look at the area in the Planning Report labelled 'Educational technology'; it included editing and design and academic course production.

When we got there we discovered that he [Perry] had already hired a Head of Design and Head of Publishing and they saw these jobs in terms of what they had done before – consequently these were areas we couldn't really touch, which was a great pity because the publishing department was viewed as a kind of book publishing and it became quite obvious to me that the correct model in publishing was that of a newspaper or magazine and not book publishing. Secondly, the design studio's job originally was to design the covers, rather than the actual content of information, and re-draw diagrams which already existed in textbooks. There was a design format, (which was perfectly good typographically) and publicity information for universities, (which was very good in comparison to other universities at the time), so it's clear then that the Director of Design knew his job. What he hadn't done, (and neither

had the Head of Publication), was to think seriously about how different the University was from the work they had done previously. What we did when we came, was to think about the University's actual position as a new kind of enterprise, so from the point of view of Alan Tout this concerned how production would go, because normally in universities lectures take place in lecture rooms, and what one person teaches has no bearing on what another person teaches (and so on). But in this University, courses would be produced involving a number of academics, and they would have to be scheduled through a production process.

There was an industrial aspect of the production which Alan [Tout] took care of, mainly by face-to-face teaching and by designing the right kind of charts and so on. It proved very difficult for academics (and other people too) to work a production system – it's not a qualification for Open University academics to work six months in a car factory, so they really don't know what you do when one place effects what goes on in another place, that's a real lesson of industry which is almost completely missing from the academic profession. The one part we were able to have an impact on, was the construction of learning material by the academics. In a normal university, apart from lectures there are a lot of safety nets. There is a library, books, and a lot of people around you – invisible safety nets. There are people who do fail, but the failure rate in most of British universities was quite low at the time that the Open University was started. The Open University faced the strategic problem that most correspondence courses would fail our purposes, because they had a very high drop out rates. This is exactly what the Open University didn't want, because sooner or later the Government would axe us.

The Open University was founded under a Labour government – Harold Wilson with Jennie Lee as the Minister responsible, but it was not widely reported throughout the country, it had a lot of enemies from traditional universities, so it was quite clear that if it didn't do well it would be axed. The idea we took on board was of active learning. We saw people were not actively learning and they didn't have people all around them to talk to about the subject matter. So the desire was to design the relevant system to make up for the gaps in learning that you would face learning in your own home. This was partly done by summer schools. Tutors at all Open Universities always give feedback, they don't just mark essays, they give feedback and the tutors themselves are monitored – ultimately fired if they don't help students. Among other things the students perform self-help groups and so on. The idea of the course was to make the learning active and to some extent co-operational, rather than simply passive. Inside the text you would have little activities, and you would get feedback for the activities, so you would practice the many skills long before you ever came to an assignment and you practice the assignment long before you ever came to an exam.

We also moved into an area looking at an examination system and decided on roughly speaking 50:50 between course work and exams, which is almost universal now as a concept, but we were almost the only people in the country doing it when we started. Our preparation started in (early) '69 or mid 1969 and the first courses came out in 1971, so in about 18 months we created the foundation courses. There were originally four foundation courses, in maths, social sciences, humanities and science and some other things were added later. So this is just a broad picture of what the Open University was and as far as Isotype product was concerned, nothing in its product was anything like Isotype but some of the ideas that underlay the production were very similar to those that Neurath produced.

When did you hear first about Neurath's ideas?
Probably early in the 1970s. I transferred to a senior lectureship in due course, as I was spending most of my life on Open University work. I gave up consultancy and took a salaried job that gave me time to explore these things. It was therefore after the Open University work had started, that I found out about Neurath, so it's not too surprising that the appointment of the Head of Publishing and the Head of Design made it impossible to run the show. What I did do was to create the course team – composed mostly of academics, a BBC producer, an editor and an educational technologist working with the team and turning up at meetings.

This was probably the first time in the world that this had even happened in a university and probably the most useful single thing I did. The idea being implicit in the planning paper, so I can't entirely claim it was my idea, but the course team was produced as a result of a paper I wrote to the Vice Chancellor, and then I worked with some of the early course teams to help it go on.

The things that occurred in the 1950s onwards had their roots in World War II training, and one of these routes was programmed learning, because it was shown that programmed learning was more effective in certain kinds of learning than ordinary classroom teaching. When you go into World War, you have a lot of people of all kinds of abilities coming in and you want to know where to place them to get the best advantage, so you have a battery of tests. You always come down to the fact that here's a gang of guys in the field with equipment and something goes wrong and they have to fix it. They constantly face practical problems. The design of the manuals and the design of the training you give them beforehand is all dependent on "can they read" and "where do they go if they want help," I can tell you, they ask someone in their platoon. So let's hope he doesn't go and get shot! But World War II was the one where training technology began to affect education and people began to think that some of the things that we did in wartime should be able to be done in education. We had clear objectives and needed to test whether the objectives were met. This formed the basis of the movement, which was called 'educational technology'. It wasn't anything to do with hardware, it was to do with the human organisation of learning. So that was there, rather than Isotype, although the roots of both Isotype and programmed learning have something to do with industrialisation. It's the fact that you are dealing with lots of people together which makes the Open University a bit like the military machine in World War II.

I would say, that the not entirely definitive answer is that it [Isotype] wasn't adopted by the Open University, that's the simple answer. But some of the organisational ideas, though, they didn't actually come from Isotype were very similar. I think that Neurath had got hold of an idea that he called 'the transformer' which is very much broader than Isotype, and Rob Waller and I both think that putting out a newspaper every day or a weekly magazine is very much about a lot of things that concern Isotype, typography and graphic communication, having a good grasp of the audience, what the audience is interested in and their reading ability. In the case of academic material, obviously reading ability is really important. You want the prose to be attractive and comprehensible by the type of people who are going to read it and technical subjects require special typography, so that people can get access to the information. The whole organisation of that data is absolutely critical. No amount of technical qualifications really makes you a total expert; you will be an expert in the things that you actually studied or researched, and then you will probably be an expert in using the reference material of the trade – to get the answers to the questions which you don't know – getting access to get at it. Somebody has to design access devices to get the information that you need. And obviously

every technical subject is full of things that have to be looked up, and this is why in the middle of your battle you will still be having your technical manual or your computer and you will need to struggle to get the information out of it. I can't say that I have actually been in a battle, but when bullets are whizzing above your head the difficulty in getting the right answer out of a manual is much increased!

Yes, but in Isotype terms, you were faithful to the information and the end user, but because of the way that Isotype was represented, it could only ever be an overview. You couldn't go into much detail, but hopefully it would allow you to want to be interested enough to go to the next level of detail. So these limitations were there in its representation but not in the theory behind the transformer...

Yes, Neurath really attended to one or two really particular cases which all involved the social history of his time, where there were a small number of highly educated people and a very large number of lowly education people. If you had been around in Neurath's youth, you would have only had an elementary education unless you came from a good family, and that really sets the target for a lot of his thinking. In the museums, with an ordinary member of the public (self-improving people like the Victorians) come into your social museum in Vienna with the aid of basic literacy and an enquiring mind and are then able to take in a lot of social information which they would otherwise be totally ignorant of. That sort of setting is very typically Neurath. They did very much the same thing in Moscow, and they did much the same thing in their [Isotype Institute] books. The books are pitched at a certain level, most of the Isotype productions are middle-brow; definitely not working class, 'red top fodder'. There is nothing in it of interest to the average reader of *The Sun* as such. At the same time, they are not professional social science material, they are based somewhere in the middle, aimed at the ordinary citizen trying to improve himself/herself.

The actual sex of the viewer doesn't come into Isotype, a lot of the subjects they dealt with are a lot more male than female. It's hard to think of Isotype dealing with fashion. We have come through such social changes since Neurath's time, that it isn't too surprising when young designers think about using Isotype. They don't use the Isotype end product – but they may use some of the ideas.

Would you like to give me an example?
One of the things that Rob [Waller as a student at University of Reading (UOR)] first did involved a project that I set up with Michael [Twyman]. This project was about Isotype and Open University texts, so the idea was to look at how Open University texts from 1971 could be improved, based on formats produced by the Open University Design Department.

(Macdonald Ross describes the way that OU texts evolved…)
Course team discussions would take place on typescripts. In those days obviously manual typescripts, with tables, would be photocopied from source material and diagrams likewise. There would be some idea of what the illustrations would be, but the discussion took place mostly about the actual logic of the prose and the assessment material.

This [UOR] project went interestingly well, but the examples produced owed little directly to Isotype, in fact not all the material included social data which is the distinction I am making between Isotype as a product, and Isotype as a process, but in his example Rob showed what you could do with a numerical table/statistics and it became very clear that you could do a

great deal with tables to make them more legible or comprehensible. So I wouldn't say that Isotype was irrelevant.

I don't know of anyone who used the product [Isotype] extensively after Neurath's death. Marie did not possess the breadth of mind to see that the process was much more important than the product. She produced one or two things, rather slight, but rather like programmed learning, – nobody produces programmed learning in the way they did in 1962 – It's dead, but it is the concepts behind active learning, and giving feedback which are actually fundamental. In just the same way, the idea of grasping what the target audience can understand, and turning professional data into a form that is comprehensible is something Neurath did again and again – which is fundamental to what's done in good newspapers and magazines. It was also being done in the 19th century. Turning complex professional material into a form which can be understood by the ordinary person is not a new venture. The BBC used to do that, it still does a little, but on the whole, the mass-media moved, more into the direction of entertainment and less in the direction of interpretation.

In my youth it was the other way around, the BBC were heavily interested in interpreting culture for the masses – slight over-simplication. The BBC thought it was their job. And in science for the masses there were a whole number of people who spent their whole lives on it in almost all European countries. The common factors in all these different people are the popularisation of science, the better of kind of newspaper and magazine, the programmed learning movement, and the Isotype Institute – and there are probably quite a few other things that one could drag in. What they are all concerned with is re-working for the masses, so that it is more comprehensive to the non-specialist and to the less well-educated person.

And there are many reasons why people think this is important, the one that Neurath thought important was democracy, that's right at the heart of what he wanted to do. He was in a very small minority in German-speaking countries at that time. But the British at least had quite a long interest in democracy.

Literacy is at the basis of communication. Once they can read its the second part. Part one is the discovery of writing, then eventually there's a great universe of literacy that makes a fantastic difference politically, socially and in all kinds of ways. The Open University, military training, the Isotype Institute, the joint stock railway companies and the police print rulebooks, then if you misbehave, they can say that you haven't done it. So I see Isotype as part of this broad trend and I don't think it's not insignificant, but it's probably not the most important of these trends in terms of its coverage. The main reason for that is the way in which they [the Isotype institute] specialise in a very determined slice – I should think well over 90% of their charts deal with social and industrial motives perhaps at the same time. They work, it wasn't just that changes that were taking place in the world, it was that the Neurath's were socialists through and through. They had a view of the world and this probably limited their effect.

Once you have a political angle on something, what you do creates opposition automatically. The reality is that newspapers were probably the most important organs of communication throughout the population through the whole of the 20th century. I recognise the importance of television of course. Television does not (or did not) in the 20th century have anything to do with the written word. Although the BBC of course produced the lists, but directly speaking, television is simply a moving image with sound. But newspapers, are in print; their possible range is much greater and also they can tackle a different kind of project. The reason is very simple, if you don't fully understand you can re-read it. In television programmes, if you actually

ask them before and after a film on television, they don't remember the details very well. This was from World War II research from the American Army, and it was one of the reasons why the Open University decided not to use television. It fact it was one of our great achievements that we took Water Perry, (the first Vice Chancellor) and convinced him that it couldn't do the job and because of that, television becomes something ancillary, and the fundamental thing is the prose – especially with academic subjects, as by their very nature they are written subjects or at least printed so they couldn't include diagrams and tables.

I remember a lot of the earlier university films around that sort of time and they were incredibly wordy and consisted of someone standing in front of a blackboard.
Yes

Probably they wouldn't have had anything to do with the Isotype transformer
It didn't have anything to do with modern communication ideas at all, it had to do with the fact you had taken people from an ordinary university. Some of them were rather rigid; and we had people we couldn't put in front of a camera at all because they were unable to talk naturally. And of course people had silly urges as to what worked on television. So this took many years, but the BBC were very helpful, they had an idea about making good television and their weakness was only that they had prizes, internal prizes, they compete for them and they tend to like entertainment too much. Television is not a good medium for detail or for complex argument. It's extremely good at giving you an idea of a kind of scenario.

In ways a bit like an Isotype chart?
Well I think I wouldn't put it quite like that, basically if you want to show more of a situation you might well choose television. This is one of the limitations of television – you can't really discuss certain data except in the most naive way, Isotype charts do that well. The other factor which applies to all forms of training material (Isotype material), and so on, is whether it is cost-effective against the enormous effort in transforming it. This is why Rob [Waller] and I would pick on the transformer idea rather than Isotype generally. We would not bother trying to propagate Isotype if we could propagate the idea of transforming. Professions are cut up by the technology of the past. There is such a gap between the author and the printer or between the expert and the television studio. The process that led to that gap or transforming is done in an author/professional/good/bad way – all kinds of a motley collection of people, there is no such thing as a professional communicator.

In your article you did put forward the idea that a professional transformer could be trained and recruited.
He could be trained (that was my younger self) – and recruited, but there's no institutional space for him in Britain or anywhere else. The whole reason why you have university departments and other operators is that there will be jobs for people at the end. There are jobs for an artist, jobs for a technical draughtsman, jobs for a typographer and for producers, television producers/directors, but there are no jobs for communicators per se. What there are of course, are people who happen to be wonderful communicators. You could say who is the greatest transformer around? Perhaps it's David Attenborough, or the sub-editor of the *Evening Standard*, (but that might not be the choice now), but we did identify a number of people; we said that the sub-editor on a newspaper was definitely a transformer, there's no question about that. It might apply to specialist reporters when they try to tell you why one cricketer is better than another, and then they really try to explain something to the ordinary person. And then there are political people – if you watch *Politics Today,* you will sometimes see a remarkable attempt to explain something quite subtle to the ordinary viewer, and occasionally it really

comes off, and you really begin to see what lies behind some issues. So there really isn't any question that there are people out there who are extremely good at communication.

I was thinking about John Snow as well …
John Snow, yes, and there are quite a few others and what could I point to. They all occupy different jobs and for different reasons and the one thing that they don't have is anything like a qualification or a training in communication – of course they've had training as a reporter, television presenter and so on. The BBC does a lot of training and does most of the training for the other companies as well. But in fact a lot of it, they have taught themselves, by virtue of their own character and upbringing. It's a help to have been bought up in an argumentative family and to have a confident personality, because that will show on screen. But these are all the un-organised, un-trained, un-regulated, un-planned consequences of growing up in a better than average family and accidental genetics and so on. I am very struck, as I get older, by the fact that you can meet (in almost any walk of life, anywhere) people who are brilliant communicators and the one thing they share, (they do tend to share intelligence), is a realisation that it's important to be able to explain and to persuade people. But there's no such thing as training for communicators and when we talked about transforming we were still hopefully in our youth and ignorance that it would be possible to institutionalise some of this. The trouble is, occasionally you do get good communicators, but on a hundred times as many occasions you run up against bad communicators.

Did you ever actively recruit someone as an educational technologist/transformer at the Open University?
We did try to do so, I wrote the job specs…

Do you still have them?
(laughs!) Maybe... I wrote the job specs, I don't think they were terribly insightful, but I thought about what an educational technologist would do, before I thought about Otto Neurath, Isotype and transformation. In the Isotype system, there was only Otto, Marie really took over as the transformer when he was dead, and Rudolph Modley took over in America and he did more than Marie was willing to acknowledge, but really it was just his own name for himself.

Do you not think that when Marie and Otto and Gerd Arntz worked together they produced the best form of Isotype?
I think that Gerd Arntz gave something original and different from the others and he should be acknowledged much more, but I would fully acknowledge his role rather than Marie's because I am too well aware of her Teutonic, rigid psychology. As well as being a good communicator.

But in many ways, with Isotype you need to take it down to three areas

- *The visual, the beautiful drawing, the well considered symbols that only came out by modification and discussion with Arntz and Otto and Marie*

- *The style of graphic argument which had to be consistent, the 'Teutonic style' of Marie could have been useful there, and of course*

- *The methodology, the transforming, the discussion of the ideas that could be taken into a graphic argument, rather than a theoretical argument and then translated using symbols.*

I don't disagree with that. What I have to say about Marie, especially in an era when we weren't personally viewing it, is that the failure of the Isotype movement to make any progress in this country after the World War II – after Otto's death, is really due to the limitations of Marie's personality. I think she was probably one of the world's greatest Number Two's and that when she had Otto, she could breeze through society in his wake. He had a very fine mind and a lot of ideas, and he had been connected with a lot of very important thinkers in a very of productive phase of his life in Vienna, so I don't underestimate Otto's influence at all. I think the truth of the matter is that the kind of framework that Isotype was casting was too narrow. Because of the overwhelming interest in social matters, he had absolutely no effect on the world of newspapers for example, none.

Although the visual side of Isotype was definitely used in newspapers
Yes, it was occasionally.

Because it was such an easy technique to reproduce?
On a lot of occasions you get a lot of the Isotype figurines appearing, and yet the kind of real essence is not there. There is probably more usage for figurines outside Isotype than inside. But in the eyes of modern designers it is too much part of the modern art movement. I do know that a lot of young students here [UOR] won't use Isotype when they get out into a job. I know several who were interested in Isotype and still think it was a wonderful thing historically, but they don't think that the graphic side of it fits well into styles that will work in their particular jobs.

But do you think that their knowledge of transformation would fit within their jobs?
Oh, the transforming idea is much wider, as I have suggested. It's not just part of Isotype, it's part of every kind of communication which attempts to improve people. Now that's a very alien thing today as you will recognise that almost all newspapers have moved from information towards entertainment and they have done that because of the enormous pressures from, television – and the entertainment medium. Television does not deal well with complex ideas. It is not at the heart of science, it has programmes about science that superficially skate over the science, but it is not really science. When it comes to personalities engaging with each other, it is wonderful, it has given an extra life to films. Films now have a much wider audience on television than when they would have been seen in a cinema. Newspapers compete with films, they've been dragged towards entertainment, and this has created a divide in society between those who are interested in keeping in touch with not just high culture, but high science, philosophy and good literature. Television has some positive effects on people who don't actually read *Pride the Prejudice*, but do see it on the screen, so they get some idea of it. But in general we have a society when people leave full-time education and many of them don't learn very much at all for the rest of their lives – unless they are forced to go on training courses, and training courses are designed to be narrow.

Could you tell me how you first heard about Isotype? Was it before you met Michael Twyman?
I was interested in communication, not Isotype and then somebody told me, there was this guy at Reading who had similar interests so I turned up here, this would be circa 1970 and introduced myself and we started talking and he [Michael Twyman] showed me some Isotype. But I am sure I learnt about it at Reading. That was about 1970 or maybe '71 or '72.

At this point you were looking into ways to communicate complex information to learners at the Open University?
Yes, I was interested in that idea for some years before, but what I was paid for by the Open University was how to communicate, how to do what the Government had instructed us to do when nobody had ever done it before. In other words how to teach at university level without going to university. So naturally they thought they could do it on television and I explained to them why they could not. This was a struggle initially, and then a bright light lit up in my head and I said to the Vice Chancellor "if you do it on television it will cost you a fortune. If you do most of it in text and just do bits of it on television…" and he immediately realised that this would keep his budget within bounds. No more needed to be said, but the reason I said it was of course that text is a far more flexible medium than television. From the point of view that the ideas that can be expressed, television is fantastically good at certain things and fantastically bad at other things, so it's a medium that is intellectually much more limited. In any rate it's a source which is vastly more expensive than text.

Did you see the Paul Rotha films that the Isotype Institute produced?
Yes, I've seen quite a few Rotha films – his wartime films, and there it is questioned if the Isotype sequences in the films were the best way of doing it. They were okay and it seems that they got over a point.

Do you think that Paul Rotha thought that Isotype was a popular addition to his films?
I don't know, I naturally found Otto Neurath quite an interesting personality, that's the most usual reason that film producers start to use somebody, and I am not sure that Isotype was that popular in the '30s, it was certainly a period when it flourished, but in comparison just because something is known to us, doesn't mean that it was popular generally.

A lot of this is because of the instant cost concentrated on certain things which he (Neurath) believed were of paramount importance – most of these were connected indirectly or directly with socialism and industry. I think it's how significant they were to a society as a whole, it is very hard to estimate. I don't know of anyone who can answer a question like that. I think they were not as successful as they thought. For a start, the whole history of the 20th century is dominated by dictatorships that still rule very large parts of the world today, so if opening the citizen up to democracy was the intension, then they've failed. The fact of the matter is that it was attempted – even if it was a failure in standard society, because not everything succeeds. I think in the actual product, was a broad scale of failure. Some of the ideas it tapped into about the importance of communication and explaining to humble people (outside universities – and the elite) what's going on in their societies, probably one of the most fundamental things that the 20th century attempted – has been thrown off course with this modern obsession with entertainment, and nothing comparable to Isotype exists at the moment. Indirectly other people are using completely different approaches – i.e. the web, or databases of various kinds. These are really important ideas and will influence a large number of people, and they share some of the same ideas that information (once a privilege of small groups) should be made available to larger groups as part of a general democratisation.

So basically it doesn't matter whether Isotype has been a total success and influence on society, because it was heading in a direction which was meaningful, it was appropriate, it was well done within its limits, but it does have limitations, perhaps the Neurath's built too narrow a wall around it.

It has been stated that the Open University used Isotype (or the transformer), in their learning programmes. Why was this method important to the Open University when there are so many other mechanisms for learning out there?
No I don't think the Open University did take on Isotype. The basic structure came about before it. At the Open University, certainly other people knew about it – they would, it's to do with the business of communication to the masses, which is not an Isotype preserve. Many organisations set out to try to spread knowledge from the elite or small groups to larger audiences. The things that were introduced specifically to the Open University (like course units) was a product of the realisation that in almost every other area of life, industrial processes revolved around groups of people, not individuals. Here was a case where, because of the production process, there had to be an interaction between academics. The idea was to move this interaction in the direction of making the subject understandable to people working in their own homes. That doesn't have similarities to Isotype. Isotype was never adopted by the Open University as a specific element.

But aspects of it were?
Isotype, and what we did in the Open University (and a million other things) are to do with the growth of specialised technical knowledge, and the gradual changing of the world from dictatorships to democracy and a zillion other things are driving the current forward. Television and print, (because print was the first early runner), are very important, and Isotype rides on the back of it, and lot of modern learning rides on the back of print. A lot of what appears on the web is printing material, so I don't think it's a matter of just Isotype, but as Isotype being one of a number of movements contributing to the growth of knowledge. But there is something else going on at the same time, if you think a thousand years ahead, there will be more of the same. Knowledge will be vastly advanced and specialised, impossible to be kept in a simple human mind. Right from birth, people will probably be genetically programmed to plug into their computers. Isotype is just one way of handling this. It's very interesting historically, and for people with graphic design and typography backgrounds it is particularly appropriate.

But when you consider television, I am aware that Isotype is not consistent with it. The Open University Director of Design really objected to the injection of these ideas. He wanted to keep design inside the four walls of his design studio. The greatest difficulty was trying to get designers to understand – they wouldn't read the text so what you get from that is far from the Open University using Isotype, they were the exact opposite.

The transforming took place on the course and even then it was a kind of chancy matter where one course would do it and it was understood and done properly, and in another course it wasn't. Teachers are all different, one's much more confident than another. It's one of the root problems of face-to-face teaching, but it's a problem with course tutors as well at the Open University, and you couldn't say with any truth that they really adopted Isotype. Neither did they adopt the actual sort of graphic format, nor at least in the part of the University that did design and typography, nor did they engage in transforming.

There were some exceptions. I transformed a series of complex forms for the University and I've worked with individual designers in certain design studios and got them to understand what the forms were trying to do, and they enjoyed doing it. So I think if we hadn't had the bureaucratic Head of Design it would have got much further, I've no doubt about that because a lot of the academics would have welcomed ideas of how to communicate their ideas.

And a consistent way of communicating ideas…
Well its consistent, but you must remember that social statistics are a very small part of the University. Really if you had used Isotype ideas in certain design studios it would have been a transforming idea which was paramount, it would have had to be interpreted in different ways.

It was some few years into the life of the University when I decided to join, while they had a senior lectureship going. What I ended up doing was something narrower and more specific, which was running a small applied research group – the Textual Communication Research Group in the Institute of Educational Technology, for which I had written all the job specs [laughs]. Well clearly the place needed a typographer, one that could understand, who was also a communicator and one of the first staff members was Rob Waller after the student project we'd done here [UOR] on Isotype

Can you describe this project?
I came to UOR to give a seminar for a few years. Each year I suggested a project area which somebody might like to take up, and Rob was the man who was asked to redesign the Open University text material. Everyone involved took a course unit, (it must have been round about 1972 or 1973 when the first course units were available) and they designed how they thought it might work, and there were several good, well above average results.

As a result I got to know Rob and Paul Luna. Later I hired Rob as a research assistant in the Textual Communication Research Group and I hired Peter Walley, an environmental psychologist. The idea being, we would try and design some text experimentally to see how well we could get it to communicate and then we would find out how well it did communicate. It seemed like a good idea at the time. Like a lot of new ideas, it didn't have as much effect as I would have hoped at the time. Rob worked for us for a few years, before he set up his own design consultancy.

The second test took place at the end of my time at the Open University. I decided to measure the students' reading ability. It was the first time that a project has been done on adults not employed by the military. The problem with military adults is that they tend to be between 18 and 30, whereas Open University students have a wider age span. So we sampled text from three or four faculties, and we estimated the quantity of text in the course feedback modules, and measured the reading ability of students taking the course. We adapted standard psychological measures. People produced the same scores roughly speaking, even if they took longer at it. We ran the tests by correspondence. It was necessary for the test to be time limited.

We analysed all the text by computer to create a measure of readability, (a very rough measure but it gives you a ball park figure) and these results were all published, and they showed that a great deal of material published by the Open University was more complex than many of the students could understand. The students varied of course, but the University worried about how it was going to open itself up to readers of the *Daily Mirror*. They started putting their adverts in the *Daily Mirror* and wrote prose which was infinitely more difficult than the prose in the *Daily Mirror*, so they were guaranteed a lot of entries from people who couldn't read the course remits. And as it is, they dropped out. If you have a big miss-match between target audience and the actual task they are being asked to do, people give up. And this is bad economics and bad psychology because you don't want learners to have disappointment – it puts them off further learning. It is better for them to be less ambitious, but to succeed and then try again. They will gradually improve their reading ability, that's for sure.

The idea was to try alert staff to the fact that they were writing stuff that was far too difficult, and of course to a lot of them it made no difference. It was utopian in the worst sense, leading people to change, just because they ought to. Because they didn't change, it made no impact, but it remains the largest survey of adult readers at this kind of difficulty level that has ever been done. You're dealing with prose that is *Guardian* standard. The *Guardian* leads the standard and the reader is more typically *Daily Mail* or *Daily Mirror* standard, so there is a miss-match and that's quite a fundamental piece of information. The Neuraths never tested their stuff much. I can't talk about Neurath himself, but Marie was very anti-experimental design. I understand why – it's the sort of psychology she dealt with a generation ago where people have a very limited idea of what an experiment was. Whereas, what I did after Marie's death was to test the students to see what they bought to the learning situation and then see what kind of miss-match there was. The theory being that there's an optimum level of difficulty and most people like something to be challenging, providing it's within their grasp, to be able to solve a problem and this is a language standard. It's got a little bit of history in psychology and it's the right sort of thing to aim for. The trouble with open learning and the Museum [NHM] is that you have so much variety that nothing you do suits all ends of the market. The central problem with museums is that people walk in off the streets, aged from 5 to 70 and don't have a common purpose or common skills. They may not even speak English. The central problem in museums is that the target audience is chaotic and uncontrollable.

Also, if you were producing a learning package in the Open University, which is challenging to people of various different levels, then which level do you aim at?
In fact all they do is go and produce things which they would normally produce, and it's only the exceptional academic who is self-aware enough to re-think. Most of them are rippling about their particular specialties, and some of them have tried to write semi-popular books, but most of them have a history of not communicating with the general public and have worked in universities where the students are a very select group.

We tried to hire good academics and many of them come from elite institutions, but they are not necessarily writers. Professional writers can write at different levels, but if they're not a professional writer, then they basically write on what they did as a PhD, and go on reproducing it for many years. In the early days of the University people were selected for their demonstrated commitment to the aims of the University. Later on, that all went by the board, and people were hired on the grounds of a good research background and that didn't help the business of teaching. Some of the first people we had were the best. In the first intake of staff, we had an historian who could draw his own diagrams and produce wonderful graphs, and he produced all the graphics that went into his unit, we didn't have to do anything in the design department at all.

So you initially recruited communicators?
If we could find them, we tried to find people with the common touch, who were capable of putting their efforts into the design of teaching material and understood what the communication process was. We did our best. I have a whole number of copies that were never bettered by any of the subsequent intakes. But gradually, however well you started, they all deteriorate towards the mean, and that happened at Sussex [University] for example – that started off with a big bang. And it also happened at Keele, which in many ways the educational player at Keele was similar to the Open University. It's got foundation courses for instance; we had not only a smorgasbord kind of approach, but also the idea that we'd take people in and we'd have a foundation course which covered the whole of humanities or the

whole of the sciences. This would help us to pick out the ones which we were leaving behind and give them help, instead of hitting them with the whole calculus in maths, give them a kind of easy ride in, a sort of confidence booster.

What was your involvement with the Natural History Museum?
One of the [OU Institute of Educational Technology] staff, Beryl Crooks got in touch with the Natural History Museum, all of her own accord, and they hired her as a consultant. But that arrangement fell through, and I got to hear about it so I wrote in and said sorry to hear about it, but she's not the only person around (i.e. me). We did two things, we got Alan Tout (who had done the production system at the Open University) to meet them and do a version of the production system for the NHM's production of exhibitions. And the second thing, I did (which was something they already had in hand), was to suggest that they did some polling of their customers to see what they thought about it. We already did survey research at the Open University and they did so at the Museum. They had already started, so I can't claim it was my idea, but I did explain that the difficultly of museums is the target audiences. If you are saying you can design something for anyone who walks in through the door, its either going to be fatuous, or incomprehensible. It's very difficult. You can't deal with the infinite variety of humanities in something which is essentially static and pre-prepared. You might be able to do something on the web but that's a different story. But nevertheless, I did suggest that they constantly kept the audience in mind and polled them, and tried every tactic to find out what they could.

The third area I helped them with was the transformer idea. Actually Isotype came into it, I might have given a talk or a seminar. But I wasn't so much interested in getting them to put little figures in lines, I was interested in them setting up course teams, and in their case, the chair would probably be one of the Keepers, who the public never see, but have a lot of skills. But sometimes the Keepers are so dogmatic that they wouldn't listen to anything anyone said, and other times they did run into a lot of flack through adopting what some people from outside the museum would call the dumbing-down process.

Historically the Natural History Museum has been for two types of people, experts or students (who can get access to anything they wanted), and the public, who would come in and look at whatever happened to be on show, with nothing in the way of explanation (or a label with a little text). The idea would be to try and tell them what the biology was, and this is strictly because museums are repositories of objects (art objects in the case of some museums), natural objects at the Natural History Museum. And objects are not the whole of the science, but science is made up of this complex mixture of objects, experiments and conceptual information. They are all strangely woven together.

Why did you put forward the idea of Isotype to the Natural History Museum when it was part of your cocktail of learning methods and techniques for use at the OU, because the Natural History Museum do recognise the fact that they took up idea of the transformer and Isotype.
Yes, well I mean as far as Isotype is concerned you have to remember that Neurath started out in museums. It was obvious, potentially appropriate, but I don't think he'd done an actual natural history museum.

He wrote about it…
Yes, but doing is another matter. Anyway, obviously I would mention it, because it was a museum, not that the details of the actual [Isotype] graphics would necessarily be useful,

but the concept of the transformer was, I certainly did introduce that to them. And really, irrespective of Isotype, whereas newspapers have transformers, (they don't call it that of course, they are called sub-editors and features editors, and television has transformers and they are called directors). In the case of the museum, there's nobody operating that kind of role. What had happened before, is that fish exhibits were the property of the curator of fish and he would give the orders and they would stride around trying to satisfy him. So there's no transforming done at all. If you wanted any explanation you would have to buy the Natural History Museum's books they sold to the public, and they were quite informative in an old fashioned sort of way. But, because they didn't have anybody doing that sort of work, I think at first it did have a lot of effect, certainly Roger Miles' appointment as Head of Exhibitions [Head of the Department of Public services] did. I think he had two divisions under him, I think one was education for schools, and the second was exhibit programme stuff, so I think he had quite an important role. He was a former keeper in Zoology [Palaeontology], but certainly fish was his thing before he became more generalist. I only worked for him for a short period of time, maybe 1978, while I was at the OU. I think that the first Isotype [inspired] exhibition happened at the Natural History Museum in 1978.[1977]. I think they had actually been here, [UOR] – there were an awful lot of key people bussed down here in 1975 when they had the big exhibition.

What I did for the NHM was to introduce them to concepts which they certainly didn't have at the Museum at that time. I believe the most important one was the course team. I think that they never again operated with the keepers and the designers at arm's length, at least they might do now but that's because they've lost their touch. There were a lot of problems with these new exhibitions and they got a lot of bad publicity because some people didn't like them, so assessing them would be a job for somebody else. I wasn't really close enough, they didn't share a lot of the survey research information with me. I saw some of it but their survey research was very naive, when I was dealing with them. But what they learnt I don't know. I think again it's very difficult to introduce new methods to a place that is already running and it wouldn't surprise me if they don't use the same methods now.

The sort of people who stayed for a lifetime i.e. Marie Neurath would have one set of tools and ideas, methods are a complete anachronism, there's no job in which you can avoid all kinds of adaptations during your lifetime, so therefore this whole business of re-making yourself is very important. Now the NHM have a new Director and new staff and I think probably a lot of what I have seen has more to do with entertainment than it has with learning.

The new Darwin Gallery is interesting…
I haven't seen it but it should hopefully be state-of-the art. Yes at least they've got a lot to work on. I mean the amount of research in Darwin has been enormous; we've now got about sixteen volumes of letters and things like that. There's an awful lot of basic material which has come to light but one thing which that is open to query is how much they should display things that are not unique to the museum – I mean Darwin has been taught everywhere? Why should a museum be the place to teach it again? Is their programme of education actually coherent or are they not just repeating things that are done better elsewhere in other media.

Every exhibition has a number of objectives and responses to various key stages, which go hand-in-hand with the curriculum, and exhibitions are changed every ten years plus generally...
Certainly in an Open University course the lifetime is about eight years. You can change some things easily but they do last a long time, this is why it's not very reactive to changes in the

outside world. It's easier to change things if they are available on the web, where an awful lot of learning takes place now. I haven't really been very precise about what the Museum might have got from me, because of lot of it was not clear. I know that something like a course team was set up for the exhibitions that were done, fairly close to the time to those that were suggested to me and some keepers were very resistant, obviously they are naturally egocentric about natural life pouring away from Palaeozoic fish, and you are apt to think you are the only person that knows about Palaeozoic fish, and that's what the museum's job is, not all this new fangled nonsense.

There's always been a culture gap between scientists at the grass roots of it all and the people who are trying to explain to the public what it is all about, which is much less high brow.
Yes, this is why a gap exists between research and the public, because the public is not really able to understand what is going on in research. What they are entitled to is to have some sort of an idea if they are interested.

You'd like to think that a good exhibition is informed by the absolute expert in the subject who would just happen to be there at the museum and gain benefit from that...
Yes of course. It's not true in the case of Darwin, if they go into a museum like that, I can guarantee that the top experts on Palaeozoic fish will not be at the museum, but, that's another question, this is why art galleries and art museums stick with the product itself, they don't necessarily claim to have the world's art historians.

The 'Hall of Human Biology', (which I think was a real landmark exhibition), was virtually exhibitless. Everything was based on graphic panels and models which was a new departure for the Natural History Museum who were used to having exhibits in cases or glass jars. I don't quite know how they would have done an exhibition on human biology previously.
No they didn't, because they couldn't. What they had were objects.

Well yes they had objects and museum staff who were good communicators, (well some of them)
They did it outside of the museum, mainly writing books and so on.

Well that's about it in brief. I didn't do a lot of work for the NHM and if anything stuck at all I would be gratified and slightly amazed. And apparently not much has stuck over the twenty to thirty year period which is interesting. It may be that they are not doing their jobs as well as they should.

Well you need to investigate it anyway, because Isotype is a repeating thing, and with many other kinds of innovation if we'd been doing this forty years go you might have been interested in Basic English, which again was a wonderful idea, a system. There are a lot of books written in Basic English – none of which is given the time of day now, and Basic English is a better concept of an international language than any of the other artificial languages. Basically since people without bidding have chosen English as the international language, they have not chosen Chinese even though there are a vast number of Chinese students; they have chosen English and therefore Basic English you would think, would be a very prominent enterprise today, but it doesn't exist.

And Isotype, you would say, ought to have been around considering how much more knowledge we have about the social world, and how much more data and so on. You would think that would be prominent too, but it doesn't exist. That's not to say, of course, that they

didn't have some part to play and consequences and traces of which can be seen, but in general a lot of these idealistic, modernistic, socialistic endeavours have vanished from the earth like dinosaurs and seemed to be the natural thing forty, fifty, sixty, seventy years ago. Now they are curiosities, and nobody can really say how much they contributed to the present-day world. Perhaps it was quite important that we went through some of these periods. The 1930s was such a period of change and ferment with a lot of socialism, Nazism, totalitarian dictators and much of the mass media being concerned with propaganda – not information. Propaganda is the story of the 20th century rather than information.

It's sad but its true that we now have Prime Ministers who spend their time on propaganda, this did not occur in England until virtually recently. People who were thought to be good at media like Harold MacMillan were naive compared to Blair who could have been an account manager of any first rate advertising company. He had everything, the plausibility, the quickness of mind, the charming manner and many of the good qualities. People who met Blair thought of him as a very successful politician of the modern world who would have made an absolute killing in an advertising agency, he just fitted the bill, and yet he would have been thought to be a very strange creature in the world of the past.

Isotype and Basic English were non-trivial attempts to tackle the business of popular communications. There were many other attempts, (artificial languages), all aimed at this sort of Amazon river of trying to send information out from small elites to the massed population. No-one makes their minds up any more they just copy attitudes from things they hear and read on the television. It seems to me that the idea of informing the public leading to a better democracy is one of these ideas which has to have a question mark over it, something has gone wrong in this plan. It was too naive a model of what human beings were like, and that applied to sophisticated people like Neurath and the people who were interested in international languages. There is a sort of relationship between these people and the internationalist movement in general and the modernist movement in architecture. I think they are part of the same strain. There is a strong relationship and in many cases they would have known about each other and thought they were doing the same sort of job. I don't know what Neurath thought about it, but I can't believe he wasn't acquainted with people like Frank Lloyd Wright, the Bauhaus and a great number of other sort of radical/democrats in Central Europe.

The world has turned out very differently from the way it was configured, the world-wide crash of socialism was absolutely resounding. No-one thought that the Soviet Union could collapse the way it did and no-one could foresee that the more radical kind of socialism would not be voted in, in any country. But you get social democracy watered down so you can hardly recognise old-fashioned socialists. Blair got elected and re-elected purely because there was very little socialist substance. He wouldn't have got elected, neither would Brown. There are some wrong assumptions being made about human society and human beings, which mean that a lot of the pre-conceptions of the generations of the 1920s and 1930s are not being fulfilled in practice. I don't think it's a store against Isotype in particular, I think its just that intellectuals didn't know what the public was really like, and unfortunately people like Hitler and Stalin knew a bit about what the public were like, and despite the evil and perhaps madness, their perception of these peoples' limited mental grasp and other things about the public were quite accurate. It's a terrible thing to have say because it means that a lot of good people have wasted their lives (as well as a lot of bad people). You can look around the world, at Africa for example, and see that almost every country is in the grip either of a paranoid lunatic or in some cases a thief. There are a good number of deeply good men in charge of African countries, who can be counted on the fingers of one hand. That's very sad.

The world is not in a good shape. On the other hand the world has so many people in it now that probably it's making it much more difficult to govern. A lot of these ideas were conceived into a world, which had (in Neurath's case), not much more than a thousand million, perhaps fifteen hundred million in it. I was born into a world of three thousand million and this is increasing to perhaps six and a half million now? It is easy to forget the fact that having more people squabbling over less actually makes it very difficult, as things like education depend upon peace and people feeling secure. Otherwise you might as well buy yourself a gun!
You could say that Neurath's system was designed for considerably less people. Neurath's upbringing was pre-World War I, in Austria – a very stable country, and the culture and society had been very stable for a long time. Of course it did immediately face World War I which caused a major disruption, but we may not quite know what effect it had on him. The people I do know who went through World War I say it was a very traumatic experience, and a lot of things happened between World War I and World War II – which was like the second round of World War I. Many of the people who were famous in my youth, had become famous because after World War I they were pacifists and socialists. I am thinking of people like Bertrand Russell for example. Pacifists, socialists and elitists – and this applies to Neurath too. They believed that the world was going to get better, optimists or idealists. Better people found it harder to live with the world and the idea that the world might get worse, and thought that World War I was a terrible mistake.

Thank you very much.

Interviews with NHM transformers

Dierdre Janson-Smith

Scientist in a transformer partnership from 1979 to 1991
11 September 2008 (email response to questionnaire)

What was your involvement with the Natural History Museum?
I joined the NHM Department of Public Services in 1979, when the Museum decided to advertise externally for content developers with science backgrounds. I think they had 'gone through' the NHM curators who were interested in communication but who really wanted to get back to research – top notch people like Richard Lane and Dick Vane Wright. Roger [Miles] wanted people with no museum agenda, with open (malleable) minds.

Could you tell me how you first heard about Isotype and the Transformer?
I had never heard of either before I joined the museum. As the new recruits, the first thing we were given was a booklet about Transformation. [*The Transformation Reader*]. We had an intensive two-week training, where we were introduced to the theory…

Isotype was about communicating numbers/statistics clearly and 'honestly', without resorting to graphs and pie charts. The main idea was accessibility. I can remember diagrams with lots of little people in rows. But I can't really remember whether we applied it rigidly, or just absorbed the general principles of clarity, accuracy, accessibility and the power of clear visual imagery to communicate better than words. But then, I wasn't a designer. What was odd is that the 3D designers designed the graphics, and only at the end did the graphics team get hold of it – so all the development was done by someone who wasn't a graphic designer. Maybe Isotype made that possible, but it did lead to very unimaginative graphic design!

'Transformation' was much more the buzzword and philosophy for me. I found it very exciting, to be asked to think hard how to 'transform' information into something that a non-scientist could understand. The approach was extremely didactic – what we were taught was grounded firmly in learning theory, and the aim was very much to get across what you needed to get across.

We were introduced to 'The Enchanted Loser' – one of the images in the book that I remember very well – the basic message being that less is more, that crowded displays with loads of objects and labels actively hindered communication. I am sure this must be a key influence of Isotype.

With a lot of feedback from our in-house educational technology/visitor survey team, we were taught that we needed to develop exhibits that attracted and held visitors for long enough for them to absorb what we wanted them to learn. Transformation was about hooking and holding them, starting where they were. Our concept of engaging with the visitor was a lot less sophisticated – we were in a way being taught long-distance learning techniques (and there was an OU link, I think).

What were the events that led to the Natural History Museum considering the use of Isotype/ the Transformer as a method for designing exhibitions in the 1970s?
A few things combined. The then Director, [Claringbull], was frustrated by the stranglehold of the scientific staff over exhibition development (they basically did all the content and gave it to designers to fit in the cases. This meant not only that the exhibitions were developed for their scientific peers, but also that an exhibition took eleven years to do (I think the Fossil Mammal gallery broke the camel's back, according to rumour!) Graphic design was just making panels and cases look decent, and doing the scientific illustrations.

This Director also saw what was happening in museums in America – or maybe it was the science centres (Oppenheimer's *Exploratorium* was the Mecca, the fount of all wisdom when it came to the 'I do and I understand' philosophy). Roger [Miles] and his colleague Roger Hamilton in Palaeontology got enthused, and were given the task to create a new exhibition department to transform the way the museum communicated with its public through the exhibitions. Roger Miles took a very academic approach and got very excited by learning theory. I don't know if transformation was a term he found or invented. Certainly, it's very likely that Isotype would have been his baby.

Who were the key people involved in introducing you to it?
Roger Miles, of course. Mick Alt came from an educational psychology background, and he really drove the education theory. Rodney Eastwood[755] was his assistant. Giles Clarke took over from Roger Hamilton, who was by all accounts someone with enormous charisma and enthusiasm. Giles was always more academic in his approach. The team of designers and scientists (like me) was run on a day-to-day basis by Brenda Walpole and David Gosling.

In your opinion, did it influence the thinking behind the formulation of the New Exhibition Scheme? See above.
The most important influence I think it had, which is still something being 'discovered'

[755] Rodney Eastwood (assistant to the Director) was responsible for the coordination of the scientific content of new exhibitions. He is now Secretary of Imperial College London and Clerk to its Council and Court.

by museums to this day, is that it gave the designer a critical role from the beginning of a project. Nowhere else, even today, have I found the same role given to design in the very early clarification and shaping of content and concepts – maybe in the Netherlands at Leiden and, at science centres where interactives were developed by in-house scientists/engineers.

As content developers, we had to sit day after day convincing our designer (we worked one-to-one) of the interest and relevance of our content, as well as getting them to understand it. If they didn't understand it, we just had to keep working at it until they did. They were our 'naive visitor'. It was incredibly good training for getting to the heart of a subject. The influence of Isotype, then, is that it required that the designer, graphic or 3D, understand what they are designing. Rather than see designers as participants in the journey to communicate with visitors, they are usually seen as hindrances. (And the truth is, those who do not wish to engage with content, are!)

But the other key driving force behind our approach was learning theory – especially the old 'do and I understand' motto. The new exhibition scheme was based on a rigid didactic methodology, designed to test (sometimes to destruction) our ideas for exhibits against learning criteria, through formative evaluation. Although we talked about affect, etc., it was really communicating content we were after. We judged success according to how people could reflect back our identified messages.

In what ways did your knowledge of Isotype/the Transformer change the theoretical approach you were taking with NES in the mid 1970s?
Maybe by the time I joined [1979], it was accepted mantra rather than novel.

Can you state any actual instances of aspects of Isotype/the Transformer being used in the formulation of the design of educational exhibits?
The idea of looking at HOW to transform information would led us into wonderful and wild ideas, trying to come at things from very different, non-scientific angles.

Was the design team structure directly influenced by Isotype/the Transformer, or did it take more from educational technology?
I think it was both. We worked one-to-one and the designer was the first person to communicate with. But our methodology was very education technology based – learning objectives (actually I think they were teaching points then) had to be developed first, and all our design ideas were tested against them, both in meetings (which could be like Chinese communist self-criticism sessions) and in evaluation exercises. Looking back, it was both a brilliant discipline, which hasn't left me, and a straight jacket – one always asked why do something, rarely why not? I found moving into the private design world very liberating. And, over the years, working with different institutions, I realise that there is no one route to a good result, or indeed one way of predicting it. Mostly because the most unpredictable of all is the design quality/inspiration, which feeds the 'soul' and makes one want to engage.

What other systems for designing information were in place during the 1970s?
My understanding of the form of exhibition design at the time was that curators would assemble a set of exhibits (objects), and write the labels and background information for them, and hand them over to a designer to make it look good. The designer was a 'service industry'. This was certainly true of the old galleries, and at the Science Museum (I remember going across to see a friend developing the new Wellcome History of Medicine galleries, and meeting

a designer who had so many labels to put in, there was no room for objects.)

Would you consider that the principles of Isotype/the Transformer are still used at the NHM, or if it has been absorbed, or evolved into a new improved system for translating complex information?
In my last encounter with the museum, I felt that Roger's methodology had been lost, in that a new generation had come in on the 'Learning' ticket, and via new media, who had little knowledge of exhibition design, and an arrogance about their own point of view. I remember one training day, which I helped run, when the Head of Learning quite extraordinarily lectured us on things that Roger taught us, as if she had just invented it herself. Only the terminology changes, from teaching points to objectives to learning outcomes, but the basic premise is the same.

I think this is changing back now – the in-house exhibition team is building up again although really only on the content side. People there have been trained in the science communication field, which previously didn't exist. There are people from Australia and USA, too, to bring other perspectives and other methodologies.

There is a big difference in philosophy from that in Roger's day. There has been a slow shift in thinking about what we are trying to do, from making the *Public UNDERSTAND Science* (PUS) to *ENGAGING* them with it (PES), so the old strictly didactic days are over. You wouldn't dream now of merely evaluating the success of an exhibition in terms of what people had learned from it. And you'd be more interested in knowing how they would take it forwards, into their own lives.

(Scientists have been told for so many years that their work is impenetrable and they must break down barriers, that engaging with the public is a given starting point in any exhibition. Places that deal with human history tend to be more conservative, and often don't feel the need to 'transform' their information in order to communicate it – or use other methods to communicate – enactments, scenarios/dioramas, gallery characters, film etc. etc.)

Roger was – rightly for his time – determined to move away from exhibits of objects in cases, surrounded by academic treatises and labels. He didn't see the value of objects as things in their own right, but felt they should justify their inclusion. Storyline and ideas first, objects after. His approach was completely idea/content driven, so objects only had a place in an exhibition if they served a communication purpose. ('Human Biology' was famously attacked for having only one biological object – the brain and spinal cord). Nowadays, museums recognise the value of objects per se, for their 'real' qualities, for their aesthetic and emotional qualities (valuing too, what sets them apart from Science Centres). I doubt the museum will ever go back to Roger's time.

More widely, things have changed because we have had 20 years of 'science communication' training. We also had to deal with the 1980s–90s charging regime, which altered how the museum (and lots of other places) saw their visitors. The need to entertain and amuse them became much more important, so the interactive approach got a lot more support. There was a lot of pressure generally on science and scientists to communicate with the public who gave them money.

Overall, would you consider that Isotype/the Transformer has had a positive effect on museum design today?
I am not sure about this. Unless you see both as part of the wider move to understanding how to communicate with visitors. Design influences come from so many places. For me, graphics is one of the areas in which external influences, e.g. in using graphic design 'environmentally', have been very important. I always see the graphic design as an integral part of the whole multi-sensory/multimodal experience of an exhibition – and texts as part of the graphic design rather than just 'the words'. I'd like to think that this has given graphic design a higher value in exhibition design.

I rarely if ever come across any one using classic Isotype approaches – my instinct is that such communication is more likely to end up on a computer screen, animated in some way, rather than relying on fixed graphics. I personally think we owe a lot to the wider art and multimedia world – we've benefited from changing attitudes in Britain to modern art and design. And what we can do now to evoke, play with and explain ideas is radically different to what we could do then, and what we considered appropriate.

That said, I still feel that the discipline of thought I learned through Isotype/transformation training was immensely valuable. I still find myself with groups/institutions who don't talk meaningfully about communicating with visitors – especially once you go outside the science/natural history world. Even if I work with people who do, they then merrily ignore their audience – and everything they have paid someone to find out about it – because it doesn't suit them to change what they want to do.

Under Roger, you had to just work until you found a way of communicating. Time constraints, and the fact that museums employ outside designers on limited budget and limited time, rather than have this one-to-one dialogue built in from the start, no-one has that kind of time any more to really test and try again. (I'd say the Science Museum under Heather Mayfield is the only place I've worked with in recent years where that's not true, and that is the legacy of a very powerful evaluation education team.)

Alan Ward 3D designer in a transformer partnership
from 1975 onwards
26 January 2009 (email response to questionnaire)

What was the job title under which you were recruited?
I was recruited as an exhibition designer for the then new 'Hall of Human Biology'.

What was your involvement with the Natural History Museum?
I worked as the design partner in a transformer team.

Could you tell me how you first heard about Isotype and the Transformer?
I had seen examples of Isotype at art collage but first came into close contact with the principles when Alan Tout was brought in as an external consultant to work on the 'Hall of Human Biology' (HoHB).

What were the events that led to the Natural History Museum considering the use of Isotype/the Transformer as a method for designing exhibitions in the 1970s?
As I remember this was introduced as part of the changes that Alan Tout suggested. The

underlying idea was to create a common graphic language to help us put over some of the more complex ideas in the HoHB to members of the public. This led to the visit to University of Reading.

Who were the key people involved in introducing you to it?
The three key individuals were Roger Miles, Alan Tout and to a lesser extent David Gosling.

Did it influence the thinking behind the formulation of the New Exhibition Scheme?
I do not think so, the underlying influence was to turn the exhibitions in the museum away from a collection of specimens based on taxonomy, into a cohesive biological based learning experience for the visitor. Isotype was looked at as a possible way of codifying information across all aspects of natural history

In what ways did your knowledge of Isotype/the Transformer change the theoretical approach you were taking with NES in the mid 1970s?
The key change was two-fold, the first was the introduction of the Transformer team bringing designers and scientists into a close working relationship, the second was the requirement to view the information from the lay-persons perspective rather than the perspective of the expert in particular the taxonomist.

Can you state any actual instances of aspects of Isotype/the Transformer being used in the formulation of the design of educational exhibits?
From memory no, but it did suggest that in many ways a diagrammatic approach to presenting information was more successful than specimens and labels.

Was the design team structure directly influenced by Isotype the Transformer, or did it take more from educational technology?
Overall the transformer team was taken as much from educational technology as Isotype. In conclusion I would say that in our experience, Isotype worked best for statistical information where much of the interpretive work had already been done and the system was employed to represent the information in a way that was both statistically correct and intuitively understandable. Much of what we were trying to do fell outside this. Although there were examples of Isotype being used for other types of information the results were no more or less successful that other methods. In all the time I was involved with designing exhibitions we never carried out independent evaluations of the different approaches to putting over information, although we did test exhibits with visitors.

What other systems for designing information were in place during the 1970s?
There were no other systems in place and as we did not have time to test options until they went into an exhibition; we had no opportunity to learn or adapt our designs.

Would you consider that the principles of Isotype/the Transformer are still used at the NHM, or if it have they been absorbed, or evolved into a new improved system for translating complex information?
I do not know as I left many years ago

Overall, would you consider that Isotype/the Transformer has had a positive effect on museum design today?
I do not think that Isotype had any effect apart from making us think about what we were trying to do when seen from the visitors' perspective. But the idea of a transformer team made up of a member of the scientific staff and a designer was beneficial as it allowed a dialogue to develop between the scientist representing the information and the designer representing the visitor and this was the key change that the new exhibition scheme brought in.

David Gosling Head of Design and Head of Exhibition Development from 1975 to 1984

9 September 2008 (email response to questionnaire)

Although I'd seen ISOTYPE used in books when I was a child, I had no idea what it was until Roger [Miles] brought it to my attention, I think, via Brian Lewis at the Open University.

I think that one should separate out the idea of Isotype and transformer. The concept of transformation of information and hence the idea of a transformer was important because we developed and designed exhibitions, as far as possible, with the museum visitor in mind. Previously, exhibits had been developed from an academic standpoint and, generally speaking, the scientists simply utilised their information structures on the assumption that if they could understand them so would the general public.

I don't think ISOTYPE and transformation were as important as your questions imply. NES [New Exhibition Scheme] started with a re-appraisal of where natural sciences stood in the seventies and the structures represented by the museum at that time were no longer appropriate. The natural sciences were more concerned with processes such as evolution, ecology and so on, which were not represented in the galleries. Teams of scientists developed an outline plan of a different way of presenting the natural sciences in the museum. That was really the starting point of the NES. Roger took over the new department and began to address the problem of how to go about it. If anything governed what we did, it was scientific method rather than ISOTYPE. Karl Popper was more important than Otto Neurath. Roger went about discovering what would enable us to undertake such a large project responsibly. Via the Open University, he introduced cybernetics, psychology, educational science and information design, of which Isotype ideas were a relatively small part. For example, Time-Life books used a team approach for developing their books and to my knowledge this had no basis in Isotype thinking, it was just a very good way to go about it – an interplay between people with the knowledge, the editors and the designers.

I don't think Isotype graphic models played much part in actually communicating information in the exhibitions as they weren't appropriate. The scientist/designer partnerships had their origins in the transformer but the number of partnerships employed had more to do with getting the work done in a predictable amount of time hence the involvement of cybernetics in the planning.

The only other system for communicating information in the seventies was the educational science approach adopted by the Open University, certainly there were no others that we were aware of. Roger drew together a number of appropriate models from elsewhere and created a methodology from them.

Having worked for the Natural History Museum on the *Restless Earth* gallery, some time after Roger left, I could see no evidence of an Isotype or transformation approach coming from the museum. We designers were very largely told to get on with it. I don't know for certain if things have changed, but I feel everything seem to collapse after the NES lost momentum. It was certainly actively rejected by many of the exhibition designers of my acquaintance.

I think that the kind of organised and rigorous approach adopted in NES was only possible in a publicly funded institution. All the museums I have designed since have had, as a priority, economic concerns and although education was important, it was feet through the door that mattered most! To achieve this, designers spend more time dealing with affective concerns than educational ones – i.e. unique selling points.

One of the problems with a heavily structured approach to communication is that it does not lend itself well to dealing with emotional issues. For example, I designed a museum about the First World War in Ypres, Belgium. The economic prerogative was to raise visitor numbers from the original 60,000 to 130,000. We chose to use the words used by the participants themselves to convey the experience of being in the war and this brought about a different approach that used not only artefacts, but artworks, sculpture, film, and poetry. This was unlikely to have come about by taking a strictly rational approach. The whole experience became much more theatrical and submersive – for example, instead of "recreating" a sanitised trench experience we focussed on what was going on in the minds of men in battle. To achieve this we created an abstract space which utilised fragments of film, sound, smoke lights and so on with the voices of the participants of the battle recollecting their feelings at the time.

I only dwell on this to illustrate the fact that museums' objectives can vary widely and information design may not be the best starting point. It wasn't at the NHM either.

Roger Miles, 22/8/08

Origins of New Exhibition Scheme and its pilot exhibition (Human Biology)

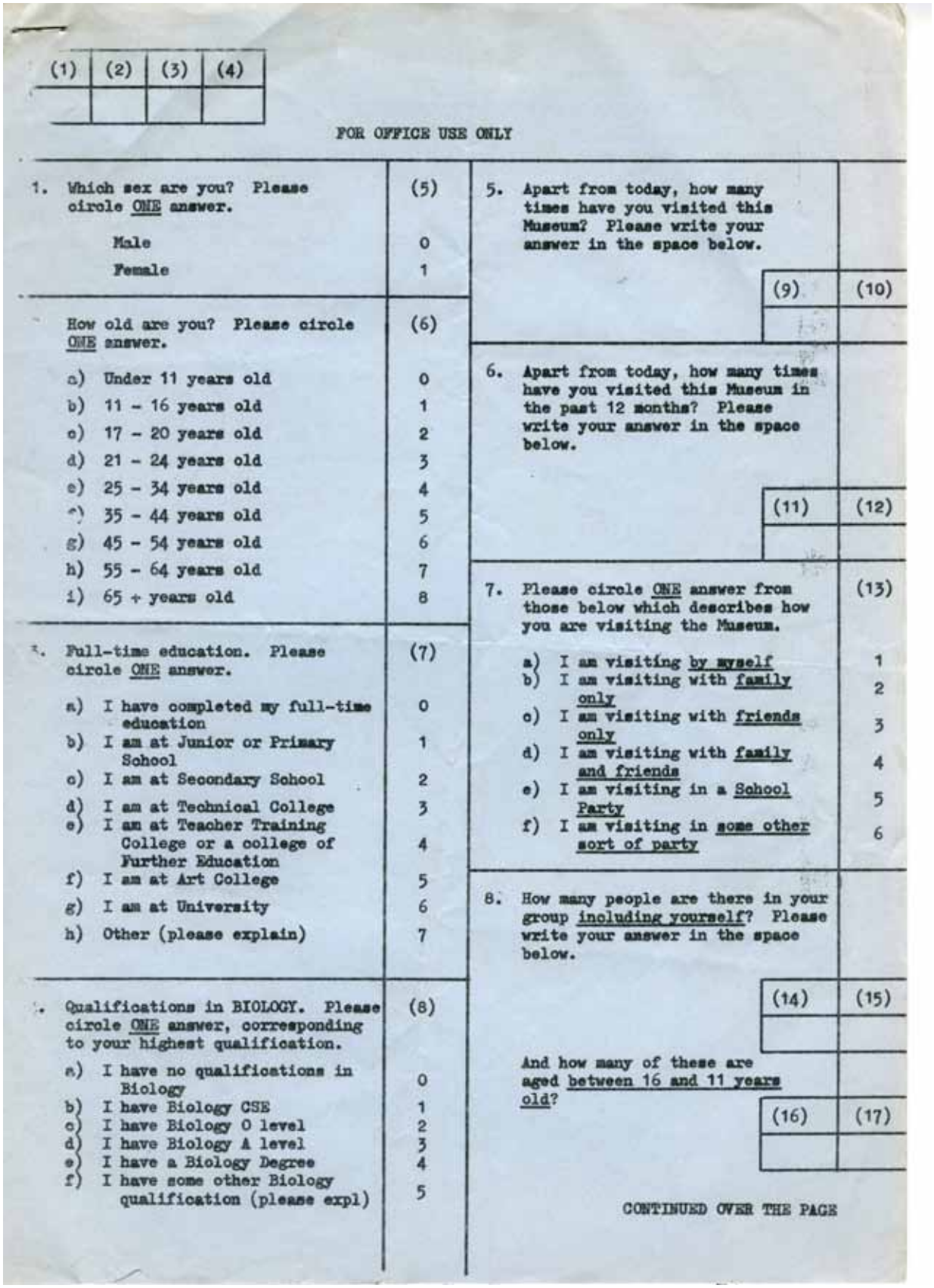
Date	Activity	Outcome	Comment
1.12.1968	Dr GF Claringbull (Keeper of Mineralogy) appointed Director of Museum		Trustees wanted the new Director to redevelop the public galleries. He first removed galleries from the control of Keepers and took responsibility for them himself. This was a first step towards an unified exhibition policy
1970—71(?)	Director chaired group of scientists to consider how galleries might be redeveloped in terms of scientific content	None	Document in archives throw light on this stage of work. It was before RS Miles (Palaeontology) became involved.
November 1971	Director set up and chaired an Exhibition Panel comprising 12 members of the Scientific staff plus the Education Officer (F Brightman).	Trustees' Paper (February 1972), *A proposal for a new approach to the visiting public*	RS Miles was the Secretary of the Panel. The paper, approved by Trustees, set out four themes for the New Exhibition Scheme: (1) Man, (2) Ecology, (3) Life Processes and Behaviour, (4) Evolution and Diversity It was prepared by a subgroup since the full Panel had proved unwieldy. Subgroup included the Director, RS Miles (Palaeontology), JFM Cannon (Botany), LA Mound (Entomology) and perhaps one or two others
1972	Three small working parties of scientific staff set up to develop detailed proposals (of content) for the Man, Ecology and Life Process and Behaviour themes	Large documents, placed in the Library Reading Room for all Museum members to read and react to	The Evolution and Diversity theme was not developed at this stage since the Director felt the Museum had sufficient experience in the area. The Ecology working party was chaired by JFM Cannon (Botany), the Life Processes and Behaviour by RS Miles (other members were CR Curds and V Southgate (Zoology) and R Vane-Wright (Entomology)
1973	New working parties set up to rework proposals (of content) of the first three themes and to work up Evolution and Diversity for the first time	Large documents, again made accessible to all through the Library	C Patterson (Palaeontology) chaired The Evolution and Diversity working party. R Forty chaired that for Man. About 40 scientific staff in all were involved in the two sets of working parties

Roger Miles, 22/8/08

1973	Decision taken to mount a pilot exhibition, drawn from the Man theme, to test the Museum's ability to carry out the programme of new exhibitions, which was now called the New Exhibition Scheme.	Ten page outline (content only), for an exhibition on the life history of the individual, completed in July 1973.	A small group comprising RW Crosskey (Entomology), AL Rice (Zoology), TI Molleson (Palaeontology) and RS Miles (by then seconded from Palaeontology to the Directorate) carried out this work. This outline may be the document sent to outside assessors, including JZ Young and B Tanner (both University College, London University?). Documents in archives may confirm
1973	Development of exhibition brief (content only) for pilot exhibition	Completion of 104 page document in December 1973. This formed the basis of Trustees' paper 74/3 (April 1974), *New Exhibition Scheme: Aspects of Human Development,* which secured authorization for the project to go ahead.	WR Hamilton, RS Miles, TI Molleson and BD Rosen (all Palaeontology) developed the brief. External consultants were Angela Hobsbaum and J Versey (Institute of Education, London University)
1974	Redevelopment of brief for pilot exhibition	Completion of revised brief of 195 pages in August 1974	Redevelopment was necessary because the original brief contained too much material for the available space, and the subject-matter had been worked up in too much detail. The work was done by the same team as before plus the addition of Beryl Crook, on secondment from the Institute of Educational Technology, Open University from March to September 1974
November 1974	Employment of AF Tout (Plessey, later self-employed) as consultant to the New Exhibition Scheme	Series of Working Papers that over the first six months set out guiding principles for the design and production of the pilot exhibition.	M McDonald-Ross (Institute of Educational Technology, Open University) had written to the Director on 22 August 1974 to say, 'Your staff are faced with a management problem more demanding and more complex than any they have handled hitherto. Therefore, I recommend that a project control system be set up. To do this you will need the services of a consultant experienced in these matters; I recommend: Mr A F Tout,…' Between 1974 and 1980, Tout wrote over 60 Working Papers covering all aspects of New Exhibition Scheme work

Roger Miles, 22/8/08

1.1.1975	Formation of Public Services with RS Miles as first Head of Department	DPS became responsible for all of the Museum's biological galleries. Its first task was to complete the pilot exhibition	The Department was formed by merging an existing Exhibition Section with new staff brought in to develop the New Exhibition Scheme. This group included a writer (A Bedser), since the Director was concerned about the quality of Museum writing for the general public. The existing Education Section joined Public Services six months later
1975	Basic planning and organisation of team for the design and production pilot exhibition, still known as *Aspects of human development*	Definitive brief for the exhibition, a document of 30 pages, produced in March 1975. This was soon followed by first floor plan, first schedule and project control system	Scientists were seconded to work on the exhibition. These included WR Hamilton, TI Molleson and BD Rosen (Palaeontology), R Vain-Wright and R Lane (Entomology)
6.4.1976	DPS Open day	Exhibition arranged in Conversazione Room, for all Museum staff, to show progress on Human Biology	Communicating with Museum staff about the redevelopment of the galleries was a major concern during early years of work, hence the number of Museum Notices and staff lectures devoted to this theme
1975—77	Design, production, installation and opening of *Human Biology*	Exhibition opened 24.5.1977 by the Secretary of State for Education and Science, the Rt Hon. Shirley Williams MP	Site preparation and exhibit production was done in co-operation with the Property Services Agency of the Department of the Environment, who provided engineering services and contract drawings, arranged contracts and supervised all shop-fitting aspects of the work



(1)	(2)	(3)	(4)

FOR OFFICE USE ONLY

1. Which sex are you? Please circle ONE answer. (5)

Male 0
Female 1

How old are you? Please circle ONE answer. (6)

a) Under 11 years old 0
b) 11 - 16 years old 1
c) 17 - 20 years old 2
d) 21 - 24 years old 3
e) 25 - 34 years old 4
f) 35 - 44 years old 5
g) 45 - 54 years old 6
h) 55 - 64 years old 7
i) 65 + years old 8

Full-time education. Please circle ONE answer. (7)

a) I have completed my full-time education 0
b) I am at Junior or Primary School 1
c) I am at Secondary School 2
d) I am at Technical College 3
e) I am at Teacher Training College or a college of Further Education 4
f) I am at Art College 5
g) I am at University 6
h) Other (please explain) 7

Qualifications in BIOLOGY. Please circle ONE answer, corresponding to your highest qualification. (8)

a) I have no qualifications in Biology 0
b) I have Biology CSE 1
c) I have Biology O level 2
d) I have Biology A level 3
e) I have a Biology Degree 4
f) I have some other Biology qualification (please expl) 5

5. Apart from today, how many times have you visited this Museum? Please write your answer in the space below. (9) (10)

6. Apart from today, how many times have you visited this Museum in the past 12 months? Please write your answer in the space below. (11) (12)

7. Please circle ONE answer from those below which describes how you are visiting the Museum. (13)

a) I am visiting by myself 1
b) I am visiting with family only 2
c) I am visiting with friends only 3
d) I am visiting with family and friends 4
e) I am visiting in a School Party 5
f) I am visiting in some other sort of party 6

8. How many people are there in your group including yourself? Please write your answer in the space below. (14) (15)

And how many of these are aged between 16 and 11 years old? (16) (17)

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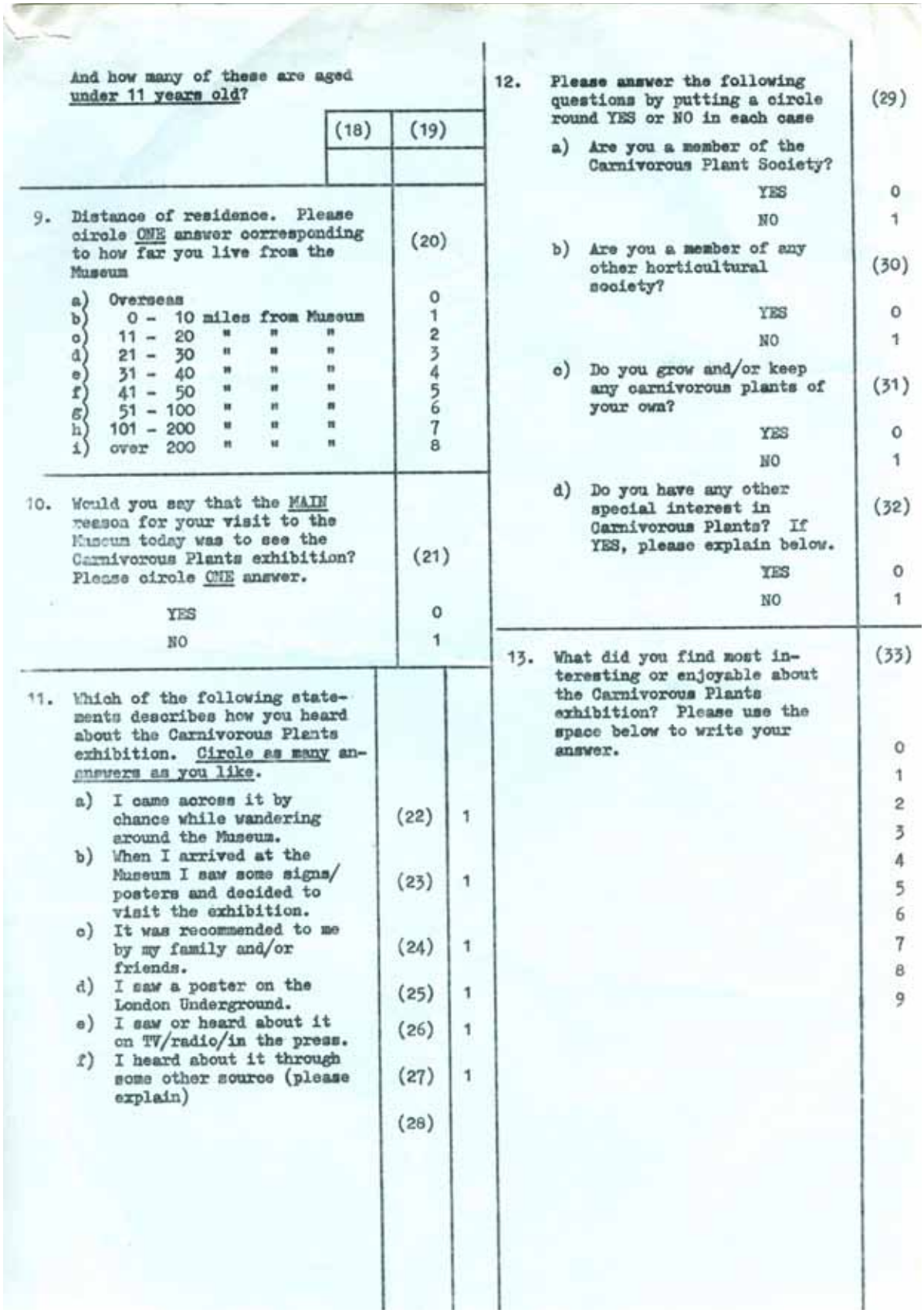
Audience evaluation questionnaire from the Natural History Museum circa 1984.



And how many of these are aged under 11 years old?

(18) (19)

9. Distance of residence. Please circle ONE answer corresponding to how far you live from the Museum (20)

a) Overseas 0
b) 0 - 10 miles from Museum 1
c) 11 - 20 " " " 2
d) 21 - 30 " " " 3
e) 31 - 40 " " " 4
f) 41 - 50 " " " 5
g) 51 - 100 " " " 6
h) 101 - 200 " " " 7
i) over 200 " " " 8

10. Would you say that the MAIN reason for your visit to the Museum today was to see the Carnivorous Plants exhibition? Please circle ONE answer. (21)

YES 0
NO 1

11. Which of the following statements describes how you heard about the Carnivorous Plants exhibition. Circle as many answers as you like.

a) I came across it by chance while wandering around the Museum. (22) 1
b) When I arrived at the Museum I saw some signs/ posters and decided to visit the exhibition. (23) 1
c) It was recommended to me by my family and/or friends. (24) 1
d) I saw a poster on the London Underground. (25) 1
e) I saw or heard about it on TV/radio/in the press. (26) 1
f) I heard about it through some other source (please explain) (27) 1

(28)

12. Please answer the following questions by putting a circle round YES or NO in each case (29)

a) Are you a member of the Carnivorous Plant Society?
YES 0
NO 1

b) Are you a member of any other horticultural society? (30)
YES 0
NO 1

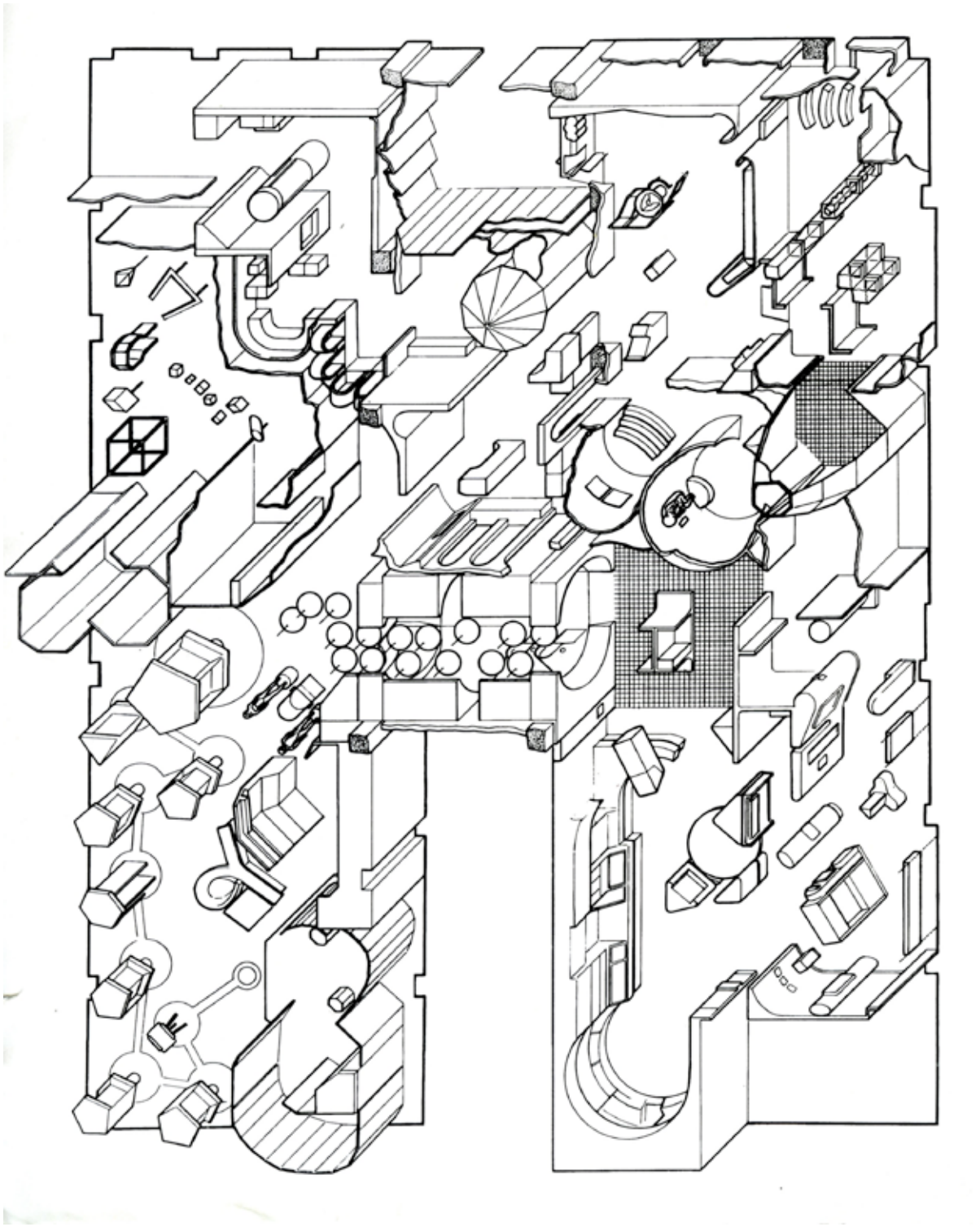
c) Do you grow and/or keep any carnivorous plants of your own? (31)
YES 0
NO 1

d) Do you have any other special interest in Carnivorous Plants? If YES, please explain below. (32)
YES 0
NO 1

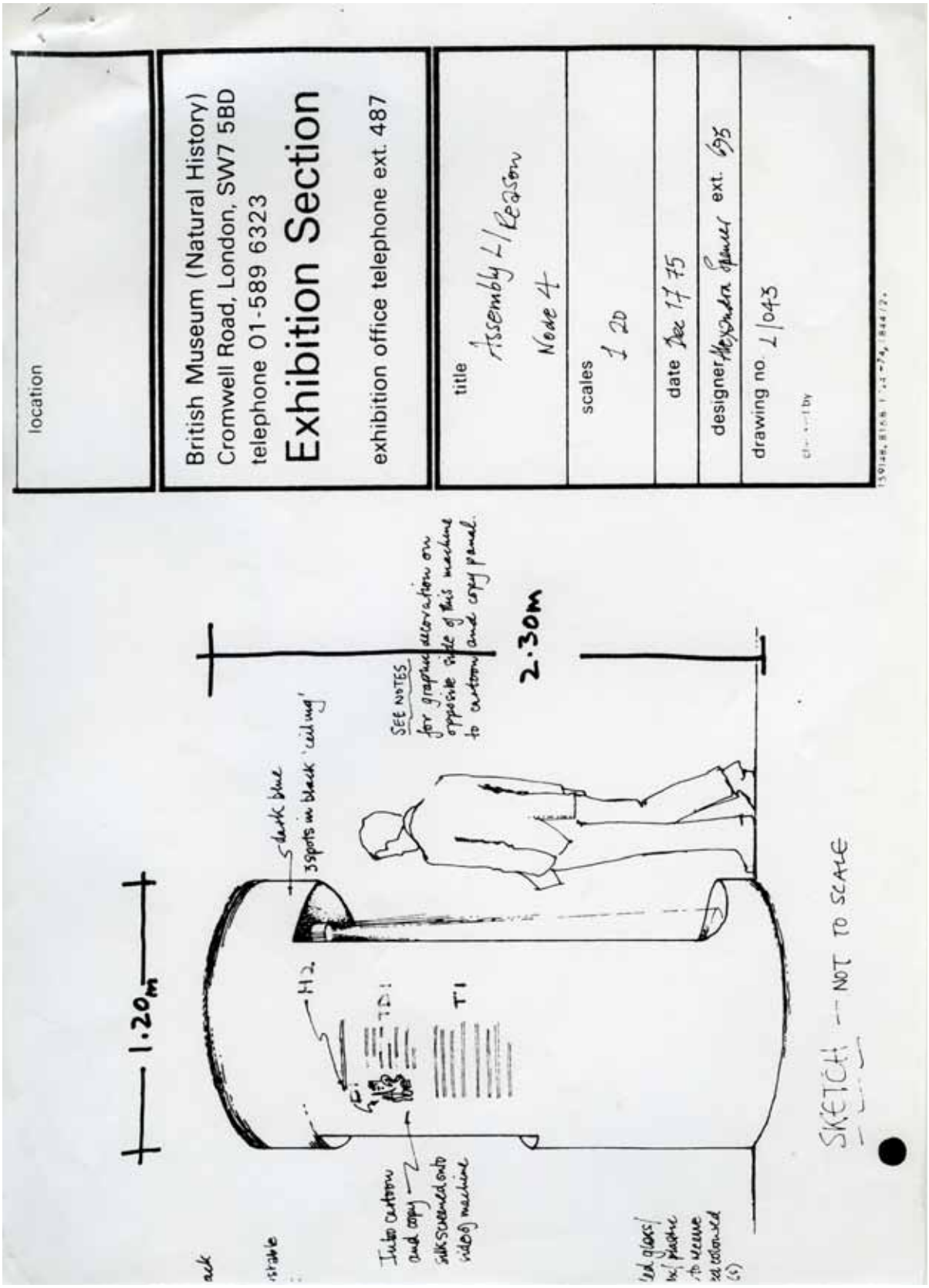
13. What did you find most interesting or enjoyable about the Carnivorous Plants exhibition? Please use the space below to write your answer. (33)

0 1 2 3 4 5 6 7 8 9

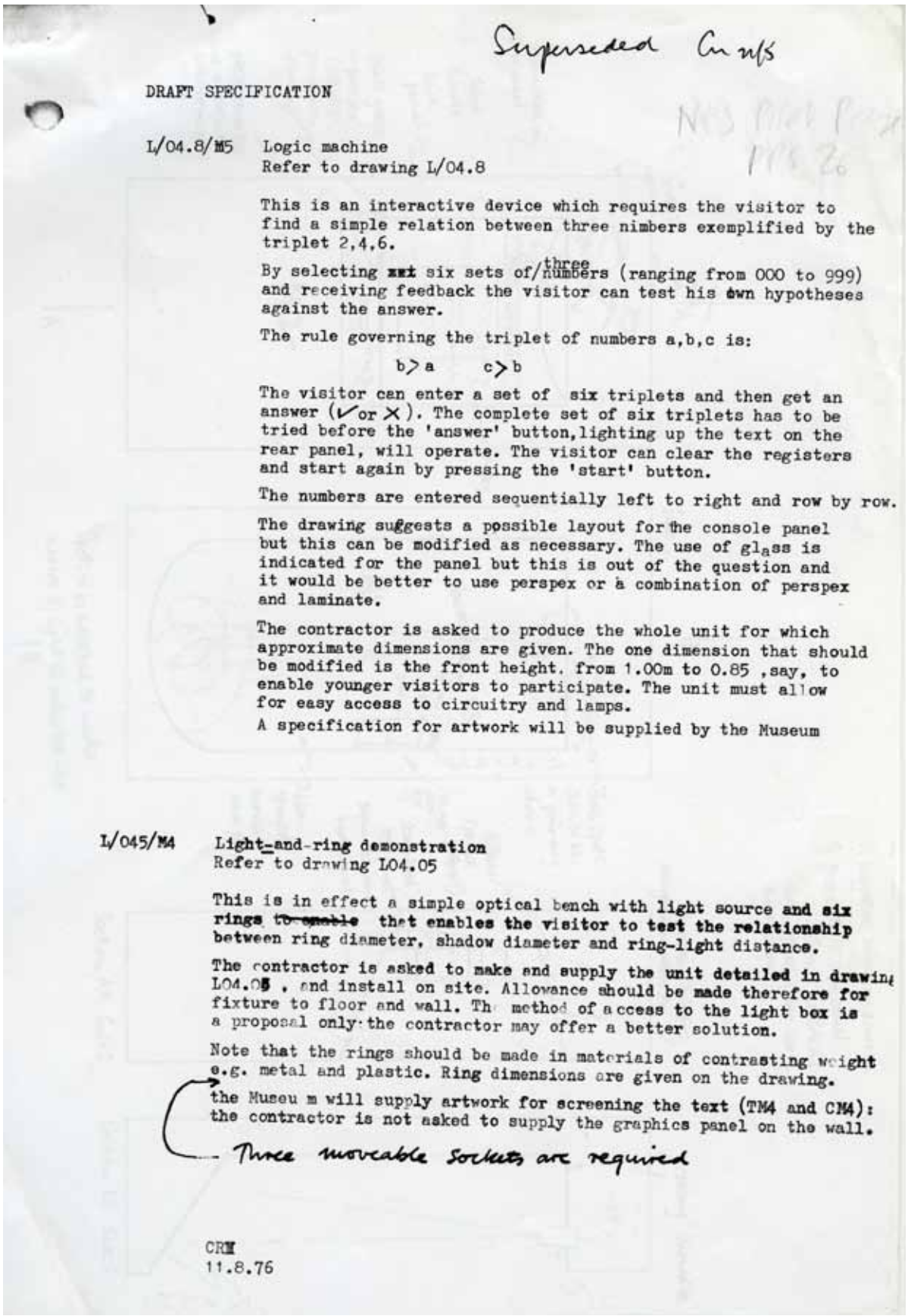
Audience evaluation questionnaire from the Natural History Museum circa 1984.



Isometric drawing of the Hall of Human Biology, Natural History Museum, 1977.



Working drawing of Assembly L, Reason, Hall of Human Biology, 1975.



Superseded Cn n/s

DRAFT SPECIFICATION

L/04.8/M5 Logic machine
Refer to drawing L/04.8

This is an interactive device which requires the visitor to find a simple relation between three nimbers exemplified by the triplet 2,4,6.

By selecting ~~xxx~~ six sets of three numbers (ranging from 000 to 999) and receiving feedback the visitor can test his own hypotheses against the answer.

The rule governing the triplet of numbers a,b,c is:

b > a c > b

The visitor can enter a set of six triplets and then get an answer (✓ or ✗). The complete set of six triplets has to be tried before the 'answer' button, lighting up the text on the rear panel, will operate. The visitor can clear the registers and start again by pressing the 'start' button.

The numbers are entered sequentially left to right and row by row.

The drawing suggests a possible layout for the console panel but this can be modified as necessary. The use of glass is indicated for the panel but this is out of the question and it would be better to use perspex or a combination of perspex and laminate.

The contractor is asked to produce the whole unit for which approximate dimensions are given. The one dimension that should be modified is the front height, from 1.00m to 0.85, say, to enable younger visitors to participate. The unit must allow for easy access to circuitry and lamps.

A specification for artwork will be supplied by the Museum

L/045/M4 Light-and-ring demonstration
Refer to drawing L04.05

This is in effect a simple optical bench with light source and six rings ~~to enable~~ that enables the visitor to test the relationship between ring diameter, shadow diameter and ring-light distance.

The contractor is asked to make and supply the unit detailed in drawing L04.05, and install on site. Allowance should be made therefore for fixture to floor and wall. The method of access to the light box is a proposal only the contractor may offer a better solution.

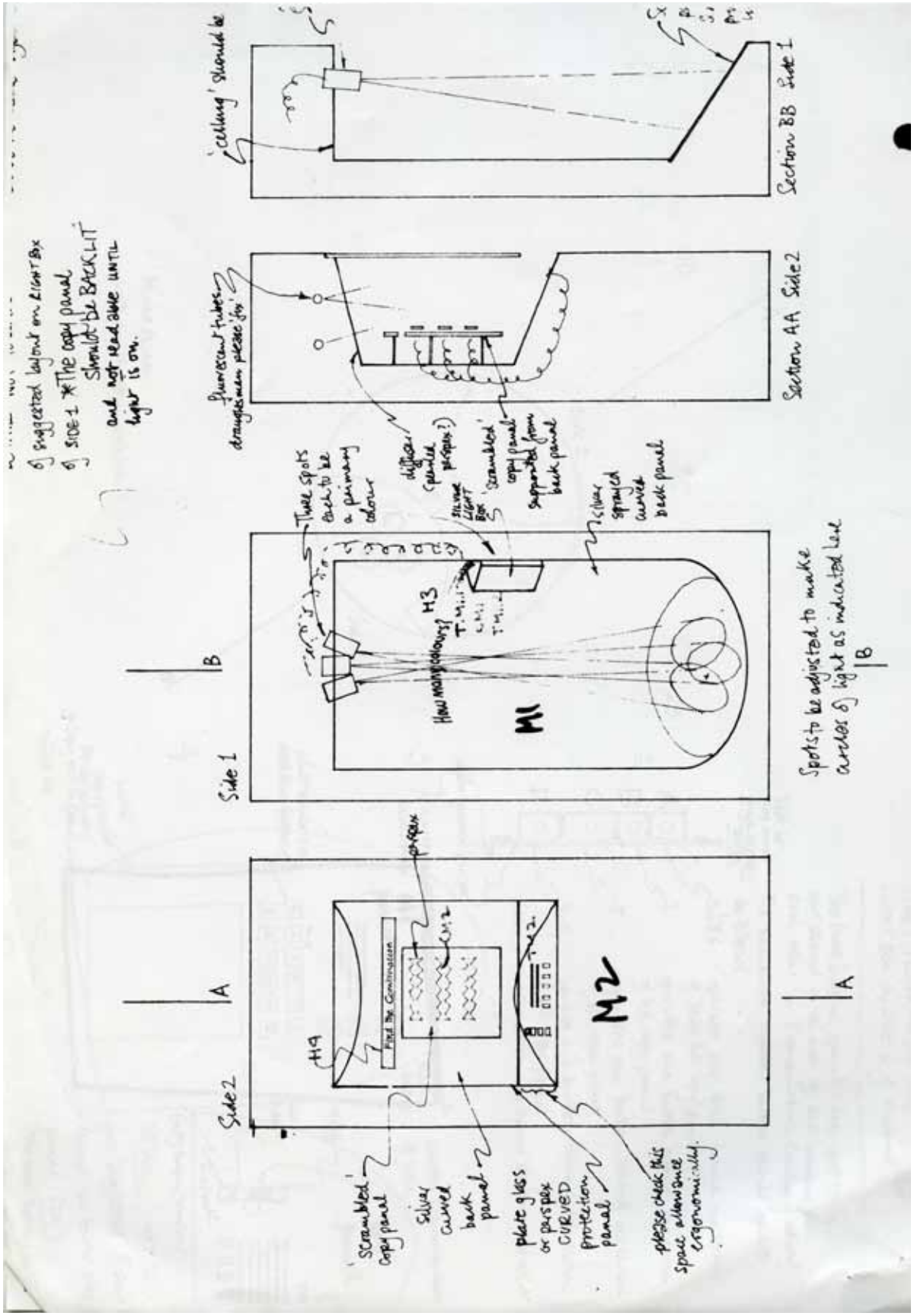
Note that the rings should be made in materials of contrasting weight e.g. metal and plastic. Ring dimensions are given on the drawing.

the Museum will supply artwork for screening the text (TM4 and CM4): the contractor is not asked to supply the graphics panel on the wall.

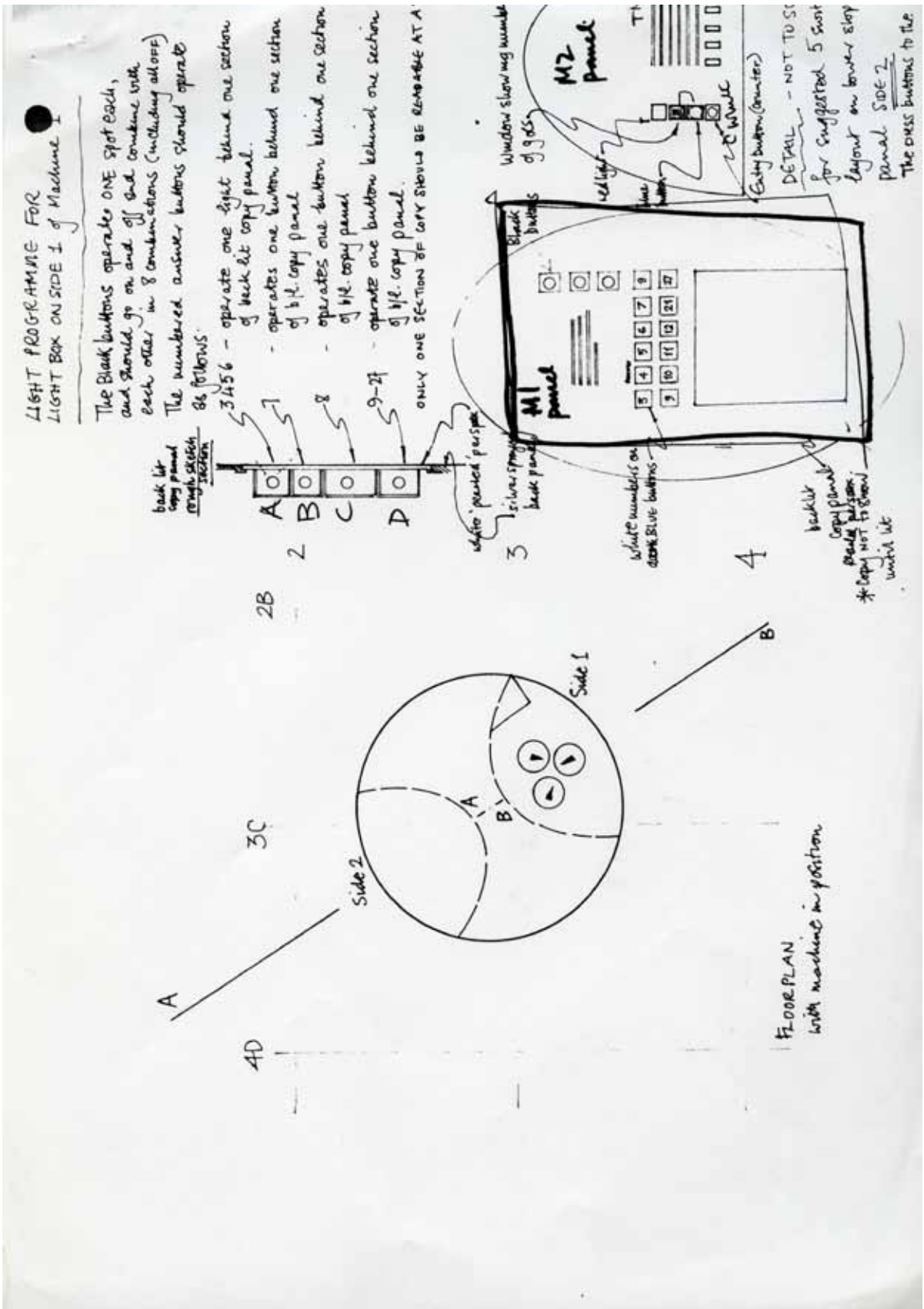
Three movable sockets are required

CRM
11.8.76

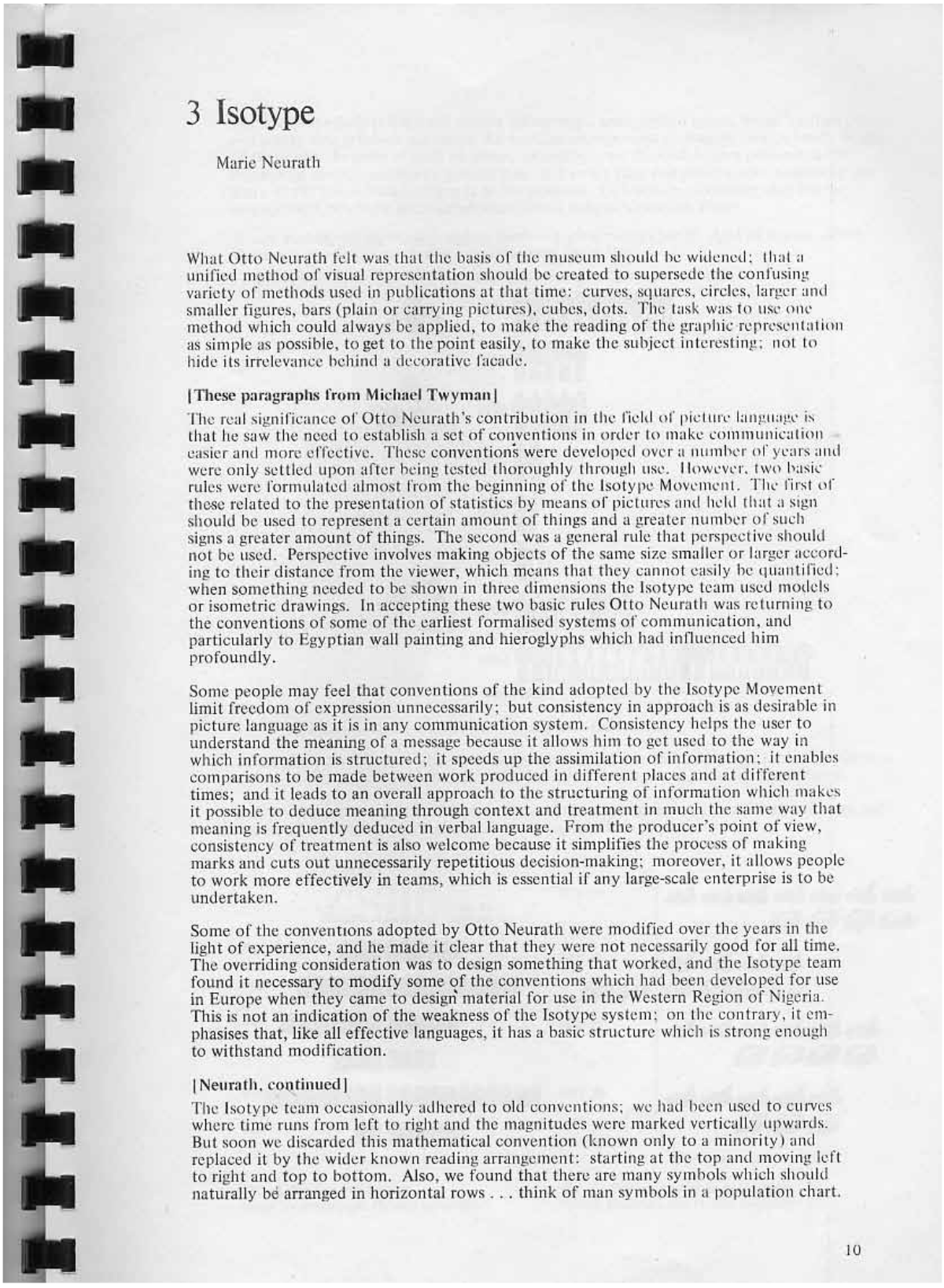
Draft specification,
Hall of Human Biology, 1976.



Working drawing M1 & M2,
Hall of Human Biology, 1975.



Working drawing M1 & M2,
Hall of Human Biology, 1975.



3 Isotype

Marie Neurath

What Otto Neurath felt was that the basis of the museum should be widened; that a unified method of visual representation should be created to supersede the confusing variety of methods used in publications at that time: curves, squares, circles, larger and smaller figures, bars (plain or carrying pictures), cubes, dots. The task was to use one method which could always be applied, to make the reading of the graphic representation as simple as possible, to get to the point easily, to make the subject interesting; not to hide its irrelevance behind a decorative facade.

[These paragraphs from Michael Twyman]

The real significance of Otto Neurath's contribution in the field of picture language is that he saw the need to establish a set of conventions in order to make communication easier and more effective. These conventions were developed over a number of years and were only settled upon after being tested thoroughly through use. However, two basic rules were formulated almost from the beginning of the Isotype Movement. The first of these related to the presentation of statistics by means of pictures and held that a sign should be used to represent a certain amount of things and a greater number of such signs a greater amount of things. The second was a general rule that perspective should not be used. Perspective involves making objects of the same size smaller or larger according to their distance from the viewer, which means that they cannot easily be quantified; when something needed to be shown in three dimensions the Isotype team used models or isometric drawings. In accepting these two basic rules Otto Neurath was returning to the conventions of some of the earliest formalised systems of communication, and particularly to Egyptian wall painting and hieroglyphs which had influenced him profoundly.

Some people may feel that conventions of the kind adopted by the Isotype Movement limit freedom of expression unnecessarily; but consistency in approach is as desirable in picture language as it is in any communication system. Consistency helps the user to understand the meaning of a message because it allows him to get used to the way in which information is structured; it speeds up the assimilation of information; it enables comparisons to be made between work produced in different places and at different times; and it leads to an overall approach to the structuring of information which makes it possible to deduce meaning through context and treatment in much the same way that meaning is frequently deduced in verbal language. From the producer's point of view, consistency of treatment is also welcome because it simplifies the process of making marks and cuts out unnecessarily repetitious decision-making; moreover, it allows people to work more effectively in teams, which is essential if any large-scale enterprise is to be undertaken.

Some of the conventions adopted by Otto Neurath were modified over the years in the light of experience, and he made it clear that they were not necessarily good for all time. The overriding consideration was to design something that worked, and the Isotype team found it necessary to modify some of the conventions which had been developed for use in Europe when they came to design material for use in the Western Region of Nigeria. This is not an indication of the weakness of the Isotype system; on the contrary, it emphasises that, like all effective languages, it has a basic structure which is strong enough to withstand modification.

[Neurath, continued]

The Isotype team occasionally adhered to old conventions; we had been used to curves where time runs from left to right and the magnitudes were marked vertically upwards. But soon we discarded this mathematical convention (known only to a minority) and replaced it by the wider known reading arrangement: starting at the top and moving left to right and top to bottom. Also, we found that there are many symbols which should naturally be arranged in horizontal rows . . . think of man symbols in a population chart.

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Page on Isotype from *Transfromation Reader* (Second Edition), 1979.

For many symbols it does not matter either way: iron, coffee beans, bread, coffins etc. For a very few symbols we found the vertical arrangement necessary: water levels, height of flight etc. In spite of such necessary exceptions we decided to give preference to horizontal arrangements as a general rule, and to let time run downwards, beginning our story at the top left and ending it at the bottom. This was an advantage also for the arrangement of charts in an exhibition with a common heading above.

A rule should not be broken unless there is a good reason for it. And of course, often there is a good reason. A few examples may show this.

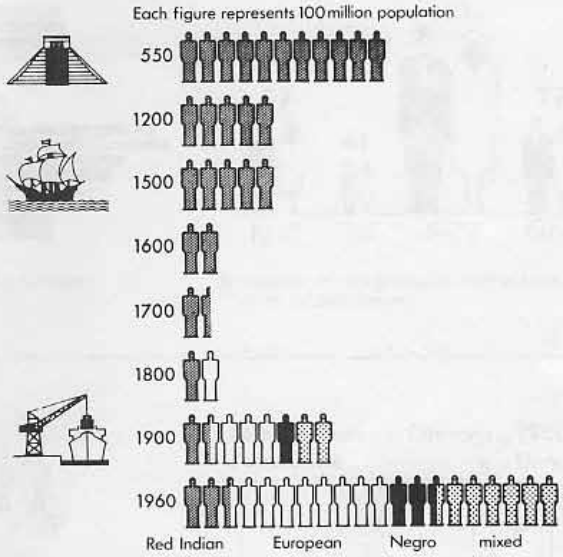

Fig. 2. Population of Latin America (from 'Living with One Another').

In this case we decided: the most important aspects are the fate of the Indian population and the total population. But in addition, other subgroups can also be clearly seen.

But if we want to stress a shift more than the totals, the use of an axis helps to bring out the point much stronger than mere colouring could do:

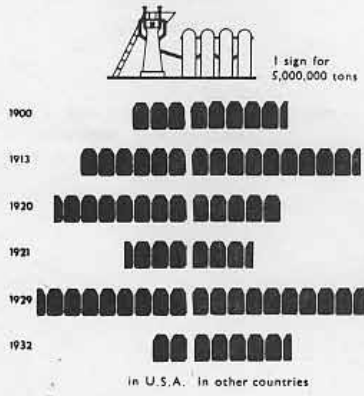

Fig. 3. Pig iron production (from 'International Picture Language').

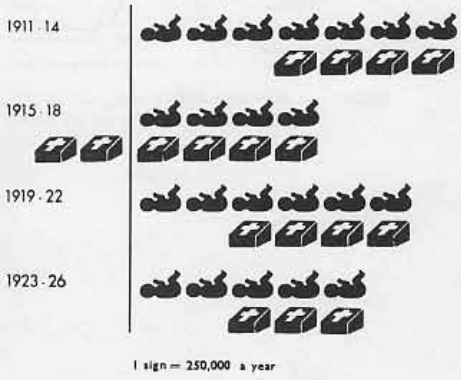

Fig. 4. Births and deaths in Germany (from 'International Picture Language').

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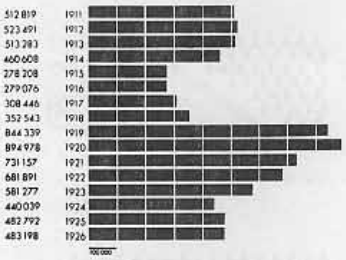
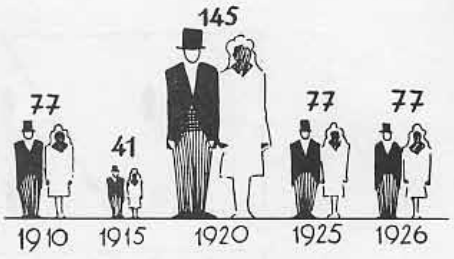
Page on Isotype from *Transfromation Reader* (Second Edition), 1979.

In Figure 4 the symbols for birth and death have been arranged in such a way that their difference comes out clearly; only their difference matters for the change in population. If surplus and deficit is the subject of a chart an axis becomes important.

In all such charts we had to decide which years to select and which units to use to give a simplified, condensed, characteristic representation. In *International Picture Language* we gave an example which explains itself:



a. Men getting married in Germany



b. Number of men getting married in Germany out of every 10,000 persons

c. Men getting married in Germany in a year.

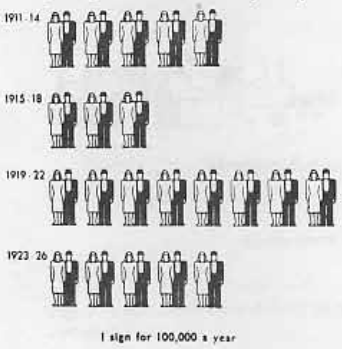


Fig. 5. Men getting married a) basic data, b) bad system, c) Isotype chart, from 'International Picture Language).

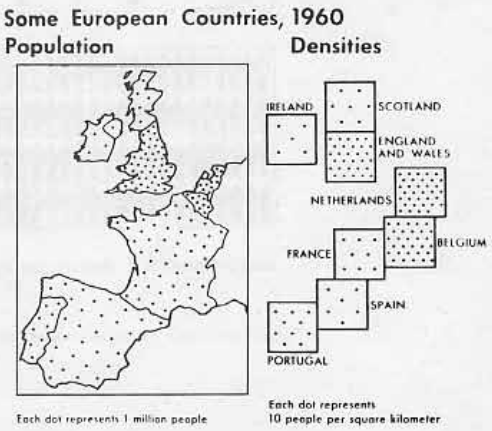


Fig. 6. One way of showing population density (from 'Living with One Another').

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Page on Isotype from *Transfromation Reader* (Second Edition), 1979.

To conclude, a chart about European history in which density indicates the level of development:

In this chart Otto Neurath succeeded in giving a memorable overall view of the history of nations and groups.

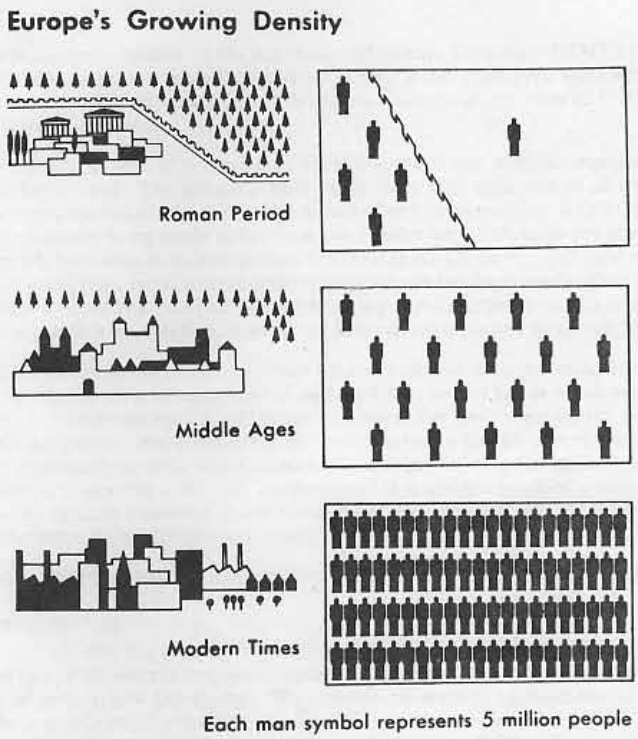

Fig. 7. Chart comparing density to level of development (from 'Living with One Another').

Transformation

The rules mentioned in the previous section are the concern of that step in the total process of production which we called "transformation". From the data which are given in words and figures a way has to be found to extract the essential facts and put them into picture form. It is the responsibility of the "transformer" to understand the data, to get all necessary information from the expert, to decide what is worth transmitting to the public, how to make it understandable, how to link it with general knowledge or with information already given in other charts. In this sense, the transformer is the trustee of the public. He has to remember the rules and keep to them, adding new variations where advisable, at the same time avoiding unnecessary deviations which would only confuse. He has to produce a rough of the chart in which many details have been decided: title, arrangement, type, number and colour of symbols, caption etc. It is a blueprint from which the artist works. The aim is to present some worthwhile information, show up some relationship or development in a striking manner, to arouse interest, direct the attention and present a visual argument which stimulates the onlooker to active participation.

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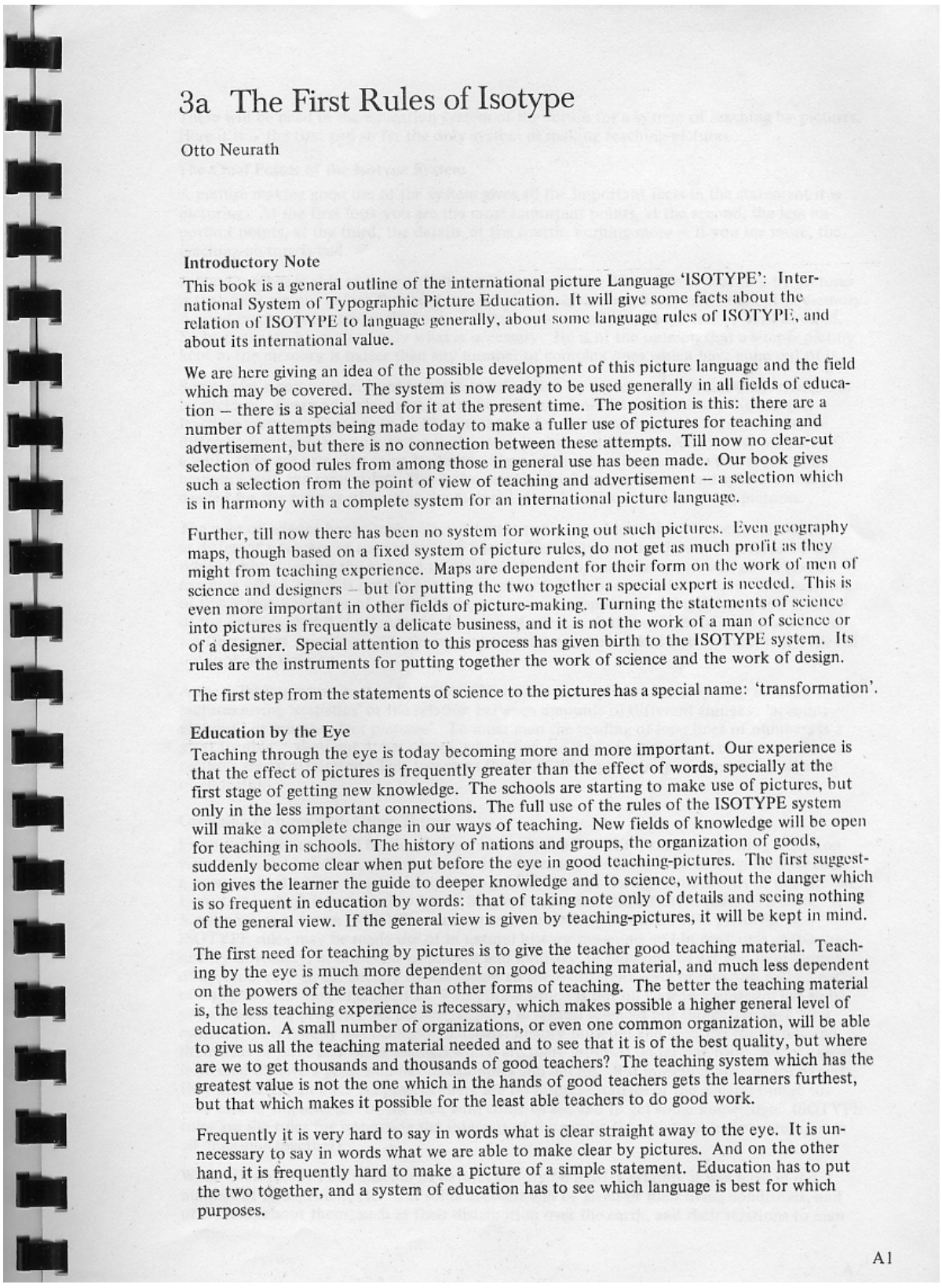
Page on Isotype from *Transfromation Reader* (Second Edition), 1979.



3a The First Rules of Isotype

Otto Neurath

Introductory Note

This book is a general outline of the international picture Language 'ISOTYPE': International System of Typographic Picture Education. It will give some facts about the relation of ISOTYPE to language generally, about some language rules of ISOTYPE, and about its international value.

We are here giving an idea of the possible development of this picture language and the field which may be covered. The system is now ready to be used generally in all fields of education – there is a special need for it at the present time. The position is this: there are a number of attempts being made today to make a fuller use of pictures for teaching and advertisement, but there is no connection between these attempts. Till now no clear-cut selection of good rules from among those in general use has been made. Our book gives such a selection from the point of view of teaching and advertisement – a selection which is in harmony with a complete system for an international picture language.

Further, till now there has been no system for working out such pictures. Even geography maps, though based on a fixed system of picture rules, do not get as much profit as they might from teaching experience. Maps are dependent for their form on the work of men of science and designers – but for putting the two together a special expert is needed. This is even more important in other fields of picture-making. Turning the statements of science into pictures is frequently a delicate business, and it is not the work of a man of science or of a designer. Special attention to this process has given birth to the ISOTYPE system. Its rules are the instruments for putting together the work of science and the work of design.

The first step from the statements of science to the pictures has a special name: 'transformation'.

Education by the Eye

Teaching through the eye is today becoming more and more important. Our experience is that the effect of pictures is frequently greater than the effect of words, specially at the first stage of getting new knowledge. The schools are starting to make use of pictures, but only in the less important connections. The full use of the rules of the ISOTYPE system will make a complete change in our ways of teaching. New fields of knowledge will be open for teaching in schools. The history of nations and groups, the organization of goods, suddenly become clear when put before the eye in good teaching-pictures. The first suggestion gives the learner the guide to deeper knowledge and to science, without the danger which is so frequent in education by words: that of taking note only of details and seeing nothing of the general view. If the general view is given by teaching-pictures, it will be kept in mind.

The first need for teaching by pictures is to give the teacher good teaching material. Teaching by the eye is much more dependent on good teaching material, and much less dependent on the powers of the teacher than other forms of teaching. The better the teaching material is, the less teaching experience is necessary, which makes possible a higher general level of education. A small number of organizations, or even one common organization, will be able to give us all the teaching material needed and to see that it is of the best quality, but where are we to get thousands and thousands of good teachers? The teaching system which has the greatest value is not the one which in the hands of good teachers gets the learners furthest, but that which makes it possible for the least able teachers to do good work.

Frequently it is very hard to say in words what is clear straight away to the eye. It is unnecessary to say in words what we are able to make clear by pictures. And on the other hand, it is frequently hard to make a picture of a simple statement. Education has to put the two together, and a system of education has to see which language is best for which purposes.

A1

Page on Isotype from *Transfromation Reader* (Second Edition), 1979.

There will be need in the education system of the future for a system of teaching by pictures. Here it is – the first and so far the only system of making teaching-pictures.

The Chief Points of the Isotype System

A picture making good use of the system gives all the important facts in the statement it is picturing. At the first look you see the most important points, at the second, the less important points, at the third, the details, at the fourth, nothing more – if you see more, the teaching-picture is bad.

A good teacher is able to keep out all unnecessary details. The value of teaching by pictures is that facts are put before the mind in a simple, straightforward way and are kept in memory. A good teacher is conscious that only a certain amount of knowledge will be kept in mind. So he puts into his picture only what is necessary. He is of the opinion that a simple picture kept in the memory is better than any number of complex ones which have gone out of it.

Sometimes a comparison is made between education by pictures and business advertisement by pictures. Every advertisement has to be different from its competitors. Not so the teaching-pictures. One has to be like another so far as it gives the same details, and to be different from another only so far as the story it gives is different. All pictures are part of a unit: they are using the same language. Signs of the same language are put together in harmony with the same rules. This is the reason why long experience and special training is needed for the process of putting the material given by science into teaching-pictures.

The man of science has to make clear-cut statements on which other clear-cut statements in different branches of science may be based. The picture-maker has to be guided by the rules of education by the eye and to make a *selection of material which will give a certain teaching effect,* but it is not his purpose to give a full account of all the facts. The outcome of this is that a number of experts in science are not supporters of this system, and are even of the opinion that it is a danger to the rules of science. But the needs of education are of a different sort from those of science, and they have to be worked out by men with a special out-look and training.

A specially important part in the ISOTYPE system in its present development is taken by the pictures giving 'statistics' or the relation between amounts of different things – 'account pictures,' or 'number fact pictures'. To most men the reading of long lines of numbers is a great trouble – they put down a book when they see it has in it numbers or curves. But pictures are an attraction. This fact gives the ISOTYPE system a special value for all sorts of education.

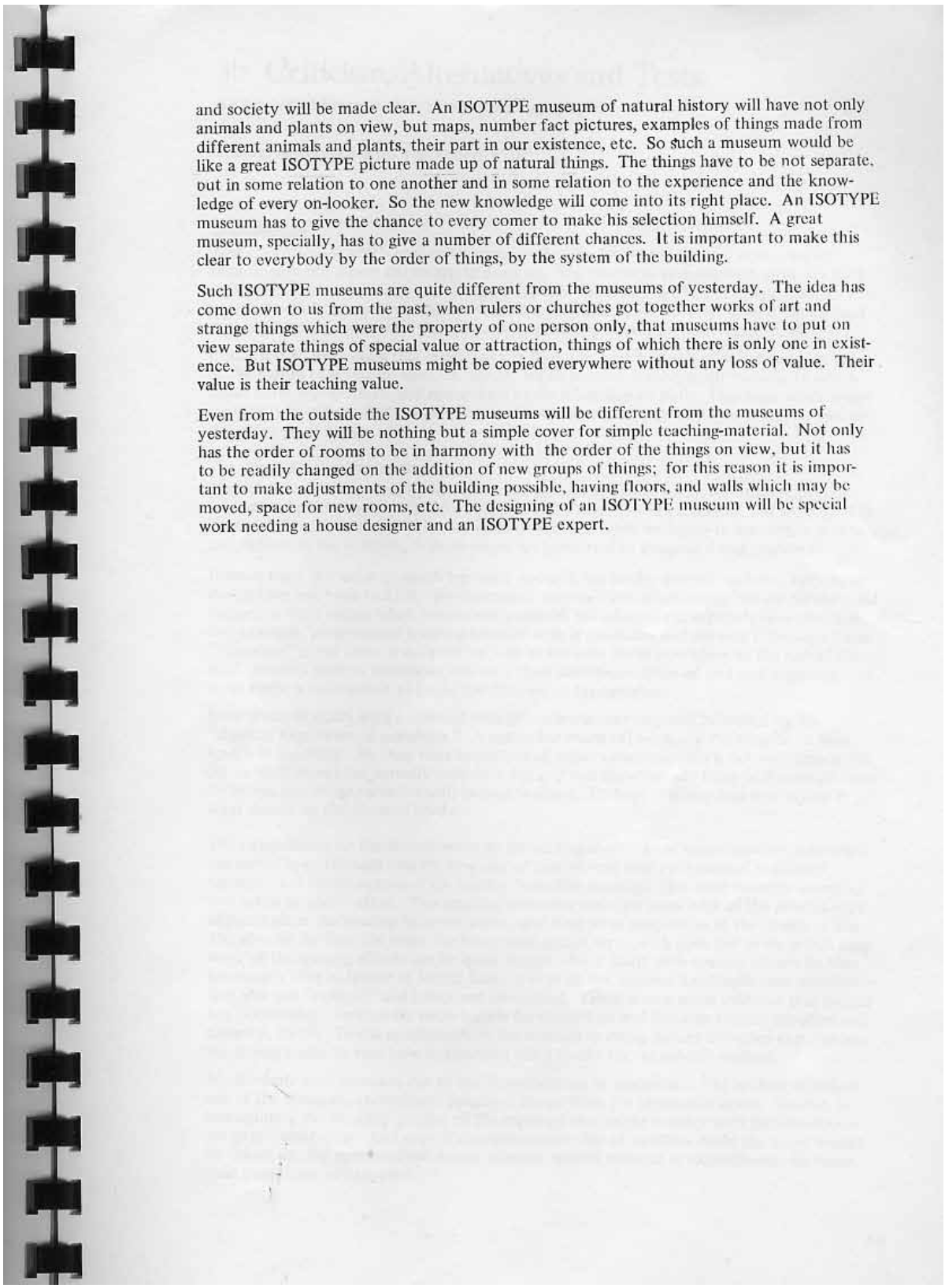
Grouping Pictures with Other Things

From this account it will be clearly seen what are the ISOTYPE rules for putting things on view, in special buildings, museums, etc. It is necessary for the public to be guided through a museum in the same way as the eyes are guided through the signs and words of one picture. Everything which is put on view has to be given order like the different parts of a book. It is not necessary for an ISOTYPE museum to have nothing but ISOTYPE pictures: no, ISOTYPE rules may be made use of in natural history museums and in museums giving the history of society, in museums of science and industry, in museums of art and in museums of hygiene, etc. In the society of the future all these different sorts of museum will be parts of one great teaching organization. Everything which is put on view in a museum has to be given a teaching prupose. At present, experts in special sciences put things together for a museum – everybody has been into a natural history museum and seen the thousands and thousands of birds and other animals which are there grouped under one roof. Every expert is pleased to have a great number of examples and details. But museums are not for experts, they are for the public. At present there are no respresentatives of the general public to take care of the interests of the men who come to see and to get some knowledge. ISOTYPE rules are the rules for respecting the interests of the public (in a picture, in a museum, or in all museums together).

What will an ISOTYPE museum of natural history be like? Certainly it will have in it a number of birds, fishes, etc. But some account will be given of their living conditions, and other facts about them, such as their distribution over the earth, and their relations to man

A2

Page on Isotype from
Transfromation Reader
(Second Edition), 1979.



and society will be made clear. An ISOTYPE museum of natural history will have not only animals and plants on view, but maps, number fact pictures, examples of things made from different animals and plants, their part in our existence, etc. So such a museum would be like a great ISOTYPE picture made up of natural things. The things have to be not separate, but in some relation to one another and in some relation to the experience and the knowledge of every on-looker. So the new knowledge will come into its right place. An ISOTYPE museum has to give the chance to every comer to make his selection himself. A great museum, specially, has to give a number of different chances. It is important to make this clear to everybody by the order of things, by the system of the building.

Such ISOTYPE museums are quite different from the museums of yesterday. The idea has come down to us from the past, when rulers or churches got together works of art and strange things which were the property of one person only, that museums have to put on view separate things of special value or attraction, things of which there is only one in existence. But ISOTYPE museums might be copied everywhere without any loss of value. Their value is their teaching value.

Even from the outside the ISOTYPE museums will be different from the museums of yesterday. They will be nothing but a simple cover for simple teaching-material. Not only has the order of rooms to be in harmony with the order of the things on view, but it has to be readily changed on the addition of new groups of things; for this reason it is important to make adjustments of the building possible, having floors, and walls which may be moved, space for new rooms, etc. The designing of an ISOTYPE museum will be special work needing a house designer and an ISOTYPE expert.

Page on Isotype from
Transfromation Reader
(Second Edition), 1979.

Appendix 2

CASE STUDY 2 Graphic argument
Nigel Holmes of Explanation Graphics, New York

Edited transcripts of formal interviews with Nigel Holmes and Bruce Robertson

Interview with Nigel Holmes
22 March 2009
Location: Zeist, Holland

Nigel Holmes of Explanation Graphics New York has cited his appreciation of the work of Arntz and Neurath and evidenced his knowledge and application of some of the basic principles of Isotype in the design of charts for US news publications and in his self-published booklets. His most outspoken endorsement of the principles can be seen in the paper 'Pictograms: A View from the Drawing Board, or, What I have Learned from Otto Neurath and Gerd Arntz (and Jazz)' *Information Design Journal,* 10: 2 (2000), 133-143. He also discussed the influence of Isotype in the introductions of his 'Designers Guide' books on pictorial charts, symbols and maps which he authored from the mid 1980s to the early 1990s.

Where did you first learn about Isotype and who were the key people involved in introducing you to it Nigel?
The first person who mentioned Isotype to me (and I don't think he used the word Isotype) – I think he probably mentioned Otto Neurath actually – was Richard Yeend who was working at the *New York Times* as an art director in the business section, in about 1982 or 83. I was just beginning to work on my first book there about charts and diagrams. And Yeend said I should look at Otto Neurath's work. At about the same time I went to England and met Michael Twyman in Reading and started to look up the work of Otto Neurath.

What inspires you most about it?
Simplicity. Some of the things I was doing at *Time* were very complicated – illustrations on top of diagrams on top of statistics. This was because *Time* was a magazine for busy people who weren't necessarily interested in the subject matter. I was very much encouraged by the then art director Walter Bernard and by editors to change the look of *Time*'s charts. Since I trained as an illustrator that seemed like a fairly natural fit. I'd done work of this nature for the *Radio Times* for David Driver in England before coming to America. The first things I did were very complicated and then I learnt that you could still be pictorial but simpler, and to use one of Otto's phrases to be 'statistically accountable'. Statistical accountability was what he promoted – to be able to count and see the numbers and to see what they were about so that they weren't just illustrations with a number at the end of them like his first charts. I liked the idea of pairing things down to the absolute minimum and keeping it simple but also keeping it pictorial. I got into a lot of trouble with academic people like Tufte who was incredibly critical of the work in *Time* because he said if you have to dress up the numbers then they are the wrong numbers and people should be just intrinsically interested in the numbers themselves. This is a very hard academic viewpoint for a general magazine like *Time*, which was for busy readers who needed to be stopped to say 'hey look at this'.

I think Tufte also visited the archive at Reading with his wife. In Tufte's second book he reproduces something from *Time* but does not say who did it, but it says *Time* hired an English illustrator and he goes on about it being terrible 'chart junk'. I can talk forever about the awful situation between us, and a lot of the time we're not that far apart actually. He comes from an academic point of view, I'm a commercial artist. I do what people want to see. I have tried to apply some principles to it.

What inspired you to write the article in Information Design Journal?
It was Karel van der Waarde who got me to do it. And I think Paul Mijksenaar might have suggested that I should do that.

Does Paul Mijksenaar acknowledge any influence of Isotype in his work?
I think so, on a rather (I don't think he would mind me saying this) on a rather superficial level – the look of the things.

What principles of Isotype have been most useful to you as a designer?
The simple one is to repeat objects rather than making them bigger. But people say to me wouldn't it be more fun if you just made this person bigger than that person? And I find myself educating people saying 'no, this is a geometric enlargement and the person has got fatter – and they have got thicker too, and so you'd be surprised how small the difference would be in these two bars if I really did that!

The *New York Times* has overdone the idea of values represented by the area of the circle and its great if you've got huge differences between the amount of people who have AIDS in one country compared to Africa for instance. And you have a key that represents each one. You mentioned Gapminder earlier, now they use that principle and to me that isn't good enough. You can't read the Gapminder charts. They look precise because they're abstract and they're animated, you can play with them and put in different coordinates and different countries or whatever you're dealing with. But you can't get precise numbers out of them. I know that from William Playfair, who always said charts are pictures of numbers, but they aren't the actual numbers, so if you can understand the trend then that's better than nothing or it's better than a load of numbers. I think actually Neurath said that as well; you will remember a picture but you won't remember the numbers. You can always go back to the numbers. But what was great about Neurath was that you could see what the subject was as well as the numbers, and you can't with Gapminder because it's all abstract. Hans Rosling has done a lot of good work but his charts are all the same. I come from a picture background, I want people to be interested and to identify with the pictures and not to have to read them exactly like a book but to have a picture come though. The numbers are behind the picture, but if you don't deliver the numbers then you're just doing illustration, you're not doing information graphics.

One of your latest books is 'Wordless diagrams'. You obviously work sometimes with words and sometimes exclusively with pictures...
Wordless Diagrams was an attempt to see whether I could explain a lot of things without any words at all. It was a kind of exercise.

What effect did Isotype have on your work intellectually?
It had an effect later. The first things it confirmed to me were that you could use pictures and statistics. But I still went on the same way and just used the surface look of some of the things that I guess Modley had done. Modley produced his popular Dover book in America,

something like a thousand pictorial symbols.[756] I looked at that book a lot. Some of the symbols came from the Netherlands, some were based on Isotype, and some were Modley's and there's a huge difference within the book. It was a very influential book, because its all black and white and they were all very easy to copy.

But it was only after a while at *Time*, I thought that we should not be trivializing information. The period of getting people interested was over and maybe we should take the reader a bit more seriously. People would write to me and say, if you want to be a cartoonist go off and be a cartoonist, don't try to mix these two things together, I didn't agree with that but certainly that's what Tufte was saying.

Ultimately I started to get more interested and read about Neurath and I thought we should calm things down. I was rising in the ranks at *Time* and I got all the editors together and I said I think we should change the direction slightly of the way we do charts, we should make them calmer and maybe strip out some colour because they were getting too colourful, splashy and illustrative. They were also getting ripped off by people like *USA Today* and some awful work was being done, and I felt bad about that. I said I'm going to suggest that we do much more straightforward charts in *Time*. The editors hated this, because they said we're going to get boring charts and I said no, that's not what I mean. That was the beginning of the end for me there. I thought *Time* was making the mistake of having nothing to do with information graphics, just selling magazines. They said they were trying to appeal to a younger audience, and I was saying young people don't buy this magazine. By changing it you're not going to get people to buy it, you're just going to turn off your existing readers. Once more those young people are going to grow up eventually and there going to want a calmer thing. Not more staid exactly, but more serious, in keeping with the articles.

They gave me a sabbatical in 1993 and I decided within a week that I wasn't going to go back. It was just at the beginning of the really big 3D programs and of course Photoshop. So they replaced the stuff I was trying to make calmer with something which was much worse than the original, over-done, over-blown graphics which had nothing to do with the news, because if you have a news article you've got to know everything about it to render it effectively.

Before this you were working with Radio Times with Peter Brookes?
Yes.

He was very big on humour is that somewhere that you picked up on?
Yes, I liked him a lot and we got on very well together, David Driver, art director of the *Radio Times* put us together. I think David knew instinctively that I was good at organising things and Peter was good at drawing. We did some Olympic and World Cup things together. He needed a long time to complete his drawings, but he would draw the horse as though he was jumping over nothing and I would do the big arrow and a diagram of the fence and how high it was. And the two worked really well together. The *Radio Times* when we first started was all black and white, later there was a coloured section. The colour had to go a week in advance of the black and white, so you had to plan the whole thing. We did a Soyuz/US link up diagram and Peter drew all the machinery and I did the diagram that went with it. Of course now we have computers and processes don't take so long.

[756] Rudolf Modley, (assisted by) W.R. Myres, *Handbook of Pictorial Symbols 3,250 Examples from International Sources* (New York: Dover, 1976).

And the simplicity of your work, alongside the fact that it can be produced on a computer, means that any magazine/newspaper processes can be done quite quickly now...
Yes, that doesn't help me because people just leave it later.

But the style of work got much simpler?
That was partly just an intellectual thing – I wondered what I could take away from it and still hold it together. I also started to work in black and white only and add colour when it was necessary. Colour was never decorative (or I hope not). Sometimes you break your own rules but mostly it's symbolic. The key to these things was Harry Beck's underground diagram. It's been updated lots of times and still holds together.

Your work is known for communicating complex ideas simply, where does this come from?
Well this came partly from Brian Haynes who had been at the Royal College of Art and then got me an internship at the London *Sunday Times Magazine*. He also recognised that at that time I wasn't very good as an illustrator. I'm still not any good as an illustrator – I'm a designer who uses pictures. Haynes saw something in what I was doing. He was an entrepreneur and an art director. I was never a good art director. But Brian was a very good art director. He taught me more in the few weeks that I did in internships with him than I did in all the time that I was at Hull Art School and the Royal College of Art.

Brian was different because he was older and he was able to pay me. And he gave me some great jobs to do, such as the Buckingham Palace and Wimbledon projects. All sorts of things – like getting containers off at the docks and how that system works. That was actually on the cover of the *Observer* at one point for one issue of the magazine. And we did a piece about Guy Fawkes and I worked with an illustrator called Adrian George. That was a terrific period of learning and I got my illustrative style together during that time. And that was the style that made the jump into computers very easy. I realised that I could draw relatively well but as soon as I knew it was going to be printed, I tightened up and I thought if that's what's going to happen I'll tighten it right up and simplify it and have no free hand work at all and just use French curves. They formed what I wanted to do because they have certain shapes in them and that's what the computer does.

So that formed your visual language?
Yes. The other thing I learnt from Neurath and Arntz was from a wonderful loose-leaf book that they put together, with pages and pages – a sort of visual dictionary.

That made me think about using things again and again, which saves time, but much more importantly it starts a language. So I do that now. If you look carefully through my work you see the same little icon again and again. It's not because I'm lazy, it speeds things up, I don't have to think about it again, I thought about it hard in the first place. The person I draw sitting at the table, or the person sitting at a computer (which I'll update occasionally) is just sitting at a thing like this as opposed to a thing like this. (I was just demonstrating how big computers used to be). In a certain sense I have my own alphabet and that's why I want to control the words and the pictures, because the words and the pictures are all the same thing. And you might say some things in pictures and some things in works. In *Wordless Diagrams* I was just trying to do it all in pictures. Most of the time it's a real marriage of the two, just as drawing an abstract bar chart, it becomes about people by simply adding a few little lines in exactly the same form as the bar chart was drawn. It's your own set of symbols that work for you and you up date and you add to, which actually is what Neurath wanted to do. He wanted his to be universal.

Do you want yours to be totally universal?
Is it a universal picture language? Yes, you want lots of people to see it but actually it's impossible because people have different visions of what things are and I like variations in languages, styles and forms of languages. Russian looks different to Japanese I don't want the whole world to be the same because I think that would be very boring. The world is becoming very homogenised. That might be good socially for communication, but the difference in cultures should be celebrated as well and so it's an intellectually good idea that everyone should be able to communicate with each other.

Going back to Isotype, the big departure between what Neurath's and Modley's work was about universal picture language. Neurath was happy for things to remain consistent, whereas Modley wanted to adapt them and add a personality to them.
Oh personality that's interesting I… so you view Neurath's work as not having a personality?

No I don't!
He wanted it to have a different personality?

He wanted it to have humanity, but it was universal. Whereas Modley wanted to take that work and change it for different audiences and different purposes.[757]
I would wonder whether that isn't simply him saying I can't do exactly the same thing so I will change it, or I don't have such a strict mathematical, statistical, scientific adherence to principals so I'm going to change it. Or he just couldn't keep control of it, but I think it might simply be that as with a lot of language differences, that America just wants to do its own thing. You know I think there is a kind of perverse need for deliberate reinvention so that we aren't the same as the UK.

Modley was more commercial in his outlook as well. Whereas, Neurath was not commercial.
Yes.

Although a great self promoter
I think that happens. I will very often use this as an argument about any criticisms that Tufte has of my work by saying that I am a commercial artist – I'll try to apply good statistical principles to what I do, but the older I get the more I do that and the less commercial I get. But in the end I have to make a living.

You've admitted that Gerd Arntz is a hero of yours is it because of the style of drawing?
I think it is.

Did you become more like him or were you already working like that and you thought, wow, he's drawing like me!
I think actually it was a bit of both, I was both disappointed and thrilled to see that, I was disappointed that maybe I had invented something (and how stupid that is, because it's all been done before). You absorb things and don't realise you've absorbed them and then you think you've invented them. But the more I looked, the more I thought here is a real artist drawing these things that could be very ordinary, but he has tilted the heads slightly so this person is a little puzzled or this person might be standing like that rather than straight. There's a kind of humanity in them, an art in them. Which is why personally I think that Neurath's work

[757] This refers to Modley's earlier work from the 1930s and 40s. In his later work, he regarded standardisation as being of paramount importance.

has lasted so long. However strict the principles that he set down are, they are softened by the fun that you get out of Arntz's work, looking at exactly what he's done with the person who's out of work. He is facing to the left and his shoulders are hunched slightly, it's so simple but it is so real. You know it's the simplest way to draw something but it is alive.

Are you influenced by the style of graphic argument behind Isotype?
I wrote the question here, do you mean transformation?

I mean the way that the diagrams are laid out.
Yes.

The form?
Yes. But not because I've read anything about the argument, more just thinking that it works.

When you are commissioned to produce a diagram or a chart, are you given all of the information?
No, it's completely different for every job. Some people have really worked it out know what they want (and that's horrible). If they've done it right its OK, but then I'm just a wrist. So I'm not as interested in that.

So then you're an art worker rather than a transformer?
Yes that's exactly right. The best clients are people that have a good research department that I can work with, and we have a question that we have to solve. We don't have to lay out a series of numbers that somebody has found, which might not be up-to-date, which might not be the right answer or answer the right questions, and which might not be particularly relevant to the text, because very often, especially in America, an editorial department is different to an art department. They're separate and they don't talk to each other. There are good logistical reasons for this. There's a bit about that in *Drawing to Explain*. What they don't realise is that they should all work together, but typically artists are considered to be illiterate, gin-drinking, long-haired, scruffy people while writers are neat and know what they're doing and can string a sentence together. And what I do is to span those two things. I was lucky to have a good education and can argue with people about the points that I'm making so all of Neurath's ideas can come in to my arguments. And I don't necessarily say 'hey my hero says you should do this', I just take those arguments and run with them. And because I agree with them I can argue for them. I believe this is the best way to do it.

So the best brief for you would be a question?
Yes.

And a list of the people that you would be working with in the research department?
Yes, and increasingly that's a list of links on the web. Nowadays we talk about speeding things up. Google is just the most amazing place to go, but you have to be very careful (and you should never say 'surprise me'). I will often put the word in, the phrase in two or three different ways. And you get different answers. I'm increasingly finding that the deeper down you go on the list the more you will find. The thing you want is probably further down, and it just didn't come up to the top because not enough people have asked for it.

How did you get involved with the 'Understanding America' website?
I was not involved in the website. The project was a book first, not a website, to me it's irrelevant that it was a website. It was designed as a book and it shouldn't just have been shoved on to the web. Somebody just offered to do it and Richard Wurman said OK just do it.

Did you use the principles of Isotype in the film Vampire Power?
I didn't know that I was using them but I guess I just absorbed it. I find what you are telling me very interesting. I did a print piece first, and then was offered a chance to make a film [by *Good Magazine*], which could have been a film for the web, in other words in a different media and you have to treat it differently. I broke it down into a story so that instead of being one picture that you could roam around with your eye held by one big graphic image, it now became something else, and the graphic of the vampire comes in much later than you first see it in print. Because I wanted to start at the beginning and gradually go through it step-by-step. The storyboard was interesting I made it with stills, then my son and I worked on it together.

The narrative works very well. It's a great little film. Overall would you consider that Isotype has had a positive affect on information design today?
Yes, overall but I think there are many bad examples that you can find, where even I would say you shouldn't do that. For instance you have three houses that are lined up and they are compared to the number of people who live in them, and those are three people and there are three houses but it looks like far more houses than people. There are three units here and three units here, that kind of thing. I see that a lot. It's almost as bad as enlarging symbols. It's the thing about the symbols not looking equal, which again is one of the principles of Isotype. And I must say I break that rule a bit myself sometimes.

But you're probably aware that you do it.
I'm aware that I'm doing it. There is a reason.

And finally what do you consider to be the legacy of Isotype?
I think the phrase that I used almost at the beginning which is statistical accountability, It's that you can see what it's about – the subject – but you can also count the numbers. So it's making people see the numbers and the subject at the same time. That's what I was doing initially when I would do some kind of drawing which had a chart on it. It tells you what the subject is and what the numbers are. Doing it this way is an illustration with a fever line on it. I did a lot of those things and they became very popular and copied but using the Neurath (Vienna) Method is much better because of statistical accountability. The best way is something that contains both pictures and numbers in the right relationship to each other.

Thank you.

Interview with Bruce Robertson

7 July 2009
34 Elaine Grove, Camden, London, NW5

Bruce Robertson founded Diagram Visual Information Ltd in the 1970s, but previously worked for Rathbone Books (part of Wolfgang Foges book packaging empire) in offices alongside Marie Neurath. He has stated on several occasions that he has made his living 'plagiarising' Isotype. His work is significant because it bridges the period from World War II to the present,

taking in the development of visual explanation in book publishing from early attempts to popularise academic texts, to the annotated visual encyclopedias of Mitchell Beazley and Dorling Kindersley. Robertson has contributed to many 'part-works' – weekly magazines (stored in binders) that build up to form bodies of reference on popular subjects.

Where did you first learn about Isotype and who were the key people involved in introducing you to it?
My boss Wolfgang Foges assisted Otto Neurath in settling in England, he was from Vienna. He had lots of different companies but the initial one was Adprint, which became Rathbone Books and then Aldus Books. The history of how all these companies were formed will never be revealed because Foges deliberately confused everything administratively and organisationally. He was a true Viennese.

The Reading archive have a wonderful letter which says it is typed by Otto and the first sentence is "Wolfy don't interrupt while I am typing you this letter." Obviously they were trying to sign an agreement between each other about some deal and Wolfy couldn't ever *not* interrupt anybody – that was his nature!

He didn't personally fund the Isotype Institute, but he accommodated them so they were in the same offices, and I, as a young man was in the office next to Mary.[758] There were metal-framed glass partitions, and I was just on the other side of the glass in my little office and she was on her side. I never understood what they were doing, or who they were doing it for, or how they got paid, and I was just a salaried member of the company for a while. Of course she lived in Belsize Park and we lived close by, so we used to go home on the tube from Tottenham Court Road. The offices were officially in Rathbone Place but technically the door was in Oxford Street. That's how I got to know about Isotype. At the time I'd not been very involved in the presentation of graphics although I did do some, as a typographer and a book designer.

Arthur Lockwood and Edwin Taylor were there, (with Germano Facetti and Felix Gluck). We were the departmental designers on various projects that Wolfgang Foges invented. The room opposite us in the corridor, (Mary was in one, I was in the other), was occupied by a lady called Frame Smith. I didn't understand how it worked, but she had West African connections. I think it was to do with the fact that the Ministry of Education (when Nigeria gained its independence), appointed the Minister of Education, and from an earlier time Wolfy had been there to promote The British Government's Commonwealth Educational and Department of Information. He had his finger in West Africa and was making products for them, as was Longmans and other publishers.

And that's how Marie got to go out there to do that particular project?
Yes, but it was very typical that no-one knew about the relationships but himself. There is something, called the Wiener Institute at the top of Great Portland Street, and have some funding from City Lit, forming the archives of what is left of Adprint/Rathbone Books. A Berlin Jew call Fredrick Ullstein was employed by Foges to do the contracts and all the legal side. When Fredrick died, his son Bart donated them all the Wiener Institute.[759]

[758] Robertson always refers to Marie as 'Mary'.
[759] Wiener Library – Director Ben Barkow, 4, Devonshire Place, Telephone: 0207 636 2247.

What sort of books were you working on?
We all worked on very similar product. The 1930's saw a revolution in the integration of the image and the text by the process of photogravure lithography so the first exploiters of this printing process were magazines, which became *Picture Post*,[760] in England and *Life* in America. They originated in Berlin and Vienna barber shops and coffee shops. All the magazines were available in the coffee shops and you ordered your coffee and took one off a shelf. It had a long wooden board down, a board about an inch wide and two by four inch boards. They put the book through it, clipped it together, and hung it on a nail type thing, like a coat hanger, a round circle with all the newspapers hanging off it. Wolfy liked coffee shops, and he got out of Europe well before Hitler, because his parents had sent him to England as a sort of insurance policy. The other man who came, [Stefan Lorant, the editor] a Hungarian, was the founder of *Picture Post.* Tom Hopkinson was the [assistant] editor but the Hungarian who founded it brought it to England was a similar sort of character. We made integrated books, picture and text side-by-side, together. Prior to that the text had been printed [by letterpress] on a soft wood pulp paper and pictures were printed on a chalk-board, glossy paper. Wolfy exploited this situation and made an incredible series called *Britain in Pictures* – funded and encouraged by the government – during the war it re-established our belief in our Britishness. Editions were called *British Artists*, *British Poets, British Seaside Ports*, there is a vast list of them. Then he went on to make foreign editions of all these – it was Ministry of Information's idea. When the Neuraths came, he involved them in the creation of diagrams and charts and things of that nature in both those books and another series of books that he made for the Ministry of Information.

At the outbreak of war all the war effort had to absorb all the commercial activities in England, so there was paper rationing and one of the publishers had an enormous success with *The Seven Pillars of Wisdom* and they judged the paper consumption needs on the past year's needs of the paper budget, so Wolfgang Foges got hold of that paper quota so he could go on making books when others couldn't afford to do it. All this happened well before we got there. When we got there, that's Edwin Taylor, Arthur Lockwood and myself, Foges started a new company called Rathbone Books and he came up with an idea which I think preceded an American company called 'Golden Books', of a large format children's book and he made, an incredible error, and he used to just giggle at it. He made a book called *Mathematics For The Million,* which Lancelot Hogben dedicated to him, and Neurath did all the diagrams.[761] They were doing a children's book called *The Wonderful world of Mathematics,* which was great, but Doubleday in America said to him 'can you make some more?', so we had this book which is ten by twelves inches. He thought I'll make some more and Wolfy made *The Wonderful World of Dance*, *The Wonderful World of Transport*, *The Wonderful World of Food*, *The Wonderful World of Theatre* and *The Wonderful World of Medicine*. All of these were a complete disaster, because what he should have done is take the first title *The Wonderful World of Mathematics*, and made the 'Mysteries of Mathematics…' he took the wrong end of an idea. What was so unique about the book was that it explained things in very good, young people's terms, he preceded Dorling Kindersley by 50 years. He was a children's information provider, in a very exciting way. That worked for Doubleday and it worked for all the others.

760 Footnote from Arthur Lockwood: (from a letter to Bruce Robertson dated 24 August 2011) 'The breakthrough for magazines, I am sure was photogravure, printed on huge reels on paper like newspapers. Photolithography better known as off set lithography was I think not used because of the poor quality of the resulting print i.e. pale grey, blacks never black. *Picture Post* was founded by Stefan Lorant (editor), Tom Hopkinson (assistant editor). The publisher was Hulton Press.'

761 In the 1936 edition of Hogben's book, Neurath's name is not mentioned, and illustrations are credited to J.F. Horrabin.

Wolfy had been in Vienna in the 1930s making books, (as had Neurath), but Neurath didn't get involved in the situation. Foges made editions which sold in all the Eastern European areas: Poland, Hungary, Czechoslovakia, Slovakia, Yugoslavia, Bulgaria, Romania, and also Germany, they had a sense of intercontinental co-editions. To make a book, he would take the prototype to the Swedes, the Fins, the French, the Italians, the Germans, Spanish, Portuguese and the Americans and he would print one edition with all their texts overlaid – the text was always in black, and these co-editions meant that he could get up to 500,000 copy print run. The most important fact about Wolfy was (none of us ever realised, we were just staff) that he was never a publisher, he was a packager, so he sold an edition to a publisher. His main publisher in England, was Collins in Glasgow, the contact being Mr Collins, grandson of the founder, who brought lots of books. Foges made the '*The New Naturalist'* series with full colour photographs which now retail for high amounts second hand in antiquation books. He did the first ten [six] King Penguins, which were little boarded books, Penguin size. They [Collins and Foges] fell out, I think in retrospect, when Otto died, in 1945.

When Neurath died, it meant that Marie and Arntz,[762] really didn't have any base because they weren't philosophically aligned the way Otto was, Otto was a philosophical socialist. They were artists and illustrators and designers, so Wolfy got them working on educational products, but it didn't have the push or the intention of early socialist materials, because Wolfy wasn't in for that. Although the series of Future Books[763] (which were going to be a quarterly magazine, featured interesting articles by interesting people and were going to be sold in book shops as part-works. They were all looking for new markets. The publishing world had been publishing regular structured objects and selling them in a very restrictive way, where these guys were reinventing book clubs, and that's where it all came from.

You were working for one of Foges' companies and Marie was also working for another part of it so did, you obviously saw what she was doing
We saw in as much as the artwork was on the tables.

And what did you think of what they were doing with the Isotype diagrams?
I was smitten by information presentation. I was just doing visual information graphics. We had an assistant book designer who laid it out, but I would take something called *Man in Society* – an encyclopedia of social history and then decide how to use it so you know how people live in different countries. I did two, and Arthur [Lockwood] did one for MacDonald, but in the use of diagrams and charts I would just copy Otto's idea, in particular all the business about how the body works – all those sort of diagrams. I think the jump, which was quite simple (David Lambert, the editor worked very hard on this jump) was that he [Lambert] had worked on other stuff preceding all of this. He was on the payroll of Adprint we were on the payroll of

762 Arntz was not working with the Neuraths in 1945, he was a prisoner of war at the time.

763 Footnote from Arthur Lockwood: 'Future Books was Adprint's attempt to produce a British version of *Fortune* the successful American business magazine. Wartime restrictions for paper meant that there was no paper available to start a new magazine. But as a book publisher you had a paper quota. *Fortune* was first published as a hard-back book for four issues in 1945. It was a typical Adprint venture with a mystery of financial backing, changing publishing arrangements etc., great use of artists (Anthony Gross, Keith Vaughan etc.), photographers, designers and of course lots of Isotype diagrams. Isotype diagrams on a full page to explain imports/exports, manufacturing and output of industry etc. and statistics from industry explained in diagrams for the general public. The editorial emphasis was on a brave new post war world to be created by socialist thinkers. It also had articles using photographs and adapted text from Adprint books. Volume III contains an article 'From Hieroglyphics to Isotype' about the work of Otto Neurath. Any study of Adprint/Isotype should look at this magazine and its rival 'Contact' published by Weidenfeld. (Weidenfeld published Harold Wilson's first book *New Deal for Coal*!)'.

Rathbone books, but after Adprint closed down for some reason, he came on to our payroll and the jump was like this. If you wanted to know about your digestive system or how banks worked or bridges are built, you went to technical literature. Foges' device was to push, very clearly written text by authors, which we briefed about what to say to digest diagrams from the complex literature to the everyday, ordinary literature. So you could look at diagrams and see what it meant. He downgraded all the information

You worked with these academics, as you say 'downgrading' or translated the information into something that the public could understand?
It was all we could do to make it simpler.

So were you doing the transformation?
The designer was doing the transformation, the editor was doing the vetting of the submission by the author. The authors were very high-brow. I worked with Lancelot Hogben, (and it was a bit difficult) and with poets Laurie Lee and J.B. Priestly and Bertrand Russell, not the very top league but the best people. And Wolfy said to them 'my lads will sort it out, tell them what to do'. They just tell you to look at books and pages and I'll tell you if the diagrams are right or if they needed to put us right and of course. They would write in a personal way and David's [Lambert's] job was to de-personalise, he would just make it into simple, ordinary, generalist text.

So he worked on the final text and you worked on the final visuals?
Yes, that's how it worked. Peter Kindersley picked it all up and ran with it, the premise was that they won't read it unless it looks interesting, so we used to, in a sense, tart it up. We used to make the things look appealing. Diagrams were clear. The whole point of the image (it's the Otto Neurath principle), you can give them the facts at the bottom – if they want to find out about the facts, get the idea over first. Foges was promoting Neurath's belief in simplicity and clarity and that's what they all did.

But that was something that was coming down from him as company owner?
Foges would encourage all of us to make it simpler, you know to make it clearer. Penguin wanted to make it available to ordinary people. Paul Hamlyn was a disciple of Foges. Paul Hamlyn was doing exactly the same thing, promoting the common people after World War II, when everybody voted for the socialists. One of the young contributors to *Future* who wrote one or two articles, was a young man called Harold Wilson,[764] [Paul Hamlyn] had an incredible ability to pick up all these young people and ran with them. Dozens are credited in these lists – I mean Lord Boyd Orr (who wrote our food book)[765] became the president of the food and agricultural organisation. In principle he was a socialist in wanting to entertain and enlighten the public and there was an increasing market for it, which is mainly why he did it. Financially it was a very good thing to do due to the quantities involved in foreign editions, which is forgotten because technology now is very cheap. The technology was very expensive then, because you made all the pieces of artwork and you got all the copy photographs and made a board, and the type and artwork was stuck down, and over the top came a trace layer, with other bits stuck on it. You had physical materials and it was labour intensive, there was no way of getting round all this. If a foreign publisher was wishing to go ahead with some of these

[764] Footnote from Arthur Lockwood: 'Not certain about Harold Wilson. In *Future* Volume IV, there was an article 'Who runs the Labour Party' by a member of the Party – was this Harold Wilson?' The articles states that it was written by 'A member of the Labour party.'
[765] Footnote from Arthur Lockwood: *Feast and Famine: The Wonderful World of Food,* by Lord Boyd Orr

attractive items he couldn't afford to do that, but Foges could because he contacted all the others and got all of them to do it as co-editions. They just joined in with the investment.

He did a new black overlay the text
Yes, and he shipped them copies of the books. Mitchell Beasley copied that idea. They did the same sort of thing, they made co-editions.

That's obviously why there were so many different editions of Isotype books in different languages.
It's the revenues. Others couldn't afford to do it, but the earlier Isotype ones are in the frugal years of World War II, and even when Marie was doing it, I think there were very positively financed by Britain – British Consulate funding, and the Ministry of Information UK. I think we were selling ourselves, promotional material.

It was very 'British establishment' which for a German lady is quite interesting!
What inspired you about Isotype?
I come from a working class background so both Pat's [Robertson's wife] parents and my parents are socialists and we were brought up in the principles of democracy and social education being the route out of the systems. I was very enthusiastic to do work which I thought was of some benefit.

I found I could earn a very nice living out of it. I was three things – one was a Samurai the second was a mortician and the third was a partisan. The Samurai was when I left college I'd worked for Wolfgang Foges and the giants of European publishing. These guys employed us to fight their battles so they would carve out areas. They would publish part works, we didn't own any of it, we just created a product which beat them. You know the components so for instance How Your Body Works is in ninety-six parts and the complete encyclopedia of the world is in ten volumes type thing, they sold onto each other, so I was a Samurai first. I was a mortician for a while, for people like Paul Hamlyn and others.

The mortician came with an idea of a book, they commissioned a celebrity to write it, but when they got the text they knew it was boring so they got a designer to design the book by slipping pictures in between paragraphs and between each of the chapters. The Thames and Hudsons and Nicholsons were dressed up readable existing manuscripts. You would have to pay attention to and read a Penguin paperback, but if you brought a Thames and Hudson book you could just look at the pictures. So we dressed them up. We had a picture researcher, 'you've got a budget go find all the pictures and here's the manuscript' and the designer underlined some ideas that you might try, then they would come back with all sorts of pictures and we would lay it out like a corpse. I took a paragraph and I'd strip it down and I made a design, and I'd stick it down and then at the bottom I'd find I was five lines over, so I can't start the next chapter, so I'll have to chop it off and place half of it on the page and stick a couple of pictures underneath, or at the top.

The third one was the partisan – the guy who travels light and doesn't need a lot of capital. He simply gets in, makes a killing and gets out a bit quick, and so we supplied to publishers and became a publisher's supplier. I would go to a publisher and say I want to do this book and I'd have ten pages and an outline, and he'd say why, and I'd give him a reason and he'd say yes and he'd give me the money. But I had to get in and get it done and get his money and then get the hell out of it, because if payments were delayed, I'd go bankrupt.

How did Diagram Visual information Ltd come about?
First of all Foges moved office – that was a great change – to the top of Euston Road and Tottenham Court Road behind where the GPO tower is. When they moved there I already had eight jobs simultaneously: I was senior lecturer at Chelsea School of Arts and Crafts; I was a one, sometimes two-day-a-week attendant at the *Sunday Times* newspaper (I used to go in on Thursday or Friday or both); I was Penguin book designer for two series; and I had all the freelance commissions from *Oxford University Press* and *Longmans* amongst others. I set up teaching with Edward Wright, but I didn't think that teaching would work because all the students would do was come in, not pay attention and not do anything. I said I'm going to set my office in the classroom. We'll keep the materials in the staff room but I'll sit at the drawing room desk and I'll work on my freelance projects and I'll get them helping me.

So we ran a little studio, and Bob Chapman was the co- partner. We used to invoice, we used to get it done, the students did all the hard work, all the tracing of the maps and the overlays and they'd get few bob, but my accountant said you can't keep doing this because as a partnership you are liable if it all goes wrong, you have to register as a limited liability company which I think was in 1968. We then registered as a limited liability company and I got an office in Soho. We got a young lad from the Ordnance Survey Department up in Harrow-on-the-Hill, and Bob [Chapman] and I used to go in on some days, or nip in, because art school used to break up at 4.30–5.00, and I used to go and do another couple of hours. We worked on supply and demand really, there was no problem about work – seems strange now. I think it was called the Haymarket Press. They had over 200 magazines and they wanted stuff all the time. They didn't have people who could draw diagrams so they used what were effectively poor linear diagrams by the authors. We did them in full colour – flashy artwork, it was a real pleasure. We'd create magazines, medical magazines, racing car magazines you know all that sort of stuff. We worked on three newspapers including the *Sunday Times* and the *Economist*

Around that time they started this thing called part-works, which were 32 pages long and you buy it weekly and get a binder to keep them in. We had contracts, and these part works were 96 issues, which is a year and a half so you got a year and a half's worth of works and you had to do it each week. And you had to provide it all every week and give it to them in a presentable form, and there were stages that we had to go through. These activities were going on simultaneously which kept us financially buoyant.

Did you leave Foges?
I wasn't employed. When I went there I was on a payroll with Rathbone books but when they moved office and I had all these other things going on, there was no way I could keep working, so I quit. We took on some jobs for them as all publishers have 'schedule crises'. Some jobs were maybe a year's length. You'd put all your work with one company.
So that was the gap between working for Rathbone books. It changed into Adprint and so I worked for Adprint on a number of projects making books on contract.

So you would go to a publisher and said would it be a good idea….
I told them it was a good idea, and they funded it.

You also did work for UNESCO and United Nations
Well that was the next thing that grew out of it.

You became known as someone who could do diagrams?
That's what it was. The other factor was that the UN divisions: Food and Cultural Organisations (FAO), United Nations Environmental Programme (UNEP), and another one in Regents Park called International Planned Parenthood Federation (IPP), were quangos of United Nations and they needed to publish texts on various subjects and the problem was that all the texts were illegible, so I used to sit down with an editor who dismantled the text and turn it into journalese, he and I.

You became the 'mini expert' on that subject?
Just like a newspaper would, I untangled it.

Did the visual side of Isotype influence the outcome of your work – you've already said the academic and the intellectual side of it used transformation?
Well the visual side was the simplicity they obviously came out of the Bauhaus style, and we were all being taught to 'range left all the time and use upper and lower case, so all my generation had a strong sympathy towards the modernist tradition. We weren't so interested in the classical style of typography, we were much more interested in modernist typography, and the industry complied with that, it also applied to cartography by the way, because they had masses of maps and charts to draw with cartographic elements. Simple graphic presentation of maps was what appealed to us all. There was a tragic end to the Penguin book jackets because Alan Aldridge was brought in to do covers [a pop artist known for his Beatles record covers]. He was the art director who worked in this style – sans serif type faces and range left and bold, and all that stuff that Penguin seemed to create, so we had our noses pushed out. We didn't do that any more. – there was also Brody the typographer.

That was another way of destroying the rigidity of our stuff. Our brochures were all pretty rigid in terms of the typography, railway time-tables and that sort of business, so that's what I got in terms of style from the Neuraths. We developed the necessity of developing photographs of the symbols and then duplicating them, because we didn't have a computer. We would get a line of images which we had designed to reduce down to get clear, and then run off lots of photo prints (which we had to go out and get) and we could cut them up and stick them down. The filing cabinet draws are full of this stuff. But like Letraset it was another one of those individual applied stylistic things. That's what I got from them, the Germanic approach – the Bauhaus approach.

Overall would you consider that Isotype had a stylistic effect on information and design today?
Sadly no. I don't think it has. It wasn't taken up by the television. I don't understand why it wasn't taken up more extensively by the educational product, because it isn't any more.

Although the Open University did take on some of the transformation side of it…
There were little branches of it where it appeared. Ivan Dodd did a Nuffield Foundation Educational Programme and used symbols as a device, but in principle it is not common practice. So it didn't go anywhere, it was a cul-de-sac which is sad because I would have liked to have been able to switch the television on and see a bar diagram comparing the number of people who went to Michael Jackson's concerts compared to the Rolling Stones or the Beatles, but all you get is just clips of the crowd to show attendances so you don't have any concept of who got the most in.

I was watching 'Land of Promise' last night and Isotype is the thing that helps people make the decisions and show the way forward, it had quite a commanding role!
When I worked on newspapers like the *Sunday Times* I used to stick it in there all the time, you know stacks of coins, is the classical one, stacks of bank notes, things of that nature, but it never really took off and I don't understand why. And certainly 'Interglossa', the language business never took off, neither did Lancelot Hogben's Basic English. None of those things took off, I regret that the normal kids in schools don't get some sort of encouragement to read information.

What about the legacy of Isotype?
Well one thing that is absolutely certain. The depiction of objects in the physical world in a graphic simplistic way has now become common practice everywhere, so symbols on a washing machine or a shirt that goes in the washing machine as to whether it is heat resistance or not heat resistance – all of those things in car manuals highway codes – all that sort of stuff.

Computer icons?
Yes, all that sort of thing. We've got Apple Macs they use symbols to decorate all theirs. I think that's a great inheritance. Whether it came all out of Isotype, or whether it came out of the need for simplicity in the Bauhaus. Gerd Arntz's symbols had a lot to do with it. They were very simple – the simplest at that point.

One final question, Is Nigel Holmes influenced by you?
I don't think he is at all.

He took your job at the Sunday Times?
I don't think there is any relationship at all. Nigel does useful, attractive solutions involving the reader in a very simple idea. I disagree with Tufte, because we have to remember that Nigel's job was to get the guy on the subway train in the morning to pick up the idea, and they had previously only had a photograph to refer to. But Nigel draws you a bar diagram and its turned into stacked chimneys talking about pollution, so smoke is coming out the top of the bar. It involves you. So I don't think he was in any way influenced by us. We had the same direction in terms of making the reader aware of the basic elements of the argument, but that's all.

You did it your way and he does it in his way!
There was a difference. Nigel draws them, he sits there with a pencil and he invents them. I think that he is the sole creator of the image right down to what goes up on the page. I was never the sole creator because I had a team, so the guys who did the symbols did symbol design whenever they were needed, and the designers worked out designs and the editors labelled and captured it all, much more team work, it was called Diagram Visual information Ltd, we were a team and it wasn't just me doing them.

'Charts on File' file is quoted as one of the very important pieces of information design...
Here's what happened. It was an economic situation that drove us to doing this. An American publisher sued a state in America for permitting the photocopying of images for the pupils and allowing the teachers to do it, so instead of suing the school they sued the state and they won, and the copyright rules say that you can't distribute other peoples' work. The consequence was that in 1981 we provided the purchaser with the right to do it, so they paid a lot of money ($75) at that time, and the art style was the direct result of the quality of photocopies in the day, they were not colour photocopies they were flat bed and coarse textured – they couldn't photograph textures.

Why do you think this book is quoted as being such an important example of information design?[766]
It is not a book. In the photocopying world we permitted the purchaser to paint out the text and use it as a question paper. So you could have a human body with leader lines on it. I've got Chinese version upstairs, which is bilingual, they've kept the English text and they've added the Chinese text, so Chinese pupils can read the Chinese but they can read all the English words as well which opens up a great career opportunity.

Or they just have to scan it in, download a jpeg
Yes, they do, it's all going to move in that direction its not going to be printed matter anymore just physically impossible.

Thank you

[766] Wildbur and Burke *Information Graphics Innovative Solutions in Contemporary Design* (London: Thames & Hudson, 2001), p. 56, consider that Diagram Visual information Ltd 'pioneered a new kind of informational book' in *Charts on File* when it was produced in 1988. It consisted of a collection of hundreds of loose-leaf diagrammatic sheets for educational use. It has since evolved into an electronic format.

A visual analysis of Nigel Holmes' work

Visual evidence of the principles of graphic argument in Holmes' work

(This section forms the full visual analysis of four examples of Holmes' design work discussed in Case study 2).

Graphic argument – the mode in which graphic material is presented, allowing the viewer to draw their own conclusions – exemplified by the Isotype chart with equal-sized units.

The following examples of Holmes' charts and diagrams have been selected to show the gradual evidencing of Isotype principles of graphic argument in Holmes' work over the past forty years. These examples are taken from the four previously identified significant stages of his career, and represent typical examples of Holmes' design work from those periods:

- 1965-1977 Soyuz/Apollo launch and docking charts for *Radio Times* (1975)
- 1977-1993 Charts for *Time* magazine (1982)
- 1994-2000 Diagram for US Airways *Attaché* magazine (1998)
- 2000 onwards 'The Citizen's Guide to the Airwaves' for the New America Foundation

Criteria for analysis

Representative examples of Holmes' design work have been scrutinised using the following abridged checklist, formed from the original list of the three levels of the principles of Isotype stated in Part one of this thesis. The visual analysis concentrates on identifying principles relating to graphic argument, which is simply defined as the mode in which graphic material is configured and presented diagrammatically. Principles of graphic argument relate to the intellectual process, configuration of material and the graphic conventions used to present them, which can be found in all three levels of the abridged checklist. (Many of these principles also relate to transformation and graphic language, which combine to form graphic argument, and cannot easily be separated). The checklist serves as a tool to establish a common set of criteria for visual analysis throughout the four examples examined. Principles deemed inappropriate in contemporary terms have been omitted, as have been those considered to be unrelated to the formation of graphic argument.

Abridged checklist of principles specifically relating to graphic argument:

Philosophical and intellectual principles of Isotype

2. socially inclusive
3. disseminated social knowledge
4. educational
5. international

Methodological principles of Isotype

1. transformation and teamwork
2. ordered information to allow its significance to become visually evident
3. reductive by nature, achieving a balance between abstraction and pictorial representation
4. symbols functioned as repeatable units
5. universally accessible symbols and syntax
7. stylistically as neutral as possible
8. used simple clear language
9. formed a 'helping language' (symbols supported words)
10. fidelity to material and viewer
11. symbols arranged to show comparative information
12. new symbols only added or adapted if content demanded it

Graphic and operational principles of Isotype

1. equal sized repeated symbolic units arranged horizontally left to right in rows (unless argument dictated otherwise i.e. height) to indicate magnitude
2. symbols and syntax combined to form a visual grammar
3. symbols seen in silhouette or outline form, tonally balanced occupying a similar visual space
4. avoidance of perspective, adoption of parallel projection and elevation as drawing systems
5. meaning evident in black and white
6. colour used symbolically taken from a limited palette
8. guide (or qualifying pictures) *Führungsbild* heightened comprehension
13. avoidance of certain conventional statistical techniques
    - sizing circles and squares to show comparative amounts
    - absence of line graphs (Fever charts)
14. integrated pictures and text

Evidence of the principles of Isotype in the Soyuz/Apollo Charts

Intellectual and philosophical principles

educational/non commercial status

- commissioned for *Radio Times* magazine to promote TV and radio coverage educational, giving an overview of the BBC's coverage of events

designed for common benefit

- published in *Radio Times* a relatively low price magazine, and meant to enhance the license-fee paying general public's experience of a global news event

Methodological principles

transformation

- complex data about the dual US/USSR space launch and docking procedure is translated into easily accessible information by associating launch and docking procedures with simple upward arm movements and handshake gestures
- launch vehicles reversed out of the arms allowing a comparison to be made between the different shapes of Apollo and Soyuz, with comparative launch stagings contained within curved graphic arrows, projected upwards by the hands
- dual orbits of both craft are shown in simplified sequential diagrams
- stylized restaurant style menu with re-hydrated food, and emphasis on sociability reminds the viewer that the operation is as much an international human endeavour as a joint technological achievement
- precise timings are highlighted to show the technical precision of the operation

Graphic and operational principles

use of colour to simplify or signify meaning

- the meaning of the charts is evident in black and white, no extra colours are needed (may have been due to a printing constraint)

use of concise graphic symbols in outline or silhouette form

- simply realised symbols and diagrammatic illustration shown in silhouette or outline form (launch craft, staging diagrams, orbiting sequence diagrams)
- equal-sized repeated symbolic units arranged horizontally left to right in rows indicate quantity (seated figures within launch craft showing the location and capacity of cabin areas)
- avoidance of perspective

mode of representation of numerical/statistical information

- sequential annotated flow charts showing comparative staging and orbiting

use of graphic signifier to attract attention

- realistic hand and arm drawings humanise the subject matter and allow the viewer more immediate access to the information

Evidence of the principles of Isotype in the 'Diamonds were a Girl's Best Friend' and Monstrous Costs' charts

Philosophical and intellectual principles

educational/non commercial status

- commissioned for *Time* magazine to highlight news features
- educational – it is relatively easy to understand that the price of diamonds has dropped and campaign expenditure has reached 'monstrous' levels

designed for common benefit

- published in *Time* magazine in 1982, a US weekly news magazine for the business sector

Methodological principles

transformation

- *Time* magazine's rigorous data-checking department provided reliable information (from the Diamond Registry and Citizen's Research Foundation) that was translated into quirky, illustrative popularist charts that deliver memorable graphs with immediate messages
- plotted pathways from line or fever charts are turned into key illustrative elements

use of simple language

simple language, but based on popularist references

Graphic and operational principles

use of colour to simplify or signify meaning

- the charts are configured in red and black, with tints – red is used to emphasise the line graph (and the lips of the reclining woman). In the 'Monstrous Costs' chart, black is used in the background to emphasize the graph 'teeth' or shape – restriction of colour palette would probably have been due to printing constraints

mode of representation of numerical/statistical information

- use of line or fever chart – a form of graph that goes against the principles of Isotype

use of graphic signifier to attract attention

- humorous cartoon style images allow the viewer immediate access to the information

Evidence of the principles of Isotype in 'A Quick Scan on Bar Codes'

Intellectual and philosophical principles

educational/non commercial status

- commissioned for US Airways *Attaché* magazine for in-flight entertainment
- educational – explanation of what an important everyday concept (bar codes) actually mean

designed for common benefit

- published in *Attaché* magazine in 1982, for airline passengers only

Methodological principles

transformation

- the technical mechanism to denote monetary value is explained with the help of a metaphor connecting the stripes on a zebra's back with a bar code, the story line is extended using humour to connect the zebra with Noah's supermARKet [sic]
- the bar code scanner connects the zebra with the arc via a connecting line

use of simple language

- simple language explains what each part of the bar code means

Graphic and operational principles

use of colour to simplify or signify meaning

- the chart relies heavily on black and red and with the addition of tints and muted background colours, allowing the black of the bar code, and red of the connecting line and primary captions to stand out; primary captions are shown in red, secondary in black and tertiary in pale green and blue; pale green tertiary level captioning allows the simple fact that bar codes are mirror images to be stated economically whilst not detracting from the primary message

use of concise graphic symbols (without perspective) in outline or silhouette

- some use of symbolic representation (Ark, water, telephone and computer) the hand, scanner and zebra are all drawn in outline with colour in-fill
- avoidance of perspective, and elevation as drawing systems

mode of representation of numerical/statistical information

- flow chart configuration linking zebra to Ark

use of graphic signifier to attract interest

- humorous metaphors allow the viewer immediate access to the information

Evidence of the principles of Isotype in 'The citizen's guide to the airwaves'

Philosophical and intellectual principles

educational/non commercial status

- commissioned by non-government organizations specifically to inform the public of their rights
- educational by nature, explaining the uses and misuses of the radio frequency spectrum

designed for common benefit

- disseminator of social knowledge (informs the public of the little known fact that the airwaves are a publicly owned resource for general use

Methodological principles

transformation

Side one (main stacked line or fever chart)

- highly complex information from a multitude of sources is combined to form a multi-layered, interrelated statistical chart showing what the airwaves actually mean to the American public from a variety of different angles (including monetary and compensatory value); explained through graphs, annotation, an elongated skyline going from city to desert (indicating the distances and obstacles through which signals need to pass); the value of the spectrum if it were thought of as real estate; block diagrams which indicates the frequencies assigned to everyday devices; the value of the spectrum in comparison to other elements which help form public opinion (i.e. spending on healthcare, family assistance and the military, the value of gold, MacDonalds, Bill Gates fortune and the cost of the Empire State Building)
- 'Uncle Sam' in traditional red, white and blue highlights important facts

Side two (a series of supporting editorial and graphic arguments)

- a series of interrelated elements designed to give a more detailed picture of how the airwaves function, presented through a variety of graphic means (symbols, pie charts, line charts, bar diagrams, a map, illustrated flow charts, simple line illustration, block diagrams, organisational line charts, pictorial charts, flow diagrams, and 3D and silhouette illustration), editorial means: questions, quotations, comments, text and symbols in red to add extra commentary)
- small map with flow chart to show the 'spectrum frontier' with *Führungsbild* of covered wagon to associate original American pioneers with the contemporary practice of pushing forward the boundaries of the spectrum
- pictograms likening the airwaves to publicly owned oceans that it states, the Federal Communications Commission is dividing up into shipping lanes with tolls to indicate their approach to licensing the airwaves

- the audience can either read the entire document, or select at random to build their own picture

use of simple language

- highly complex subject matter – the uninitiated audience will need to persevere to familiarize themselves with the acronyms and technical terms found in this document that cannot be avoided if this subject is to be explored to any extent

Graphic and operational principles

use of colour to simplify or signify meaning

- predominance of red and black (and tints of black) for text and primary information
- yellow, mid-green and mid-blue used as blocks of colour and backgrounds to graphs to give emphasis
- paler greens and muted colours used as backgrounds to main graph

use of concise graphic symbols (without perspective) in outline or silhouette

- simply realised symbols, (vehicles, shipping, technology, buildings, objects, people, animals, shown in silhouette or outline homage to Arntz's figure on a bicycle appears on side two of this leaflet
- avoidance of perspective, adoption of parallel projection and elevation as drawing systems
- statistical quantities represented by the length of line of horizontally arranged symbols from the axis ('the spectrum's worth compared to other things' diagram)

mode of representation of numerical/statistical information

- pie charts, line or fever charts (forms of graph that goes against the principles of Isotype), bar diagrams, illustrated flow charts, block diagrams with graphic signifiers organizational line charts, pictorial charts, flow diagrams

use of graphic signifier to attract attention

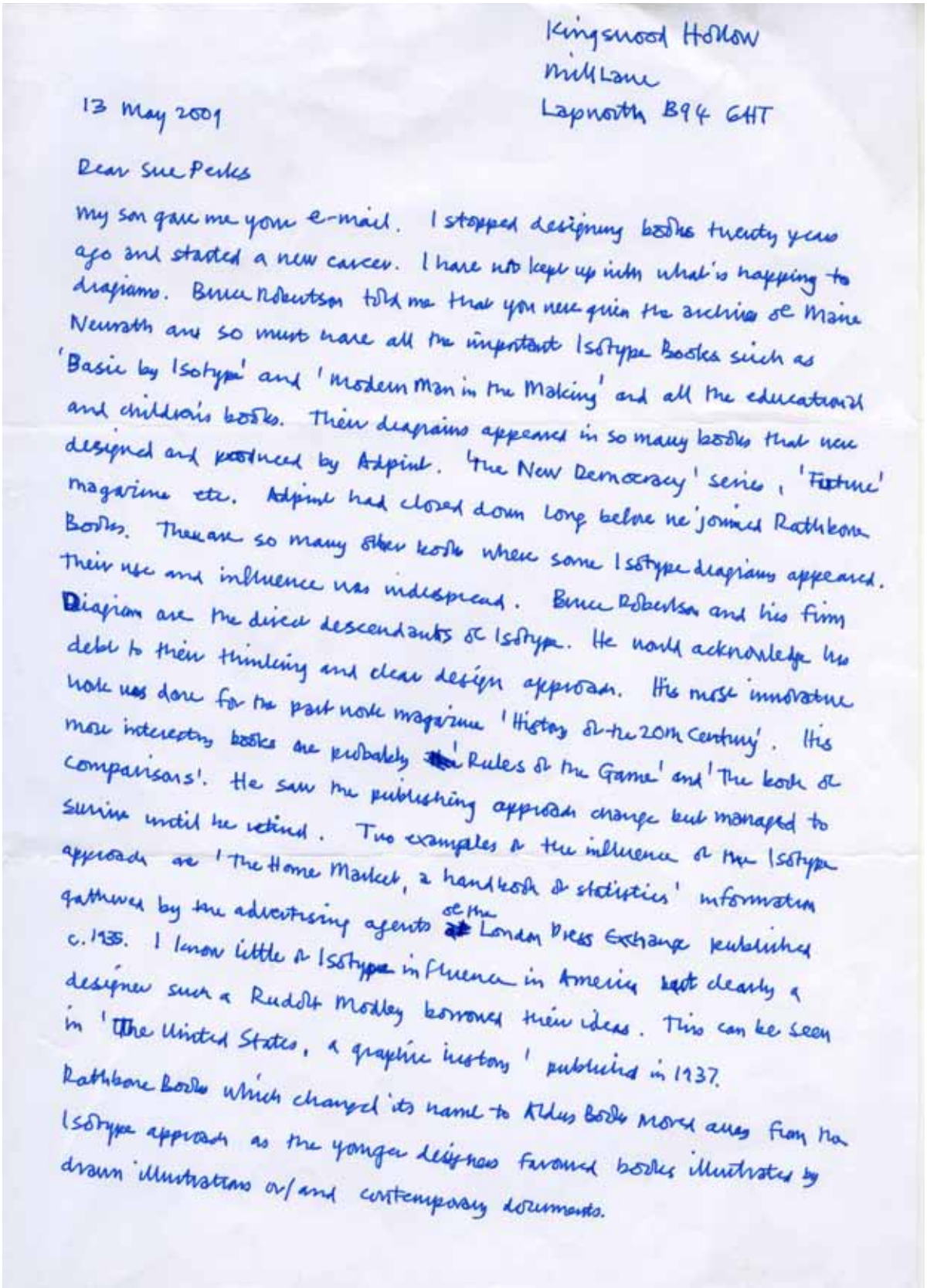
- buildings, Uncle Sam, the White House, historic covered wagons, fields, industry, power, industry and commerce) to heighten comprehension

use of map projection/stylization

- small map with flow chart and graphic signifier of wagon and horses

use of integrated pictures and text

- use of horizontal cut-through sections and sequential annotated diagrams



Kingswood Hollow
Mill Lane
Lapworth B94 6HT

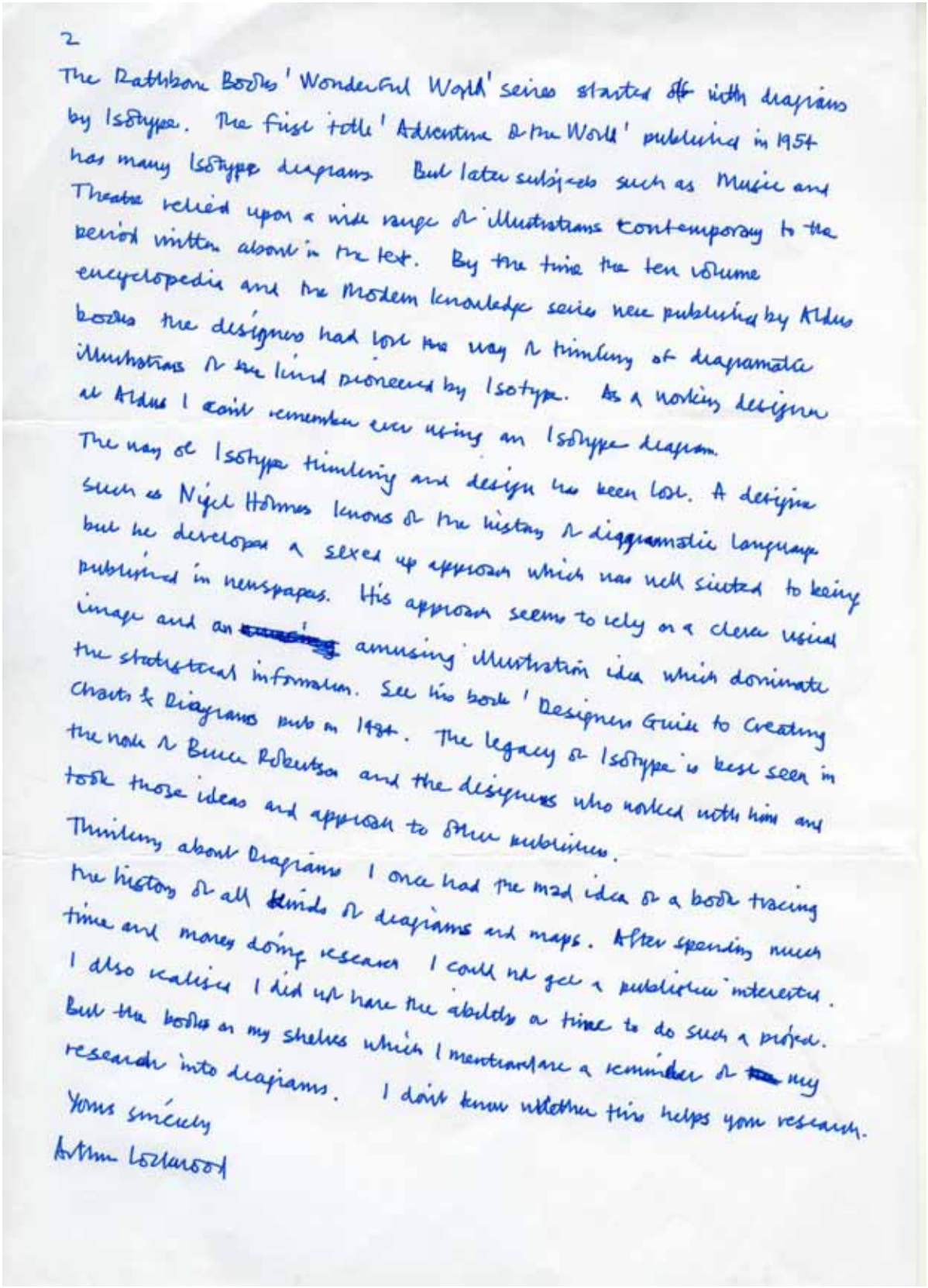
13 May 2009

Dear Sue Perks

My son gave me your e-mail. I stopped designing books twenty years ago and started a new career. I have not kept up with what's happening to diagrams. Bruce Robertson told me that you now guide the archive of Marie Neurath and so must have all the important Isotype Books such as 'Basic by Isotype' and 'Modern Man in the Making' and all the educational and children's books. Their diagrams appeared in so many books that were designed and produced by Adprint. 'The New Democracy' series, 'Fortune' magazine etc. Adprint had closed down long before we joined Rathbone Books. There are so many other books where some Isotype diagrams appeared. Their use and influence was widespread. Bruce Robertson and his firm Diagram are the direct descendants of Isotype. He would acknowledge his debt to their thinking and clear design approach. His most innovative work was done for the past week magazine 'History of the 20th Century'. His most interesting books are probably 'Rules of the Game' and 'The book of comparisons'. He saw the publishing approach change but managed to survive until he retired. Two examples of the influence of the Isotype approach are 'The Home Market, a handbook of statistics' information gathered by the advertising agents of the London Press Exchange published c. 1935. I know little of Isotype influence in America but clearly a designer such a Rudolf Modley borrowed their ideas. This can be seen in 'The United States, a graphic history' published in 1937.

Rathbone Books which changed its name to Aldus Books moved away from the Isotype approach as the younger designers favoured books illustrated by drawn illustrations or/and contemporary documents.

Correspondence from
Arthur Lockwood,
May, 2009.



2

The Ratlibone Books' Wonderful World' series started off with diagrams by Isotype. The first title 'Adventure of the World' published in 1954 has many Isotype diagrams. But later subjects such as Music and Theatre relied upon a wide range of illustrations contemporary to the period written about in the text. By the time the ten volume encyclopedia and the Modern knowledge series were published by Aldus books the designers had lost the way of thinking of diagramatic illustrations of the kind pioneered by Isotype. As a working designer at Aldus I can't remember ever using an Isotype diagram.

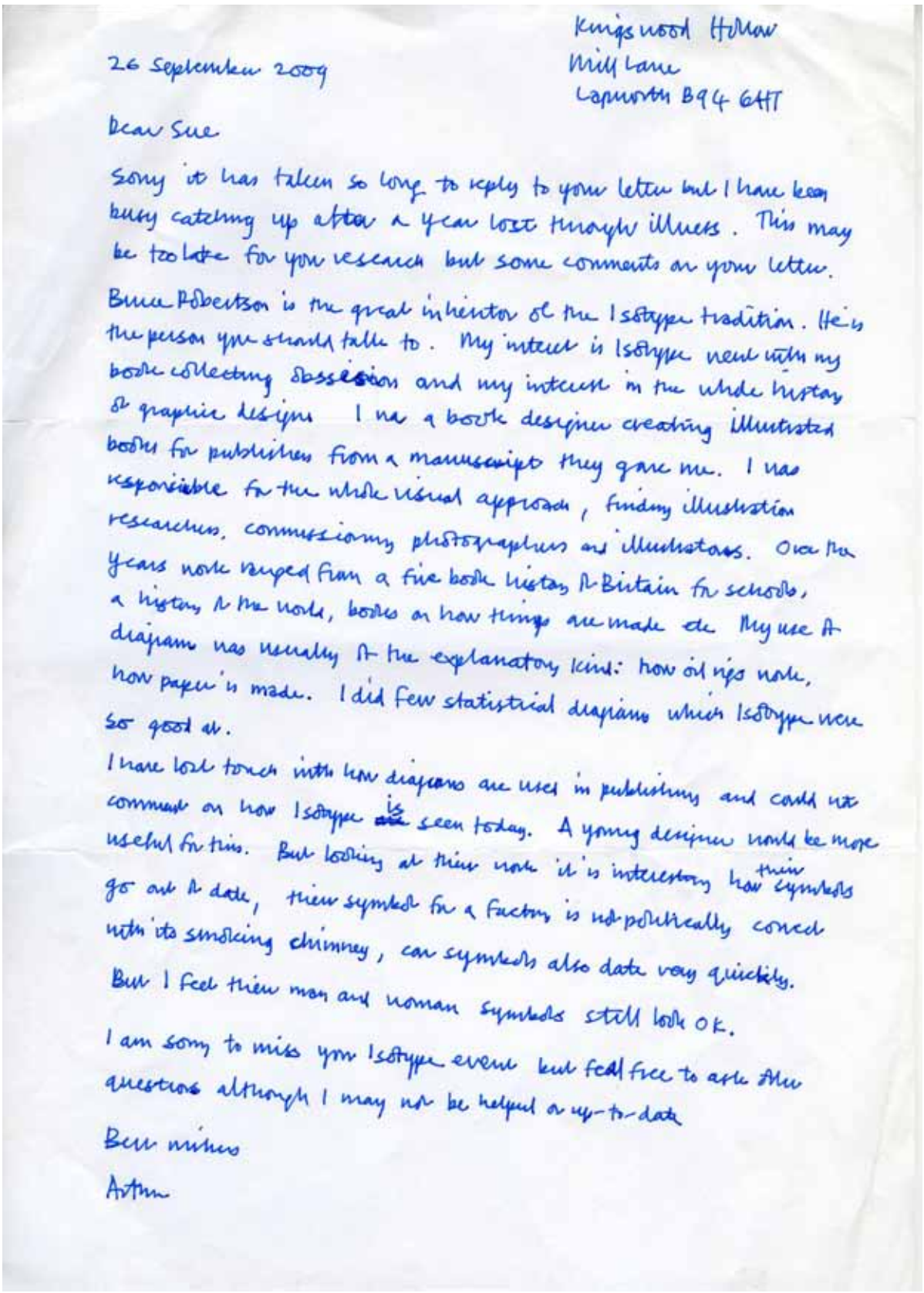
The way of Isotype thinking and design has been lost. A designer such as Nigel Holmes knows of the history of diagramatic language but he developed a sexed up approach which was well suited to being published in newspapers. His approach seems to rely on a clever visual image and an amusing illustration idea which dominate the statistical information. See his book 'Designers Guide to Creating Charts & Diagrams' pub in 1984. The legacy of Isotype is best seen in the work of Bruce Robertson and the designers who worked with him and took those ideas and approach to other publishers.

Thinking about Diagrams I once had the mad idea of a book tracing the history of all kinds of diagrams and maps. After spending much time and money doing research I could not get a publishers interested. I also realised I did not have the ability or time to do such a project. But the books on my shelves which I mentioned are a reminder of my research into diagrams. I don't know whether this helps your research.

Yours sincerely

Arthur Lockwood

Correspondence from
Arthur Lockwood,
May, 2009.



Kingswood Hollow
Mill Lane
Lapworth B94 6HT

26 September 2009

Dear Sue

Sorry it has taken so long to reply to your letter but I have been busy catching up after a year lost through illness. This may be too late for your research but some comments on your letter.

Bruce Robertson is the great inheritor of the Isotype tradition. He is the person you should talke to. My interest is Isotype mixed with my book collecting obsession and my interest in the whole history of graphic design. I was a book designer creating illustrated books for publishers from a manuscript they gave me. I was responsible for the whole visual approach, finding illustration researches, commissioning photographers and illustrators. Over the years work ranged from a five book history of Britain for schools, a history of the world, books on how things are made etc. My use of diagram was usually of the explanatory kind: how oil rigs work, how paper is made. I did few statistical diagrams which Isotype were so good at.

I have lost touch with how diagrams are used in publishing and could not comment on how Isotype is seen today. A young designer would be more useful for this. But looking at their work it is interesting how their symbols go out of date, their symbol for a factory is not politically correct with its smoking chimney, can symbols also date very quickly. But I feel their man and woman symbols still look OK.

I am sorry to miss your Isotype event but feel free to ask further questions although I may not be helpful or up-to-date.

Best wishes

Arthur

Correspondence from
Arthur Lockwood,
September, 2009.

Appendix 3

CASE STUDY 3 Graphic language

Initial email correspondence from Dr Martin Krampen

5 August 2012 (unedited)

dear sue perks.

thank you for your mail of july 20, 12. i try to answer your mail following your order of questions.

how do i see the influence of isotype on international pictographic language during 1960th and 70th? i came in contact with isotype by meeting rudolf modley when i arrived in the u.s. in 1957 and i stayed in contact with him until the glyphs period, when i also met margaret mead together with him in new york. modley did not seem to be interested in continuing isotype but rather in continuing his own way which had little to do with keeping up the tradition of Arntz's design (see the collection of his "symbols" by pictograph corporation, together with dyno lowenstein). the work of modley was concluded in his"handbook of pictorial symbols" published by dover in 1976. this collection contains also a chapter of pictographs designed by g. Arntz for netherland statistical foundation. systems designed by various designers for various authorities or organizations are listed in modley's handbook, section IV. this listing seems to constitute the state of the 1970th: a disorder of collection principles and design-styles. I contributed perhaps to this disorder by developing a sign system for icao (modley's handbook, pp 83 - 84). my attempt was to work by prescription of a design technique, i.e. by having every object (alive, human, etc. and not alive) represented by a photographic silhouette. this would in my approach put an end to individual stylistic design differences. the system was adopted by icao and i have seen it implemented in smaller countries without any designer intervention. i do not know which symbol dictionary project you mean with marie neurath's part in it. however, in 2007 my book "the world of signs", co-authored by m. goette and m. kneidl, was published in german and english (avedition, ludwigsburg). this book contains a german and english dictionary of about 2000 pictographs designed by different authors, and it presents an a0 poster with all the pictographs, of the book and a cd with first attempts to animate pictographs. my early interest in isotype did not carry through to my work with aicher. aicher learned only fairly late about neurath, Arntz and isotype. he was mainly influenced by preceding olympiades and designers like Katsumi.

i hope i could help you with my above remarks. i really think you would get some more important information from my 2007 book. with my best wishes for your work and best regards,

martin krampen, ph.d.

Edited transcript of formal interview Dr Martin Krampen

22 October 2012
Location: his home, a house designed by Max Bill in the grounds of the Hochschule für Gestaltung, Ulm, Germany
Co-interviewer with Sue Perks (SP), Wibo Bakker (WB)
Additional questions supplied by Hisayasu Ihara (HI)

After an initial meeting with Rudolf Modley in the US, Martin Krampen supplied academic papers to the 1956–61 'Preparatory Survey on Communication Through Graphic Symbols' which he discussed in 'Signs and Symbols in Graphic Communication' in 1965.[767] He went on to work in Canada and Germany as an educator, design consultant and research scientist with a special interest in semiotics. He was a member of the Icograda Commission on Signs and Symbols during the mid-1960s and collaborated with Otl Aicher in research surrounding the semantic and semiotic aspects of pictograms. Krampen also co-authored *Zeichensysteme Der Visuellen Kommunikation: Handbuch Fur Designer, Architekten, Planer, Organisatoren* with Aicher (published 1996). In 2008 Krampen co-published *The World of Signs: Communication by Pictographs,*[768] which he sees as a continuation and development of his work with Aicher.

WB *Mr Krampen, I have in front of me the book you wrote [The World of Signs]. You told me it was an important book, your life's work in the area of the semiotics of pictograms? Did I understand it correctly?*
No, its not my life's work, its a continuation of the book I did with Otl Aicher many years ago, But it is not Otl Aicher-like it's a step ahead...

WB *In what way?*
In the way that it touches the issue of the semiotics and semantics of signs, not their grammatical set up, nor a pragmatic way of treating signs, but the meaning of signs. What did you think about the cover?

WB *I think it very German, very clean, grey, black, this layer of lacquer gives it something extra... a few columns.*
It's not all it is. This half is living things, this half not living things.

WB *I wrote up on taxonomy – the idea of degrees of separation; separating living items from the human body from items of a larger scale. That's also what you tried to do with semantics.*
That's it yes – and that's what is on the cover – but no-one understands it!

WB *What do people not understand?*
The basic subdivision between the two columns, they don't understand the cover, I hope they understand something more about the book if they read it!

WB *What do people think of it?*
I don't know what they really think. It's still in the book market and I think it has been appreciated. Most of the people don't understand the semantic accent the whole thing has.

[767] Martin Krampen, 'Signs & Symbols in Graphic Communication' *Design Quarterly,* 62 (1965), 1-31.
[768] Martin Krampen, Michael Götte & Michael Kneidl, *The World of Signs: Communication by Pictographs,* (Germany: Avedition GmbH, 2007).

WB *What is the most important semantic accent?*
The semantic accent is that it is not so much concerned with the make-up of the pictograms – their design for instance, but it's concerned with the meaning of them. It's not how this cow has been done, but how he [the designer] came to design the cow like that.

WB Not about stylistic issues; but about formal issues, about what it is that makes you recognise it as a cow?
No, does it mean cow.

SP *Why did you decide to have the animated piece on the CD?*
That was at the time one of the first attempts (in 2007).

SP *The wonderful thing about animating a simple symbol means that it's not static and can show action, and the symbol can be extended considerably – by showing animation, a symbol of a man can really walk or kick a ball!*
So far this issue of movement hasn't been faced explicitly, that's why we put a few attempts into the book.

WB *Have you seen real life examples of animated pictograms in practice?*
Yes, but not before we did this.

WB *In that way it was pioneering book.*
SP *Have you heard of ASOTYPE (Animated System of Typographic Picture Education)? It's very similar to this. I've seen examples of in use with an aeroplane where you can differentiate between landing and taking off, depending on the angle – you can show the action of a static symbol.*
WB *A kind of contradiction, strange! I'd like to address your education and life prior to going to America. You started out studying art history, theology, painting. Why do so many different things, was it in your nature!*
It was in my nature! I studied theology in the first place, but with a psychological leaning. I consider myself a psychologist – not a couch psychologist – but an experimental psychologist, who has chosen the field of colour, form and so on as the area of investigation. Always experimental, I don't believe in anything that has not been tested.

WB *That must have been a strange kind of theology that you studied. Did you study everything At the same time?*
Sequentially – in my time there was a very important development in theology. A German professor of theology by the name of Bultmann advanced a theory in which he meant that the mythology which is presented in the Gospels is a reaction to the miracles and therefore is not an important point.

WB *What is the important point?*
First of all he called his theory 'Demythologisation'. This has become a very important point in my study. I decided that getting too deeply into the mythology didn't much matter, but the meaning of the psychology – the semantic approach was important. At the time Bultmann's interpretation had an existentialist leaning. In my case it turned towards the social point-of-view, so while in our studies of the Greek versions of the four Gospels, you think of the Sermon on the Mountain and you read 'blessed are the poor' – but what is the difference between one Gospel saying 'blessed are the poor' and the other Gospel saying 'blessed are the poor in spirit' and the third one saying another version. Point blank that's a question of interpretation in a semantic way.

WB You also did painting and art history.
Yes.

WB That was after theology?
After.

WB *Why this shift of interest?*
The interest in art and art history was always there, but the main focus was shifted from theology – my interest in mythology shifted into another type of imagery.

WB *In 1953 we find you with Otl Aicher, working in a practical way, how did you shift from painting to graphic design?*
That too took a few years. I had the first assignment of a doctoral thesis in Rome assigned by the Church History faculty in Tübingen. Then when I came to Rome, the topic was one of the so called key catacombs which means that there was a clergyman holding the keys so you could get into this little, not very interesting area. It had never been interpreted, so that was my task and it didn't keep me there. I just quit that part of psychology or archaeology and went back into painting again. I had always painted.

WB *Painting is different to design, it's an applied art.*
Yes.

WB *how did this come about?*
That came about during my stay in Italy. I got married there and had a little daughter. I painted, but at the same time ran a gallery with my wife, and we made exhibitions of very modern painting. There was one particular painter we didn't have exhibiting. In an event I got into letter exchange with a lot of painters and one of them was Max Bill.

WB *He's a concrete artist too besides his graphic design work...*
That was the point. And so I had an exchange of letters with him. He agreed to exhibit in my gallery. But then after a while he wrote back to say he would not be able to realise the exhibition because he was founding a new school in which 'things were made which are useful to people' or something like that! And that hit me in a way that I decided that was the school I have to go to! So I broke up the whole Italian situation and went to Ulm – I went to school again for four years!

WB *Did you live on a scholarship or earn money as a painter?*
No, didn't have a scholarship, I had a free stay in one of the ateliers annexed to the school, which was granted by Nina Kandinsky (her married name).[769] So I was staying in this place and then my mother sent me some fifty marks a month.

WB *And your wife and children, were they in Italy or did they live with you here*?
They came for a short time, and then I was often in Florence during that period. During that time I had also applied for a scholarship in the United States, which was pending all the time. That was in 1956 or so.

WB *What did you like most about the HfG?*
Oh, the boiling down of things by the method of abstraction to the very meaning.

[769] The third wife (and widow) of Wassily Kandinsky, who inherited his wealth.

WB *Essentialist, functionalist thinking.*
Yes.

WB *Did you have favourite teachers?*
Yes, Josef Albers, he was a very important teacher. I also made a movie on the classes he gave here.

WB *Why did you find him an interesting teacher, his personality or the content of his teaching?*
The content, the degree of abstraction, the renouncing of any attempt to portray any part existing in the environment.

WB *That's very definite! Were you also taught by Aicher?*
Aicher was more of a practical person. I think he liked to work with me because I was a man who had gone to university. Most people at the school hadn't studied at a university. That gave me a good position in his classes. But I also had to apply myself to his way of practical thinking, and this is one of the first things I did [points to poster on wall] – that must have been in 1954 or 1955, the left one, which was definitely influenced by Aicher.

WB *It makes me think of berries in the wood because of the purple colour. Did you ever think about being a graphic designer during your studies here?*
I became one in a way, because after I finished my diploma here I went back to Florence and took a post at Sansoni, a very big publishing house in Florence and I tried to turn everything upside down, which had been there for years!

SP *What qualification did you come out of HfG with?*
The qualification was 'Diploma of HfG' that is what everyone got.

SP *You were not a specific type of designer or artist?*
No.

WB *You went to work for a publishing house in Florence designing book covers?*
Designing book covers, setting up typography for groups of books so they could be distinguished from others.

WB *That was after your dissertation at the HfG on road signs?*
That was afterwards.

WB *You went back to the HfG?*
No, I went to Florence to work with the publisher, so I became a designer in a practical sense. But that was interrupted after a year when my Fulbright scholarship came through.

SP *You were working as a graphic designer in Florence when you heard about the Fulbright scholarship?*
Yes, before I got the Fulbright scholarship. The departure was actually in 1957 and as I mentioned to you, I made a trip to Holland recently and we also saw Rotterdam and the building where the ships were located...

WB *Where the emigrants to the US left from – the two towers where people left for America...*
Through the scholarship I was obliged to take a ship, and at that time it was three weeks to New York.

SP *You left your job to take up Fulbright scholarship, how long was it for?*
Yes, the scholarship was for four years.

WB *What happened to your family, did they go with you?*
They were supposed to follow me, and I found out all kinds of housing, it wasn't too difficult. But I think my wife didn't like to go to the States, so that was the end of it.

WB *You wrote a piece about road signs. You just showed me your dissertation on road signs from the HfG in 1957. Was it your idea to research road signs?*
Yes.

WB *You seem to have carried a life-long fascination for road signs?*
No, it was a typical case of signs applied to road traffic. In that sense.

WB *It was the perfect sign system to research. I gather you conducted research in the archive of the League of Nations?*
Yes, that was a very important step.

WB *You also mention in the 'Road Sign Special' (the journal you edited about road signs) that the drawings you made for the Swiss audience on the content of traffic signs is where your interests in the Production method started?*
Yes it has to do with it. The Production method is a typical idea used in the psychology of the arts, one of several ways of getting at data.

WB *It was a rather commonly accepted way of getting data from people?*
Yes, not the most common way, but it was a way.

WB *You also wrote an article about road signs for 'Stile Industria', Otl Aicher did the same. Was there any contact between you, was there any coordination between the articles?*
No, I think Aicher had my article from '*Stile Industria'* which was written before I went to the States. It was a direct consequence of the diploma study.

WB *You had written the article which was to be published in 'Stile Industria'?*
Yes.

WB *So Aicher was inspired by your article to do some extra research?*
No, but I think he was inspired by it. He also had it in his archives – they still have the copy he had.

WB *So there was no contact between you and Aicher about the articles which appeared at about the same time and were connected with your research on road signs?*
SP *Both articles are completely independent?*
Originally, yes.

WB *Did Aicher have an interest in road signs was he fascinated by them?*
That is a very important point. Very few people know about it. Aicher became famous for his pictograms for the Olympics in '72. He never had any contact or any knowledge of Icograda or the 'Vienna school'.

WB *But you did?*
I did, because I came to the States and I met Modley.

SP *Where did you first hear about Isotype?*
In the USA, through Modley.

SP *How did you meet Modley?*
He was one of the first persons in pictograph design I met in the States. I can't fix a year but you know that Modley was 'Vienna product', and he left Vienna and the Isotype group. I'm not so sure if it was for political reasons...

SP *It was to work with the Chicago Museum. He took some panels over, [from the G&W] and then worked with the museum for a short while, but I gather the museum lacked funding so he made his own way with pictograms.*
That's the way I see it too. I think the Chicago engagement was already finished when we met.[770] Also, at the time I had a very crazy idea that one could approach the question of pictogram design by psychological methods – statistical methods, and I wrote an application paper in which I explained that. I even got some money from Modley or from whoever his source was. I employed an Indian statistician (I know the Indians are very keen on statistical methods) to develop an approach to this question. This never had any great success.

SP *Who was the Indian statistician?*
I forgot the name. A couple, a man and a woman. But I got in touch with him through my room-mate who was also an Indian statistician in the university housing, and that was how the Indian connection came about.

SP *Was that article one for the 'Preparatory Survey on Signs and Symbols'? Was that where Modley got the money from?*
Could be.

SP Marie Neurath was part of the project. Did you meet her?
No I never met her.

SP *I was lucky enough to meet in 1984 – a wonderful lady.*
I met this other lady who was influenced by Modley very much – the anthropologist Margaret Mead. I met her with a big stick going into a 'man's club' in New York sitting there as a symbol of whatever!

SP *What inspired you most about Isotype?*
I think the semantic general approach was not like the Olympic symbols, not in the Aicher system. Aicher came to pictograms through the Japanese. They had the Olympics in Tokyo a few years before Aicher had his job in Munich, so Aicher invited the designer of the pictographic system of Tokyo, [Masaru Katsumie] here [to Ulm]. Aicher was there [Japan] as far as I know, and that was the German branch of pictograms – the Japanese branch.

SP *Coming back to Isotype do you still think that the pictogram forms the way forward for international communication?*
That is an answer I wouldn't dare to give!

[770] Modley's contractual links with the Chicago Museum of Science and Industry ceased in the early 1930s.

SP *A big question!*
There are so many new forms of international education in the process of developing that I wouldn't dare to say it's the only form. It is a viable form. It's used in public communication in cities, but it's not the only form.

SP *What do you consider to be the legacy of Isotype?*
It is, in a way for me the legacy of Arntz – a socially engaged capacity based on the graphic transformation of ideas and content.

SP *In your paper 'Signs and Symbols in Graphic Communication' you talk about the fact that the results of the Preparatory Survey were not yet known...*
That is true at the time.

SP *but the Survey didn't get any more funding – the idea of a symbol dictionary didn't continue. You talk a lot about Isotype in this paper [Signs and Symbols in Graphic Communication] – did any of your ideas on Isotype come from your experience working on the Preparatory Survey? I know you had no contact with Marie Neurath, but did any ideas come from working with Modley on the Preparatory Survey? Did ideas filter through from Modley? Did any of them filter through from Marie Neurath?*
Certainly not directly from Marie Neurath, certainly some influences came from Modley – but this influence became more and more abstract because of the whole transformation of normal languages into glyphs and all kinds of different things at the time.

SP *Do you think international language had moved on from Isotype at that point with Glyphs, Inc., Modley and Mead – were they looking at things in a different way?*
Yes, I'm afraid that the way they looked at international language was not from the problem itself but a good deal of it involved trying to get funds.

SP *Glyphs, Inc.'s ideas were quite idealist, was that a good thing or do you think a more scientific rigorous approach was needed?*
In my opinion it was needed.

SP *How did you feel about the ideas behind Glyphs, Inc. (Mead and Modley?)*
I don't know what year it was... It was not that I lost contact with Modley. I still think he was an interesting person for his ideas, but the content wasn't as intensive any more and I felt that he went his own way. The idea of methodological insistence (which I have always had) wasn't as stringent.

SP *Why do you think that was?*
Maybe there were different ways of publication opened up for him.

SP *He does quote you extensively in many articles. I get the idea that your ideas became spoken about through him...*
Yes, that is true, he got hold of most of my papers. But that was in the United States and I then went to Canada.

SP *You lost contact through geographically*
Yes.

SP *Which principles of Isotype have been most useful to you as a designer?*
As a designer...

SP *You could say none!*
None! When I mentioned Arntz, then I thought about the coherent systematic design of the pictograms...

SP *Did you meet Arntz?*
No, unfortunately.

SP *Did any aspects of the principles of Isotype comply with your scientific research?*
My problem with all the attempts which were around at the time in terms of applying systematic approaches or design methods were, in my feeling not scientific enough. They were too much on the artistic side of the question.

SP *Obviously Otto Neurath was a social scientist not a designer.*
I know.

SP *I always see Isotype as a system that is more practical than artistic.*
That was why I mentioned Arntz, I never took Neurath as a designer, but I really enjoyed his consistent application to social questions.

SP *Did you share any of your knowledge about Isotype with Aicher?*
No, not really.

WB *But was Aicher interested in Isotype?*
Yes, he thought that there was another system he didn't know about, and that's what he appreciated about it.

WB *But he didn't know it?*
Through the contact he had with me. I wonder if you came about the exhibition in Stuttgart Museum with a strange title 'The Lonely Sign'.

WB *'I read about it. They have a great book on pictograms, artistic practice pictograms and art combined, variations on traffic signs, Russian constructivist graphics/pictograms combined with practical variations on traffic signs*
They have it in English and German.

SP *You do say in 'Sign and Symbols' that you recommend that designers when considering designing a new set of pictograms adapt a system like Isotype, 'But all too often designers produce an entirely new picture language instead of helping to standardise already established pictographic systems (such as ISOTYPE)'.*[771] *You were saying that Isotype was a good system at the time to be considered as a basis.*
At the time...

SP *Did you carry on saying Isotype was a good starting point?*
No, because the change came about in me to switch back to semantics. I had to find a method of design or of not design – like a psychological experiment you keep some variables constant.

[771] Krampen, 'Signs & Symbols in Graphic Communication', 23.

So I had to keep design styles constant and varying the contents of the objects designed, depicted. I think the change came about with this book [*Zeichensysteme Der Visuellen Kommunikation: Handbuch Für Designer, Architekten, Planer, Organisatoren*] but when I went over the book with Aicher once more, it wasn't too important. But I think there were still a few accomplished ways of taking the semiotic aspects of the design (or sign) question forward. What would be more normal than studying signs from a semiotic point of view? Then, once you're there, you see what kinds of views there might be, and you come on to the question of semantics – the relationship between the meaning and the sign.

SP *Isotype was never coming from that very basis, so I can understand why you moved on. Why did you write the paper 'Signs and Symbols in Graphic Communication'?*
Because I met the editor of this journal who was also a student in Ulm. We met in the States and we decided that it would be an interesting topic. The editor was Peter Seitz.

SP *And the two papers that you wrote for the Preparatory Survey (submitted by Modley), Did you write them specifically for Modley, or had you written them beforehand?*
I think I wrote them independently. I'm not entirely sure. It was never clear to me that they were for a Survey.

You met Modley in Aspen at a conference?
It could be that I met him there too. But I met him earlier, either in Chicago or New York. Chicago was perhaps more likely because I was in Michigan and he was in Chicago, so it could have been there.

(The following are questions posed by SP on behalf of Hisayasu Ihara)
HI *According to documents from Glyphs, Inc. you became a member of their advisory committee?*
I don't know.

HI *One of the documents reported you were a representative of Glyphs, Inc. and attended the 2nd Icograda conference in Bled in July 1966?*
Yes, I was there...

HI *Were you a representative of Glyphs, Inc.?*
I don't think so, not sure.

WB *You were named as a member of the so called 'scientific community' of Glyphs, Inc. ...*
I think that was a way of putting myself into a bag, not so sure.

SP A label...
HI *In 1968, when you informed Modley of the results of the Survey of Expo '67, Modley was worried about your direction towards a democratic method i.e. a Production method. In reply Modley argued that the proper solution to symbols can be found if a group of experts from different disciplines come up with a system of basic signs, citing Bliss's Sementography, how do you feel about Modley's opinion on this?*
No, I would agree to the idea of a democratic approach to the question, but not in a political sense of organisations getting together.

SP *How do you feel about the more idealistic attempts at forming new international languages during the mid-1960s such as – Glyphs, Inc., for instance citing Armenian as a good second world language?*
No.

SP *It does seem far fetched! What was your contact with Henry Dreyfuss?*
There was no personal contact, as far as I remember. I have his thick book, but that was it. You have to remember that after Canada there was another four years. I was preparing to come back to Ulm and so I left several scenes. It was a lot to do with geography.

SP *What were your impressions of Soichi Kato and the International Committee for Breaking the Language Barrier (ICBLB)?*
That was again one of these very strong-faced titles!

WB *'Breaking the language barrier' – when I hear that I become suspicious!*
Barrier, language, breaking – aggressive!

WB *A very American way of thinking!*
SP *Even reading about it just seems far fetched! Did you ever meet Kato?*
I don't think so. He wasn't here in Ulm, because between going definitely back to Ulm in '67. I taught several Summer schools here, that might be an answer to your '67 Montreal question.

WB *What did you teach?*
Social psychology.

WB *What exactly did you teach the students – the principles of Social psychology?*
Yes.

WB *Design?*
No, I left this question to them, how would you think this could apply to the design of pictographs.

WB *What did the students say?*
They had to give an answer and write a paper.

WB *On designing pictograms? Designing or researching pictographs and symbols?.*
Yes.

SP *Your name features heavily in projects regarding the development of pictographic language during the 1960s. Do you think that this came about through your membership of the ICSS?*[772]
I don't know. In 1960 I got my PhD and went to Canada. That was already a break with the Icograda ICSS, except that it might fade into the Montreal World Fair engagement.

WB *How did you get involved with the Montreal World Fair?*
Through the University of Waterloo, where I was working as a professor. As a Canadian university, it was close to everything that happened in Canada and I was teaching in an engineering department and they were very much concerned with all kinds of design questions; like the length of queues of people, would they turn to the left or right when they came into an exhibition.

[772] The Icograda Commission on Signs and Symbols, which was formed in 1965.

WB *Ergonomic issues?*
I would say behavioural questions as a psychologist! They [Expo '67 in Montreal] enlisted the University to carry out certain tasks. There were several people in the department. Some people came from the Chicago School of Design, that was after the Bauhaus closed, there was an attempt to start...

WB *A new Bauhaus, with Maholy-Nagy? Then he died in 1944 and it continued with people like Marcel Breuer?*
No, you should read my book! My book was written for the 50th anniversary of Ulm.[773] There is a chapter on the Bauhaus closing and the Bauhaus continuation in Chicago.

WB *How did you get involved in Expo '67 in Montreal? You volunteered and said you would like to do some research on pictograms?*
I became an advisor to Paul Arthur?

WB *Did he ask you?*
It didn't go quite like that, I wanted to do that... 'may I do it? But we need somebody who can do that – would you like to do it?'

WB *How did you know Paul Arthur? Did he approach you?*
He was connected to the department.

WB *As a teacher?*
No, as a designer. There were a lot of German kids around Paul Arthur, designers coming from Germany and Switzerland so it is easy to make the connection.

WB *Did you advise Paul Arthur to use Isotype as an example for his pictograms?*
I think he already had a system which was certainly not coming from nothing, it was to a large extent influenced by Isotype.

WB *How do you know?*
Because I saw it.

WB *You saw Isotype visual characteristics in Arthur's pictograms?*
Yes.

SP *Where would he have heard of Isotype – not from you?*
No, not me.

WB *Did Arthur say to you that Isotype was one of his examples or is it your interpretation?*
No, I was more invited to give my opinion.

WB *What was your opinion?*
My opinion was more like the idea of giving the parking spot a system of animal pictograms and things like that.

[773] Martin Krampen & Günter Hörmann, *Die Hochschule Fur Gestaltung Ulm/The Ulm School of Design: Anfange eines Projektes der Unnachgiebigen Moderne Beginnings of a Project of Unyielding Modernity* (Berlin: Ernst & Sohn, 2003).

WB *Was that your idea?*
No, but I created it.

SP *Animal pictograms to differentiate between areas...*
Yes.

WB *Had you seen it before? I have seen it in America; they also used animals for indicating parking spots halfway through the 1950s.*
SP *You were working with Paul Arthur not long after you wrote the paper when you talked about Isotype as a good starting point for the design of pictographic systems, but Arthur had already designed his system when you met him?*
I think so.

WB *Were you connected in any official capacity to Expo '67?*
Officially I was hired by the faculty [University of Waterloo] to take part in Expo '67?

WB *What do you think of system Arthur ended up with at Expo '67 – was it likely to work?*
I don't remember too much about it, but I think the whole Expo was a very attractive thing. I was working with my own design firm, with a Toronto designer stemming from the Institute of Design in Chicago, so that was the connection. We designed a kaleidoscope that was a walkable three-chamber system, having the function of giving you the impression of morning, noon and evening using photographs projected into a mirror system, so you saw yourself at various times of the day.

WB *You also set up a survey to be carried out at Expo '67?*
Yes.

WB *Why did you come up with this idea, was it due to your interest in signs and pictograms? Did you see it as a great opportunity to test out some assumptions? How did this work? You had a class of students?*
No, I had a few people who were collecting the data, going around with drawings on little sheets which had the title of the drawing to be made on it and the person could depict the picture of the object on top. There are a few printed examples in books and one in a magazine.

WB *You wrote a letter to Peter Kneebone thanking him for his interest in you. What did you think of Icograda's attempts to come to a standardised, tested pictogram set. How did you view Icograda as an organisation?*
I had the idea Icograda were very self-centred and closed. Are Kneebone and de Mayo still alive?

WB *No, no-one is still alive apart from you! One of the things that interested me was the idea that when you got back teaching at Ulm in 1967/68 that you cooperated with Kapitzki and developed pictograms together. I know Kapitzki also designed pictograms for the ADV (Arbeitsgemeinschaft Deutscher Verkehrsflughäfen) – were you also involved with Kapitzki's designs for pictograms?*
Not with the designs. I wrote text for the identity/signage manuals.

WB *Icograda worked on a project for developing and researching ICTSS[774] pictograms – the Icograda/Ulm project. Was this quite a loose project – were you partners in this project, or did Icograda give you the task of researching?*
Icograda was never very instrumental in research matters. Where did the money come from for instance? There were three or four people running around the Montreal Fair... I don't know, friends, students...

SP *You decided that you wanted to do some research at Montreal – it was nothing to do with Icograda?*
No.

SP *Was it anything to do with this thing we call the Icograda Ulm Research project? Did it filter into that?*
I don't know! This was the name given to some fantasy!

WB *When you were teaching at Ulm, you also carried out a survey at airports with military men into the recognition of pictograms. Who took the initiative for this survey and whom did you cooperate with?*
That was via the School [Ulm].

SP *You also did research in Canada?*
Yes, in Canada, that was again the department, there were also student theses, things like that. Because my conviction was that I had to start with the people's conceptions of an object – the way they portrayed it. I took the international aspects of it into consideration – that's why I went to the military people – the English were sitting in Ulm, the Americans were sitting there, and the French...

WB *The perfect test case!*
Wonderful, I had only to ask for a company to march in!

WB *Did Kapitzki have anything to do with this ICAO research?*
No.

WB *But he did for pictograms for the ADV* [775]
Yes.

WB *You drew the pictograms for ICAO?*
Yes.

WB Y*ou told me on the phone that you also based the pictograms on photographs?*
Yes.

WB *Did you carry out this project developing pictograms for the ICAO project at Ulm?*
This story, about this second closure of the Bauhaus as its sometimes called, is very complex. the HfG only existed for fifteen years. It was closed in 1968 – closed! And I was in the middle of this pictogram translation. For some reason most Ulm people didn't even know of it. But we took one of the keys to get in after the whole building was closed – locked. I had a group of

[774] International Commission on Travel Signs and Symbols.

[775] Arbeitsgemeinschaft Deutscher Verkehrsflughäfen.

people working on architecture and all kinds of projects, among others was the project of the final photographic survey/depiction of the pictograms.

WB *Are there any examples of these pictograms?*
No, there was a manual, there was a handbook/manual of these pictures, I gave it away, but I've still got a very good copy.

WB *I've seen the manual at Paul Mijksenaar's studio. They have the ICAO manual with all the large pictograms in it, of the aeroplane in the air...*
Do they have it in colour?

WB *They have it in black and white.*
I have a copy in black and white which is not the original. Some student has it I'm sure!

WB *How do you feel about the ISO (International Organization for Standardization) procedure for pictogram development, it's also psychologically tested...*
I know, but a psychological test is not the final answer to anything. I find these things are too abstract.

WB *I always understood that it was their pragmatic way of determining how well a symbol was recognised by people, what do I miss here?*
Yes, It is a whole area which has not been resolved clearly. What is an object? What are the features of an object which it must have in order to be recognised as such. What is a picture of an object without the features of that picture, which has to repeat its features?

WB *Would you say that ISO research misses out on certain things? You ought to know the determining factors in how they test recognition of the object per se. Might that be the difference?*
I don't have the method in mind anymore. Did they give the test person a the name of an object and then ask them to draw variations? I don't remember I think there was a Dutch version of a test like this...

WB Yes, Harm Zwaga. *Did Aicher ask your advice about the Olympic pictograms?*
No.

WB *Strange because earlier you did your thesis on road signs, and you taught here at Ulm...*
Yes, but in the common book he made his selection of the designs he thought should go into the pictogram set. He considered the shapes that went into the pictogram set.

WB *In the book you wrote with Aicher, 'Zeichensysteme Der Visuellen Kommunikation', how did you work together, did Aicher use you as a semantic consultant?*
Yes.

WB *You provided a background story for the historical part of this work?*
I don't know what is in it. I think I had a teaching job in Geneva and there was a very important semiotic philosopher – and I was very much interested in his work. The whole part of the introduction of the Aicher book was actually the application of the semiotic philosopher's theory to the question of visual signs?

SP *Would you say that Icograda lacked the scientific knowledge about how to progress the development of pictograms?*
No, generally not.

WB *Did they come to you as a scientific consultant?*
No, they seemed to know everything!

WB *Aicher had certain ideas on grids and font characteristics, pictographic language built up of small elements, some kind of mystical holistic view – phonemes...*
SP *Graphemes.*
WB *What was your working relationship with Aicher?*
He asked me to write an introduction to sign research.

SP *Did you discuss graphemes with Aicher?*
No, I didn't develop them with Aicher. Graphemes are a clear-cut category of linguistics.

WB *Can you explain?*
Graphemes are (also in my latest book), the smallest particles of written language that make up the word or the image.

WB *They don't have meaning in themselves?*
Not so easy. Some do, some don't. They are the linguistic counterpart of phonemes. Some phonemes have a meaning, others don't. The subdivision is very traditional in graphemes, especially as the one line of research in pictographs was always to parallel linguistic categories – phonemes, graphemes.

WB *A general question to round off. Do you find that the Olympics and Expos have a good influence on the development of pictograms?*
I don't know, except for the last 1969 attempt to do this approach with the photographs, I always thought you could have done it this way, or that way – it was the best way there was.

WB *You mean the way that Aicher used pictograms as a basis for his sporting figures?*
Aicher had photographs taken of sporting figures, but he was perhaps also interested in the idea of having a system, but the system was overriding the meaning. But this is not so bad in Aicher, it is much worse in the case of the DOT system (American Department of Transportation). My criticism started because there is some kind of system of industrial norms (DIN norm, Deutch Industry norm – this I feel is insufficient.

WB *Why?*
In the sense that it leaves out too much. You can make your sins on two sides, either leaving nothing or leaving too much.

WB *Isn't that the task of a good designer? To decide what is too much or too little?*
SP *That again comes back to your work with Aicher when you were talking about abstraction and neutrality. What you're saying with these symbols is that they haven't quite hit the mark and they haven't got the level of abstraction correct?*
Some of them.

SP *Did you ever find a way to find out exactly how much abstraction there should be in a symbol?*
I thought it could be done using photography.

WB *Is that for the ICAO set (French Railways Association), which is influential, I see traces of it in Aicher's set too – I'll show you the evidence.*
SP *Would you say that your symbols for ICAO really did get the levels right in terms of abstraction and neutrality – I know neutrality is difficult!*
I can only say what else could it be but photography to approach what a human being would see under this or that condition. It's a basis. A painter couldn't do it.

WB *If you talk about painting, you yourself are a painter you make decollage. I was struck by the fact that on your website you can grade your decollages using semantic differentials. Did it give you any results?*
Very few. I used my own, I have a book out on decollage and I took a group of decollages, a sample of fifteen (or something like that) and I had them graded with semantic differentials by a sufficiently large group of people. And I found out about my own development in interesting directions.

WB *You tested your development in a scientific way?*
Yes.

WB *That's a very convenient way to test creativity! Why did you start with decollage?*
That was the influence of Albers. He said we shouldn't use paint. You should use coloured paper and one of his first assignments was for us all to bring coloured paper in the shade of coca cola!

WB *I suppose everyone was different!*
There was no shade like the other! That was what he wanted to say about paint, if you want to standardise anything, then you shouldn't do it by painting, but by using printed materials.

WB *Pantone colours...You have an almost Jackson Pollock-like decollage style – all sorts of variations, they all take on abstract qualities, I don't know what they do exactly – that's what you tested!*
Yes.

WB *Did you also give it as an assignment to students to work with decollage?*
I never set an assignment on using decollage, but sometimes students had to work on the data – the analysis of the collected data, they had to work on that, because I wanted to show that you can think analyse things which are apparently not analysable...

WB *Would you say that you would research anything you want as long as it comes to an exact meaning – a typical researcher!*
SP *If you were to have one quality that you pulled through your entire body of work would it be that of research?*
Up and down, sometimes decollage, sometimes more semantic analysis.

SP *What is the thing that you are most proud of?*
I think semantic analysis. Because what did I find from analysing fifteen decollages from say fifteen years ago to five years ago or so? I found that in this sample of decollages they were getting lighter and lighter, simpler and simpler, getting less colourful. These three factors were quite clear.

WB /SP *It must be very satisfying to know these things. Mr Krampen thank you very much, it was most interesting.*