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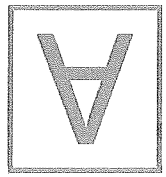
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Richard Heinrich • Elisabeth Nemeth
Wolfram Pichler • David Wagner
(Editors)

Image and Imaging in Philosophy, Science and the Arts. Volume 2

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Written Language and Picture Language *after* Otto Neurath—Popularising or Humanising Knowledge?

Friedrich Stadler, Vienna

The 'Vienna method of pictorial statistics', created by Otto Neurath (1882–1945) and his team in the *Social and Economic Museum in Vienna* (1925–1934) and developed, after his forced emigration, into the 'Isotype' (International System Of TYpographic Picture Education), constitutes to this day a relevant contribution to educational work and the communication of knowledge and science. The reconstruction and renewing of this Enlightenment concept through both pictures and writing, within the context of a 'scientific world conception' and the *International Encyclopedia of Unified Science*, offers a fruitful perspective on the current possibilities and limits of visual communication between 'science and the public'.

The integration, as pushed for by Neurath, of this picture language of 'figurative constructivism' (Gerd Arntz) into a comprehensive critical concept in the tradition of Comenius, Leibniz and the French encyclopédistes, running all the way to the Vienna Circle, leads to a remarkable, but unfortunately incomplete treatise on 'Visual education: humanisation versus popularisation' (Neurath 1945) as a model for a modern museology. Neurath's posthumous publication, a comprehensive sketch of a cultural history of *Visual Education* (excerpts of which were printed in 1973, the complete version in 1996), served as an illustration of this topic and can in hindsight be fairly judged a concrete contribution towards highlighting the relation between science, politics and the public. Fortunately, his visual autobiography was published in the meantime and is accompanied by recent research.[1]

Image and Imaging in Philosophy, Science and the Arts, volume 2, edited by Richard Heinrich, Elisabeth Nemeth, Wolfram Pichler and David Wagner. © ontos Verlag, Frankfurt · Lancaster · Paris · New Brunswick, 2011, 1–30.

The fact that, at present, written and picture languages are mostly conceived of as alternatives only has not been offset by a noticeable trend towards a 'visual turn' either:[2] an interdisciplinary 'visualistics' as the study of images, or imaging science, seems more like a compensation for the powerful influence of communication, and an appendix to computer sciences, than a well-founded investigation of the two correlative areas of word and image taking place within the context of public demand for the popularisation of knowledge and science.[3] The tension and complex relations between science and public are also impacted upon by the method of imparting knowledge and information, in which—similar to the TV and the Internet—visualisation brings about a strong polarisation between producers and consumers.[4] It seems all the more surprising that a comprehensive practical and theoretical contribution to picture language and museology has only been noticed by a small number of experts—a contribution which is associated with the life and work of Otto Neurath. There may be historical reasons for this, to do with Neurath's being driven into exile three times and his early death, but also to do with theoretical reservations and deficiencies grounded in ahistorical specialisation and typologising of language and its research. Against this backdrop, a critical reconstruction of Neurath's 'visual education' is not only a contribution to the history of education and science but also constitutes an assessment relevant to today's discourse on the 'knowledge society'. It can both help prevent a nostalgic enshrining of 'Austrian intellectual history' and break up a perspective rigidly fixed on individual disciplines.[5]

Historical Interconnections

The 'Vienna method of pictorial statistics' constituted a significant attempt to generate knowledge about socio-economic correlations for a broad public using picture language and diagrams, and was intended to serve as a communicative medium within the wider framework of the associated 'Social and Economic Museum'. However these phenomena of 'Red Vienna's' education movement were not intended to be isolated instruments of popularisation following the motto 'knowledge is power' but were rather always designed to be a part of a neo-enlightenment 'scientific world-view', which must be understood as an essential component of the encyclopædia movement up until the outbreak of the Second World War. We are therefore dealing with a thematic


JOH. AMOS COMENII

ORBIS SENSUALIUM PICTUS

QUADRILINGUIS.

Hoc est:

Omnium fundamentalium, in mundo rerum, & in vitâ actionum,

Pictura & Nomenclatura

LATINA, GERMANICA, HUNGARICA, & BOHEMICA.

Cum Titulorum juxta atq; Vocabulorum indice.

Die sichtbare Welt

in Vier Sprachen.

Das ist:

Aller vornehmsten Welt-Dinge/ und Lebens-Verrichtungen/

Vorbildung/ und/ Lateinischer/ Deutscher/ Hungerischer und Böhmischer Benennung.

Sampt einen Titel- und Wörter-Register.

A' Láthato Világ

négyféle nyelven.

Minden derekasfab ez világon lévő dolgoknak és ez életben való cselekedetekneke

és Deák, Német, Magyar és Tót, meg-nevezéſe, a' kellő által való irásoknak

Swěc Wydicedlny.

Gbmalowanỹ/ a wčzewcrakem gazỹčm předěławemy.

t. g. Wšech negdobrźassnegssich Swěta-wěcy/ a Kunšäw-ſtwcete

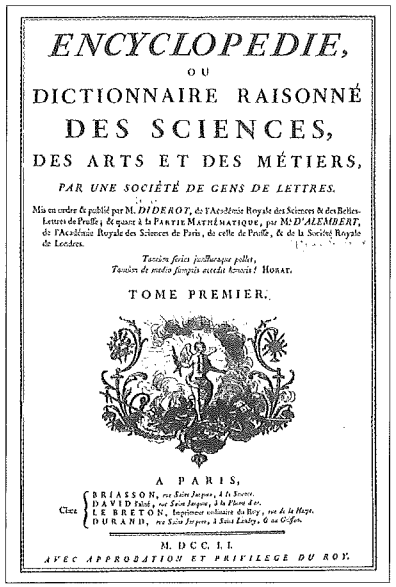
Gbmalowanỹ/ a gazỹkem Latinſkym/ Německym/ Wherſkym

y Sſowenſkym/ gmenowanỹ/ a přidanym Slowy y Cžtalow Registřem.

LEUTSCHOVIÆ, Typis SAMUELIS BREWER. Anno 1685.

Fig. 1

Precursor of the modern schoolbook:
Jan Amos Comenius's *Orbis Sensualium Pictus* (1685)


ENCYCLOPEDIE,

OU

DICTIONNAIRE RAISONNÉ

DES SCIENCES,

DES ARTS ET DES MÉTIERS,

PAR UNE SOCIÉTÉ DE GENS DE LETTRES.

Mis en ordre & publié par M. *DIDEROT*, de l'Académie Royale des Sciences & des Belles-Lettres de Prusse; & quant à la PARTIE MATHÉMATIQUE, par M. *D'ALEMBERT*, de l'Académie Royale des Sciences de Paris, de celle de Prusse, & de la Société Royale de Londres.

Tanùm series juncturaque pollet,
Tantùm de medio sumptis accedit honoris! HORAT.

TOME PREMIER.

A PARIS,

Chez { BRIASSON, *rue Saint Jacques, à la Science.*
DAVID *l'aîné, rue Saint Jacques, à la Plume d'or.*
LE BRETON, *Imprimeur ordinaire du Roy, rue de la Harpe.*
DURAND, *rue Saint Jacques, à Saint Landry, & au Griffon.*

M. DCC. LI.

AVEC APPROBATION ET PRIVILEGE DU ROY.

Fig. 2

Image plates as æsthetic add-on:
Denis Diderot's *Encyclopédie* (1772)

development of Jan Amos Comenius's *Orbis Pictus* such as was intended by its author, and of the French *Encyclopédie*. (Incidentally, the latter's image plates alone guarantee a certain æsthetic pleasure, but they offer no purposeful overview of the corpus of referential knowledge.[6]) Furthermore it seems that the mature versions of picture language, in the form of Isotype, made a fruitful contribution to the debate on popularisation, challenging all 'top-down' models of didactics in terms of epistemology and education policies.

Neurath described the typical 'Vienna atmosphere', which would be partly responsible for the development of logical empiricism.

> While the idea of German nationalism was dominant in university circles, there were among other intellectuals many who stood apart from the nationalist way

> of thinking and who subscribed mainly to the ideas of Liberalism, but later also to those of socialism, of utilitarianism, pragmatism, and empiricism, in a mixture of varying proportions.'[10]

With this, people such as Rudolf Goldscheid, Theodor and Heinrich Gomperz, Friedrich Jodl, Wilhelm Jerusalem or Friedrich Adler represented both the 'opponents of traditional thinking', but also intellectuals of (mostly anti-Kantian) modern 'scientism' in Austria, which sprang from four roots: anti-metaphysics, empiricist views of a general sort, the inclination towards the systematic inclusion of logic, and the mathematization of the sciences. This self-conception is already reflected in the programme of the Vienna Circle (1929):[11]

> Thanks to this spirit of enlightenment, Vienna has been leading in a scientifically oriented people's education (*Volksbildung*). With the collaboration of Victor Adler and Friedrich Jodl, the society for popular education was founded and carried forth; 'popular university courses' and the 'people's college' were set up by the well-known historian Ludo Hartmann whose anti-metaphysical attitude and materialist conception of history expressed itself in all his actions. The same spirit also inspired the movement of the 'Free School' which was the forerunner of today's school reform.[11]

This was not just a declaration of intent; we have documentary evidence of the vital participation of Vienna Circle members (especially Hans Hahn, Viktor Kraft, Otto Neurath, Friedrich Waismann, Edgar Zilsel) in adult education and school reform in Vienna (Edgar Zilsel and Karl Popper) from the turn of the twentieth century.[12] The most effective manifestation of this cooperation was unquestionably the work of the 'Social and Economic Museum in Vienna' founded by Neurath, which—together with the Ernst Mach Society—both aided the development of a specific picture language, and served as a platform for discussion circles on the periphery of the Vienna Circle. Here, in theory and in practice, social reform and work on education merged to form a creative field of experimentation within modernity that lasted until the wrecking of democracy starting in 1933–34.

One tried and tested thought experiment, using a *counterfactual* method, is to reflect on what could have been expected of Neurath and his colleagues had they lived longer, especially with regards the catastrophic outcome of



Fig. 3
Otto Neurath
(c. 1938)

Fascism and National Socialism: as left-wing and enlightened intellectuals of Jewish origin, they would have been forced to reorient themselves and take stock of the situation; in the case of Neurath, in exile in Holland and England, this had already led to concrete answers (for example with his planned book on 'Persecution and Tolerance'). And in the case of all of these leading figures the project of an 'enlightenment in Viennese modernity' is a topic of discussion even now in the postmodern present.[13]

On Otto Neurath (1882–1945): Between Encyclopædia and Utopia

The research on one of the most brilliant all-round intellects of modern Vienna meanwhile amounts to a substantial sum total, which can hardly be given in a brief account.[14] Neurath's life and work between 'encyclopædia and utopia' points to the continuities and breaks in social development since the turn of the century (during the struggle between revolution and reform) and the project of creating a scientific picture of the world in the spirit of the Enlightenment and in the context of modern *civil society*. In historicising this exemplary life-story of Austrian intellectual emigration,

there emerge relevant and essential elements of his future work in education and understanding of science, which can be outlined only by a few key words: a non-hierarchical picture of science (for instance the allegory of the ship's captain popularised by Quine) together with a relativistic and non-reductionist epistemology, an empiricism (naturalism) that regarded the difference between everyday and scientific knowledge as one of degree, a single overarching perspective on specialisation and popularisation in words and pictures, and, especially, research and education as the subject and object of a cooperative scientific praxis with a constant demand for societal change. Accordingly, this unfulfilled and fragmentary project of modernity is thematised, in all its facets, in the present day: in the philosophy of science and science research, in the ecological perspective in political economy, in architecture and the social housing movement, in modern commercial art and typography, and finally in the present-day construction of museums as social 'museums of the future'.[15]

It is no accident that the most recent literature on Neurath's life's work is international and inter-disciplinary and, similarly, lies at the interstitial points of tension between modern and postmodern diction.[16] These disparate perspectives, which demonstrate the absurdity of the long-prevailing quarrel about positivism, are gradually providing the building blocks for his conception of his own life and research, understood as a dynamic undertaking in his contemporary environment such that the 'producers' of science were themselves made part of the epistemological process (the 'Republic of Letters'), abandoning an absolute meta-perspective. From this vantage point alone it is easy to imagine how this conception would have interfered in past debates on the 'science wars'. In view of the limitations and fragility of our context-dependent knowledge it would not have been an 'Enlightenment dialectic' but rather a critique of it as a partial answer to the experience of totalitarianism and the Shoah.[17] At the same time, this epistemological approach means renouncing every secure *system* of science and knowledge, connected with thinking in alternative *utopias* of science/society, which certainly corresponds with a conception of possibility according to Robert Musil. This is the background to the vociferous *Anti-Spengler*'s postulating a *plan* for the establishment of freedom, happiness, and prosperity.[18] Today—after the economic crisis and in an age of globalisation and corporate planning—this is, again, a highly topical demand, appealing both as an alternative to *laissez-faire* capitalism, and to a challenged New Economy.


GESELLSCHAFTS- U. WIRTSCHAFTS MUSEUM IN WIEN

Abteilungen

Arbeit und Organisation — Sozialhygiene — Siedlung und Städtebau

Aufgabe

Aufklärung über Fragen des menschlichen Zusammenlebens durch Ausstellungen, Vorträge, Filme, Veröffentlichungen.

Tafeln und Modelle

Schematische Hervorhebung des Wesentlichen durch Bilderschrift in jedermann verständlichen Hieroglyphen, die als internationale Signaturen verwendbar sind, z.B. zur Kennzeichnung der Rubriken statistischer Tabellen.

Formen

Gewählte Darstellungsart

Vermiedene Darstellungsart

Farben

Farben als grundsätzliches Unterscheidungsmittel

Technik

Es wird hauptsächlich Scherenschnitt verwendet, der Einheitlichkeit der Farbflächen sichert, die für Wirkung recht wesentlich ist. Der schriftartige Charakter der Zeichen wird deutlich sichtbar. Scherenschnitt ist leicht erlernbar und von der modernen Schule in den Lehrplan aufgenommen. Es werden auch geographische und anatomische Tafeln in dieser Technik erzeugt.

Schrift

Die Bildertafeln sind so angeordnet, dass die Bilder möglichst allein sprechen, die Schrift nur als Beigabe erscheint. Durchweg Blockschrift, die einfach und daher leicht lesbar ist. Für längere Erläuterungen werden grosse und kleine Buchstaben verwendet.

Fig. 4

One of the first advertisements for the Social and Economic Museum of Vienna (1925)

'Words divide—pictures unite': on the 'Vienna method of pictorial statistics' up to Isotype (Vienna – Holland – England)

In 1925 on Otto Neurath's initiative the 'Social and Economic Museum of Vienna' (*Gesellschafts- und Wirtschaftsmuseum in Wien*, or GWM) was founded.[19] The members of this association were the Municipality of Vienna, the Free Trade Unions, the Chamber of Workers and Employees, the Cooperative Societies, the social security institutions, and the Workers' Bank. This new kind of institution, which was to be an 'educational museum of the present day' for the knowledge and understanding of socio-economic correlations, ran regular exhibitions in the Festival Hall of the new city hall, as well as in the first and twelfth districts of Vienna. Up to 1933 thirty-six national and international exhibitions were organised there or supplied with material.

The topics presented there convey an impressive picture of systematic encyclopædism, the work towards popular education that had been carried out in the spirit of social reform: health, women and children, social politics, housing and urban planning, peace education, schooling, the workers' movement, art, social security, architecture, etc. Along with this there were independent touring exhibitions at home and abroad, as well as separate publications and articles in various periodicals and books. In 1927 Josef Frank, brother of Philipp Frank, was acquired for the museum as an architect, and a year later Neurath employed the artist and designer Gerd Arntz, who drew the characteristic symbols and systematised the production techniques. The scientific department under Aloys Fischer, the 'Transformation' department under Marie Reidemeister (later Marie Neurath) and the technical collaborators completed the team. For several years the innovative Social and Economic Museum cultivated a working partnership with Otto Glöckel's social-democrat school-reform movement. This enabled the GWM to contribute to the cultural life of Vienna by making an impact on visual education. Additionally, in Holland in 1931 the 'Mundaneum' was founded with the aim of intensifying international collaboration. Branches were set up in Berlin, Amsterdam, Prague, New York, London, and the Soviet Union.[20] Following this phase of productive work at home and abroad came the end of the GWM after the political events of 12th February 1934. Several functionaries were arrested, and valuable fittings were confiscated. The renamed 'Austrian Institute for Pictorial Statistics' remained under the control of the Austro-fascist corporative state, until the National Socialists seized this institution for their own propaganda purposes. Despite these confiscations Neurath was able to transfer a large amount of valuable holdings to Holland and England.

The fundamental objective of the 'Vienna method of pictorial statistics' was to represent socio-economic facts and correlations, particularly with regard to their historical development, in a simple, easily graspable system of symbolic figures.[21] A range of real things and complex facts was to be represented by means of a fixed range of signs and symbols, in which the same sign would always be used for the same object. This method of visualisation therefore arose from the coinciding of content and size as well as from a mapping of sets, such that a larger set of objects was represented by a larger set of signs without perspective. In this way—said Neurath—the facts about society could be reflected quantitatively.[22] The method, developed and improved following his emigration to Holland, was, with the change in

circumstances, renamed the *International System of Typographic Picture Education*, with the acronym *Isotype* (which was also the Greek for 'always the same sign').[23]

In a memorandum (1924) Neurath developed his concrete ideas of an 'educational museum of the present day', which would facilitate knowledge and understanding of societal correlations. The (epistemological-)theoretical background of pictorial statistics possibly lies in the visualisation of logical empiricism, as the arrangement of images was meant to portray facts about society quantitatively. Likewise deserving a mention as part of the background knowledge are the 'empirio-criticism' of Mach and physicalism, since the non-dialectical form of representation—as expression of abstract sociological categories—was to correspond to the unemotional and neutral description of relations demanded by logical empiricism.[24] At the same time, both pictorial statistics and Isotype must be seen as part of a broader nexus within the context of Neurath's work: his greatest interest was in making a comprehensive contribution to general, international education. Corresponding to this cosmopolitan and egalitarian claim was the idea of an encyclopædia, which following his emigration Neurath attempted to put into practice through the Unity of Science movement. This aim formed no less a part of his emancipatory concept of social enlightenment through visual education, being a necessary premise for the 'humanisation' of life.[25] For that reason pictorial statistics was only a part of the wider work in general education, and school and adult education only one of the contexts in which it was applied.

In Holland further well-attended exhibitions were organised, but—because of the impending Second World War—despite significant publications[26] the mass impact that had been hoped for was no longer achievable. The escape of Neurath and Marie Reidemeister to England in 1940 brought an end to activity on the continent, while Gerd Arntz remained in Holland where he continued to work alone after 1945.[27] After the death of her husband, Marie Neurath continued this productive work in Oxford with the newly founded 'Isotype Institute' and moved to London in 1948. Despite the unfavourable circumstances this was not entirely in vain, as today teaching and research in the tradition of the Vienna method of pictorial statistics and Isotype continues at the University of Reading in a department dedicated exclusively to modern typography and visual communication.[28]

In 1928 Otto Neurath engaged the German Gerd Arntz as a designer, which signalled the beginning of an innovative collaboration that was to last

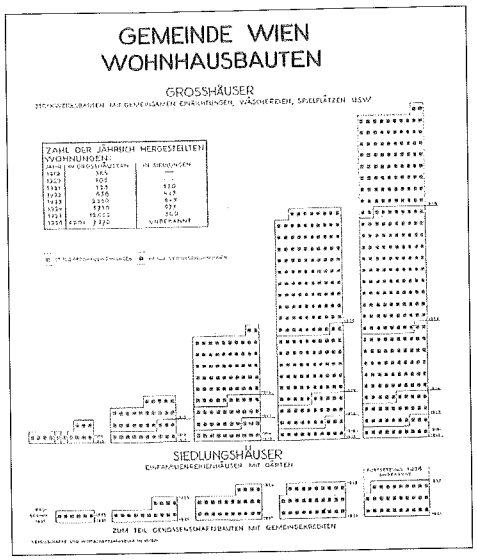


Fig. 5

Diagram designed by Gerd Arntz, originator of a 'figurative-constructivist graphic style'

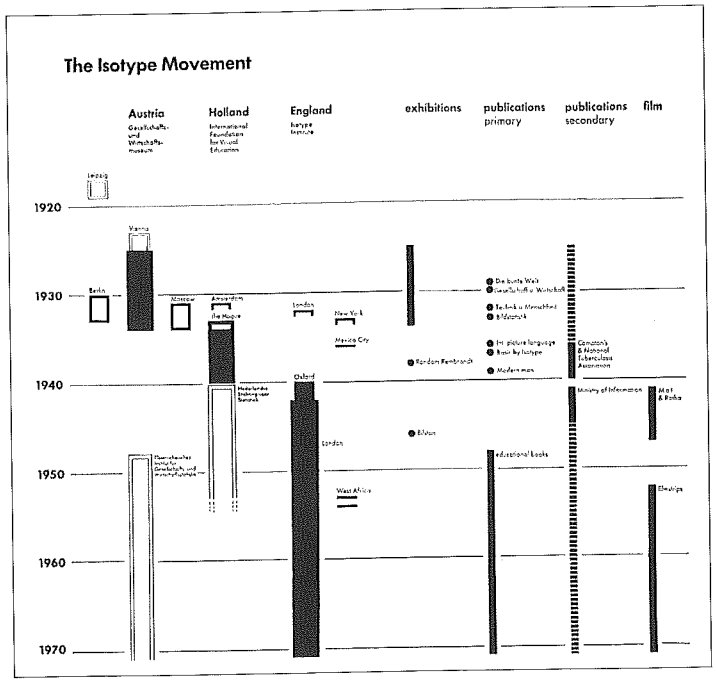
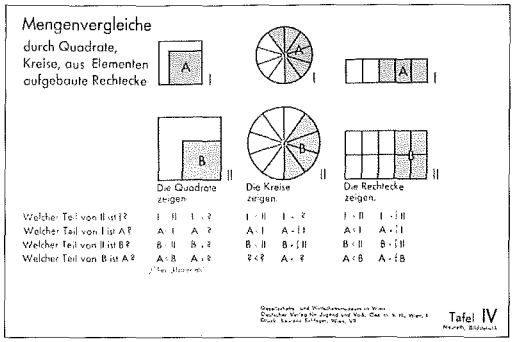


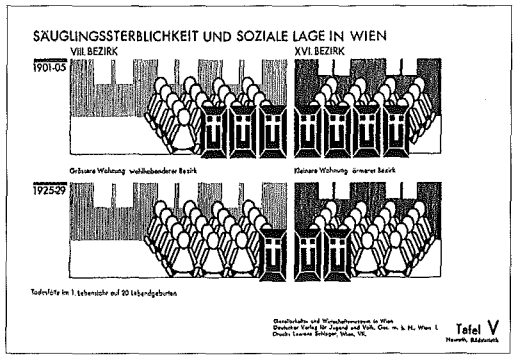
Fig. 6

Survey depicting the international activities of Isotype

many years.[29] Before this period Arntz had already marked himself out in the art world of the Weimar Republic as a member of the 'Rhine Group of Progressive Artists' (1918–1933) with an original socio-critical, figurative-constructivist graphic style. After the First World War he benefited from a specialist education amid the post-revolutionary climate of the young republic (especially in Düsseldorf) and came into contact with Cologne's circles of artists. After that Arntz collaborated again with Peter Alma and August Tschinkel, among others, at the GWM, and from 1919 to 1933 published work in *a-z*, the theoretical mouthpiece of the Constructivists. There followed further international exhibitions and—as a corollary of the GWM's activities in Moscow at the beginning of the thirties—contacts with the Russian *avant-garde*. Following the events of February 1934, and finding himself in danger, the artist emigrated with Neurath to the Hague and, alongside his demanding work at the Mundaneum Institute there, took part in the anti-fascist opposition movement (as well as in an exhibition in London and the Amsterdam exhibition *De Olympiade Onder Dictatuur* ['The Olympic Games under the Dictatorship']). It was in Holland that Arntz, together with Neurath, was able to achieve the apogee of the *Bildstatistik* output with the success of the book *Modern Man in the Making* (1939). During the war Arntz continued to work as lead designer for the 'Dutch Foundation for Statistics' (*Nederlandse Stichting voor Statistik*). Following his conscription by the Germany army he escaped to the Resistence in Paris, and was held as a prisoner of war. After the Second World War Arntz, now in changed circumstances, again resumed his commercial and artistic graphic work. Alongside the usual social commentary of his work there was also pictorial-statistical work for UNESCO, while from the end of the sixties his political graphic work would receive renewed international interest.

If Arntz's first woodcuts were still located in the expressionist tradition, his work from the twenties was already abstract-constructivist. He integrated elements of the French Cubists (Ferdinand Leger) until he came to achieve a distinctive profile of his own within the 'Group of Progressives'. The common characteristics of this Cologne group—among them Heinrich Hoerle, Franz W. Seiwert, Hans Schmitz, August Tschinkel, among others—were an æsthetic affinity centred on the use of figurative-constructivist picture-forms, a shared political (liberal-communist) outlook with a programmatic yoking of art and politics, the cultural background of the Rhine region, and finally the members' conception of themselves as forming a coherent whole.[30]





Figs. 7 & 8

Principles and application of the 'Vienna method of pictorial statistics'

In accordance with the intensive response to the Russian revolution (Lunatscharski, Bogdanov, El Lissitzky, among others) joint exhibitions were organised in the Weimar Republic, which were marked by the post-revolutionary spirit. In their periodical the Constructivists also critiqued the New Objectivity (*Neue Sachlichkeit*), but they cultivated close contacts with Bauhaus artists—as did, incidentally, Neurath, Carnap and other members of the Vienna Circle. Here we must also mention another co-founder of modern typography, Jan Tschichold, whose influence can be detected in the typical figurative-constructivist picture-forms of Gerd Arntz and in the graphic design of the pictorial statistics. The principle held by Arntz, who opposed, for instance, the 'psychologism' of an Otto Dix or George Grosz, went thus: 'make everything impersonal, use templates, be a constructor.' In this we can detect the influence of the Japanese woodcut, the French purists, and the Dutch group 'de Stijl' (Piet Mondrian) between realism and objectivity.

As already mentioned, pictorial statistics were especially suited to pedagogic reform, such that for many years Neurath and his co-workers nurtured a productive collaboration with the Vienna school-reform movement. The school reform from 1918 to 1934, initiated by Otto Glöckel, represented an attempt to reform the traditional school system, with its state and church-dominated drill schools, and to set up secular 'labour schools' elsewhere, in which teaching would be carried out according to egalitarian and socially just methods. Here the educational principles of intellectual autonomy and practical relevance, of clarity and conciseness in education, as well as of an æsthetic education with a scientifically thorough under-pinning played a large role. Pictorial statistics very much complied with these objectives. As early as the 1920s Neurath had stressed grasping the notion of the 'statistical age' as a teaching objective, and, subsequently, in a handful of articles and with systematic treatment in his 1933 book *Bildstatistik nach Wiener Methode in der Schule* (*The Vienna Method of Pictorial Statistics in School*), summarised the methods and principles, as well as the possibilities of applying them in a school setting. Practical cooperation culminated in the decision of the Vienna municipal school council to have pictorial statistics tested in a special experimental school.

This was preceded by the steady work of the GWM:[31] statistics was included as a subject in school syllabuses on a trial basis, and the GWM itself had already made 'intellectual life and schools' a permanent topic area within its 'contexts and culture' department. Various school classes visited this educational museum, and visual-education experiments were carried out as early as the nursery stage. The collaboration also bore fruit in terms of publications, particularly with the periodical *Das Bild im Dienste der Schule*, with a GWM supplement that ran from 1927 to 1930. The use of pictorial statistics was articulated most impressively by the publications *Die bunte Welt* (1929) and *Gesellschaft und Wirtschaft. Bildstatistisches Elementarwerk des GWM in Wien* (1930). In the Ernst Mach Society and in various newspaper articles Neurath tried in addition to disseminate these reformist ideas. With the start of the school experiments further activities were set,[32] until February 1934 saw the final failure of the school reform project; the above-mentioned dissolution of the GWM, as it then existed, soon followed.

The contribution of the GWM to didactic methodology and visual education had already been laid out by Neurath in his book *Bildstatistik nach Wiener Methode in der Schule* (1933): social enlightenment through training of

the intellect along with the nurturing of children's drawing and design skills. His pictures of sets were successfully trialled at the Montessori Kindergarten and Montessori school in Vienna. The emphasis on praxis also led to affinity with the Freinet system of pedagogy that was then being developed in France, which put into practice the idea of 'labour schools', particularly by means of their school printing presses. The objective of the didactical experiments begun in the school years 1930/31 and 1931/32 was to optimise 'ways and means' in concrete educational environments across different subjects. They covered four classes of schoolchildren, and the experiences were shared during many conferences, so that numerous parties interested from home and abroad came to visit these classes. The conclusion of this project took the form of an exhibition on the pictures of sets that had been made as well as the teachers' final reports. Here it was established that an introduction and a certain amount of time would be needed. Across all subjects multiple methods were used, from the presentation of prepared pictures of sets to their production by the pupils themselves. The disadvantages reported were, according to subject, the necessity of drastically rounding up the numbers, the amount of work required, as well as its unsuitability for the teaching of German. The advantages mentioned were the scope for working autonomously, the consolidation of the pupils' knowledge of the material at the end of the problem-solving, the connecting of different subjects, the increase in motivation, and, in particular, its usefulness in the subject of history.

The key to the long-overdue reconstruction and updating of both writing and image, in the context of the scientific world-view, is Neurath's publications on visual education.[33] Using them we can systematically pursue both the theoretical development and the development of the picture language of this inter-disciplinary and collaborative educational undertaking, and link current revisiting of this potential to the methods, principles and contents of pictorial statistics. Neurath's writings on visual education similarly represent an excellent field of study for inter-disciplinary and collective work on science and education. In numerous illustrated articles, brochures and books Neurath describes the history of the Social and Economic Museum as an organisation, and also the concomitant story of the internal theoretical and practical development of picture language from pictorial statistics to a visual pedagogy integrating writing and symbols. Here we can see the connections at its origin with the Vienna cultural movement as well as the interlinking of the principles of this popular education project with the logical empiricism of

the Vienna Circle and with the artistic work of the figurative constructivists around Gerd Arntz.

The programmatic titles of Neurath's specific writings alone convey a sense of the intentions and socio-political orientation of this conception, which became an international one from 1930.[34] The pictorial representation of social facts with the help of 'statistical hieroglyphs' would concisely and informatively explain society in all its aspects with a view to improving 'living conditions'. The scope of topics therefore extends from home, the reality of the world of work, housing and urban planning, to economic considerations on social welfare. From a modern-day perspective the monographs *Bildstatistik nach Wiener Methode in der Schule* (1933), *Internationale Bildersprache/ International Picture Language* (1936), and finally his most mature work *Modern Man in the Making* (1939)/*Auf dem Weg zum modernen Menschen* (1991) are of special interest. In these numerous pictograms are used to treat the theory and application of picture language along with written language. In addition, with his essay 'Museums of the Future' (1933) Neurath laid out a programme for a modern sociological and economic museum that remains impressive to this day, and which can be interpreted as the antithesis of the postmodern 'hands on' museums, the collections of devotional objects, and the contrived 'total works of art':

> From Comenius' *Orbis Pictus* an uninterrupted movement leads to modern visual education. A picture made according to the Vienna method shows at the first glance the most important aspect of the subject; obvious differences must be at once distinguishable. At the second glance, it should be possible to see the more important details; and at the third glance, whatever details there may be. A picture that has still further information to give at the fourth and fifth glance is, from the point of view of the Vienna school, to be rejected as pedagogically unsuitable.
>
> Thus a new clarity and purposefulness is developing in communication that may be regarded as preparation for more incisive social planning. Teachers and other groups of people concerned in social education, directors of museums, and editors of periodicals are confronted with the responsibility of placing their energies at the service of this common international task.[35]

The all too early death of Neurath prevented the completion of his socio-historical monograph on picture language, which was published posthumously



Fig. 9

One of the few articles written by Gerd Arntz explaining the 'Vienna method' (1930)



Fig. 10

Social criticism by means of graphic art: work by Gerd Arntz (1927/28)

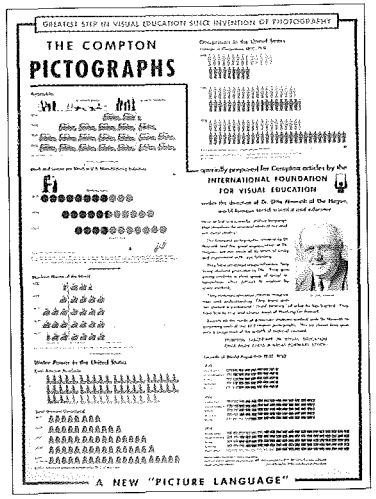


Fig. 11

Advertising leaflet to promote the use of Isotype in the 15-volume *Compton Pictured Encyclopedia*, Chicago 1939 (F. E. Compton & Co.)



Fig. 12

Contents page of Neurath's unfinished manuscript "Visual Education: Humanisation versus Popularisation" (1946)

only in 2010. With these publications we can reconstruct the aims of this emancipatory visual education and evaluate the road ahead that was implied by 'From hieroglyphics to Isotype'[36] (1946) as well as an unfinished manuscript titled 'Visual Education: Humanisation versus Popularisation'.[37] The latter discusses the possibility of a non-hierarchical international picture language, which through its neutrality imposes tolerance on education and at the same time makes possible a humanisation in opposition to authoritative popularisation:

> We must begin our explanations in accordance with the knowledge and vocabulary already familiar to the people. Gradually simple traditional expressions in more complicated combinations and perhaps some more advanced terms may be introduced. But in principle, one should try to build up more comprehensive knowledge by simply looking at the environment, and by using the language of daily life and its derivatives. This procedure from the simplest to the most complicated, I shall call humanisation.
>
> Generally speaking, the average books destined for children and the man in the street start in a different way. They try to simplify the highest level of scientific formulation, presented in scientific books. Sometimes writers think



Fig. 9

Cover of *Society and Economy*, a publication containing 100 coloured plates of pictorial statistics developed for the GWM (1930)

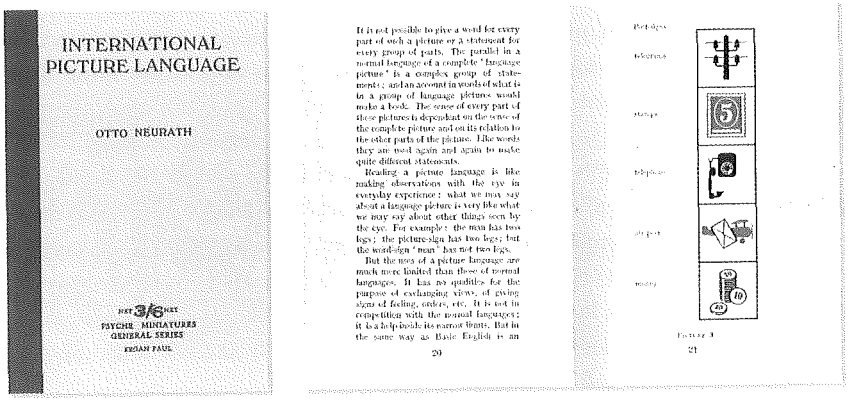


Fig. 10

Cover and double spread (pages 20 to 21) of *International Picture Language* (1936)

> that a translation of well selected terms into popular terms is sufficient, whereas it is common knowledge that the insufficiency of these terms was the main reason for the introduction of scientific terms. This kind of translation from the complicated to the simple, from top to bottom, as it were, I shall call popularisation of knowledge.
>
> In the humanisation of knowledge one tries to avoid what may be called an inferiority complex as well as all kinds of frustration which so often appear when people try to grasp a piece of knowledge in vain. Looking at a book often creates a kind of fear. There are not a few people who become uneasy when confronted with a general term like 'magnetism' but who would not be irritated by hearing about magnets and iron. Humanisation implies avoiding technical terms before they are really needed. The question is how far we can go without using more complicated expressions. [...]
>
> All statements which speak of seeing, hearing, touching, tasting, etc., appeal to the average man, because every sensual statement is possible in the common neutral and democratic language.[38]

Here, visualisation is presented as an essential means of aiding cross-cultural communication, which takes as its starting point people's everyday concrete world and, acting as a building block, enables the construction of a social museum of the present that is, as it were, cosmopolitan in character ('Mundaneum'). Equally apparent was the cooperative and international element of such an educational project, and this—against the spirit of the times—expressed the democratic idea of a 'plan for freedom':

> Visual education leads to internationalisation much more than word education does. One can use the same visual arguments, connected with different words for explanation in various languages; one can even vary the remarks on the same visual material. Visual education is related to the extension of intellectual democracy within single communities and within mankind, it is an element of international social planning and engineering.
>
> This is a period of planning, planning for getting something done, where without planning defects are manifest, such as destruction of coffee, unemployment, etc. But we can remove all this without regional planning, without city planning; we can imagine a nation with planned production as far as raw materials are concerned, but also building up 'planning for freedom', which signifies intentionally not interfering. Much city planning is full of pomposity,

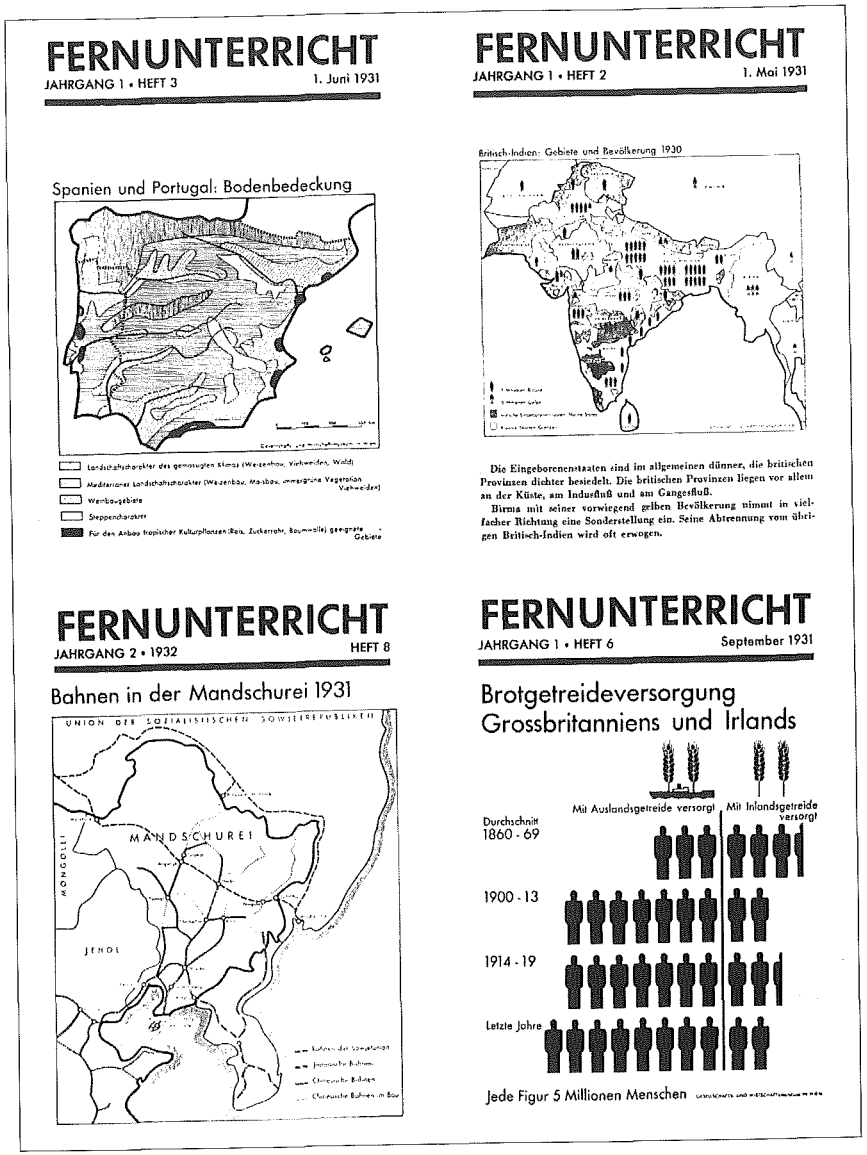


Fig. 11

Covers of *Fernunterricht*, a subscription magazine for distance learning, each dedicated to an individual topic. (1931/32)

> with a totalitarian undercurrent, pressing forward some way of life. Perhaps people want to do so; but the dictatorship of planning is a danger in itself and is not connected with planning against want. You may be in security, but free to choose your kind of life within this security. The either-or is important. We may create certain conventions in language without unifying the laws; a world language does not imply a world dictatorship but may help world understanding. For a democratic society it is important to have a common language.[39]

While the Vienna Method of Pictorial Statistics was relatively well known in its theoretical and practical application in school contexts, a parallel initiative in adult education received little attention: from 1931 to 1933 the GWM in Vienna regularly published the *Fernunterricht* (retitled *Bildstatistik* from 1932), a series of distance education booklets issued as subscriptions, with each dedicated to an individual topic.[40] As this series of publications for popular education was not reprinted in the *Gesammelte bildpädagogische Schriften*, due to its purely non-theoretical, applied approach, a brief characterisation is presented below. From today's perspective one can treat these brochures with their changing topics as foundation stones, or defining landmarks, in the field of social history. As it emerges from the preface, there was particular emphasis on user-friendly orientation and the invitation to provide feedback, which helps in creating an interest-oriented mode of communication that puts the participants on an equal footing:

> *Der Fernunterricht* is dedicated to anyone endeavouring to acquire new knowledge, and especially to adult educationalists and teachers who impart their knowledge to a narrower circle. Newspapers and periodicals are not able to devote their attention to the systematic training of the readers; the former give us ephemeral information on the day's events, the latter thorough discussion concerning specific questions. Not everyone has the time and energy to form this into a well-ordered overview and to acquire the necessary information to complement his/her knowledge. This is what *der Fernunterricht* intends to do. Lack of time compels learners and teachers to look for concise summaries. For this pictures are a great advantage. They demonstrate, clearly and quickly, even to those with the little preliminary knowledge, what is essential. The 'Vienna Method of Pictorial Statistics', which has already proved its worth internationally, combines objectivity and easy memorability. In view of all this, *der Fernunterricht* offers not prettily written articles, detailed discussions, but very

> concise substantial material and images, which will not be easily forgotten. The reader can gradually construct his own compilations of individual issues of *der Fernunterricht* to suit his own particular purposes. *Der Fernunterricht* can be easily cut up, as every section ends with a full page. Society, life, engineering and science are covered, and the reader can find out which path he should take to obtain specific information, and what shortcuts are possible. Students of the *Arbeiterhochschule* (Vienna College for Workers), whose colleagues far from Vienna suffer from a lack of educational resources, turned to the 'Social and Economic Museum of Vienna', which has a scientific department, and suggested the creation of a distance learning course which is hereby published, in expanded form, for a wider circle. [41]

Neurath then goes on to give an account of the connectedness between science and popular education, which, according to his thinking, could be brought about through the empirical view of science.[42]

The *Fernunterricht* magazine was especially important in publishing the GWM's pictures of sets, such as those, for instance, from the elementary work in pictorial statistics *Gesellschaft und Wirtschaft* (*Society and Economy*, 1930); they were accompanied by introductions and explanations, which could be obtained by post as transparencies and off-prints. An inserted page for questions and suggestions from readers facilitated free correspondence concerning particular issues of the magazine, and hence regular feedback from subscribers. Selected questions were answered in writing in the following issues. Going by reactions to it, the undertaking was a success, which was also noted abroad. The political turning points of 1934 and 1938 finally brought about the disappearance of this enlightenment tradition in Austria, and after 1945 it fell into oblivion. It is no coincidence that it was in England, where the bourgeois enlightenment brought about egalitarian concepts of education, that Neurath's ambitions struck fertile soil. Thus Neurath was able to present the importance of visual education *vis-à-vis* popular education in several articles in the periodicals of adult education organisations.[43] Above all the article 'Visual aids in adult education' (1944) ran the gamut from Comenius to modern picture language and its role in the struggle against superficial knowledge, illiteracy and the confinement to simplistic reading material; his argument was supported by a web of various 'visual arguments', and ended with a perfectly realistic, but still unrealised vision:

> It seems to be within the reach of our generation to support a future commonwealth in a practical manner. Of course the network of arguments conveyed by means of Isotype is much smaller than that conveyed by literature, but it may be of a similar kind. Should all these international day-dreams of an intellectual world of the common man not be realized, the introduction of visual education in schools and adult education classes seems nevertheless to promote an atmosphere of argumentative meditation and of some peacefulness.[44]

Current international research into the field of visual communication and general semiotics confirms to an impressive degree the viability of developing Neurath's approach further.[45] Following the further development made in the Anglo-American world, slowly but surely in German-speaking areas, too, attention is turning to this innovative tradition of the 'Vienna Method', as demonstrated by the new discoveries, and the rediscovery, of Neurath's life and work.[46]

Outlook

The contemporary relevance of picture language after Otto Neurath in the context of science, politics and the public can only be outlined here. His model of a combined visualisation and museology, against a linear and hierarchical popularisation of knowledge and science, is manifest in at least four overlapping research areas:

1. In perception research, starting from the static diagram (as a 'visual argument') all the way to the TV screen and film application.[47]
2. In reconstruction within a general inter-disciplinary semiotics which had begun to show itself at the time in the cooperation with the Dutch significs around Gerrit Mannoury for the journal Synthese.[48]
3. In the critical assessment of the correlative relationship between society and science which is apparent, for instance, in the new works on the potential of the encyclopædist project.[49]
4. In its applicability in the area of the social sciences and the alternative political economy, which does not restrict the criteria for progress and wealth to money alone.[50]

Concerted work on this loose programme *after* Neurath would once more show the limits and possibilities of building and rebuilding a ship, a task which would only be possible through cooperation and a continuous division of labour in a joint and endless project. But that, of course, is the fate of every conception of science, which is in principle sceptical vis-à-vis the demands for a single method and a single rationality. The late W. V. O. Quine recognised this fact as far as philosophy is concerned, when he used Neurath's sailor simile—outside its historical and thematic context—as a motto for his book:

> *Wie Schiffer sind wir, die ihr Schiff auf offener See umbauen müssen, ohne es jemals in einem Dock zerlegen und aus besten Bestandteilen neu errichten zu können.*
>
> We are like sailors who must rebuild the ship on the open sea, never able to dismantle it in dry-dock and to reconstruct it there out of the best materials.[51]

Notes

This article is a translated and revised version of my 'Schriftsprache und Bildsprache nach Otto Neurath—Popularisierung oder Humanisierung des Wissens?', in: *Wissenschaft, Politik und Öffentlichkeit. Von der Wiener Moderne bis zur Gegenwart.* Edited by Mitchell G. Ash and Christian H. Stifter (Wien: Facultas, 2002), 267–303. I am grateful to Naomi Osorio-Kupferblum (Vienna) and Bryn Harris (Oxford) for their valuable translation work.

1 Otto Neurath, *From Hieroglyphics to Isotype. A Visual Autobiography*, edited by Christopher Burke and Matthew Eve (London: Hyphen Press, 2010). Also: Hadwig Kraeutler, *Otto Neurath and Exhibition Work. Spaces (Designed) for Communication.* (Frankfurt/M.-Berlin-Bern-Bruxelles-New York-Oxford: Peter Lang, 2008). The most sytematic documentation and research is done at the University of Reading, Department of Typography and Graphic Communication, especially the 'Isotype revisited' project: www.isotyperevisited.org

2 As an example of the growing interest in visualisation see the series *Philosophie & Repräsentation/Philosophy & Representation*, edited by Petra Gehring/Jörg Maas (Amsterdam-Atlanta, GA: Rodopi, 1992ff.). Also: Johanna Hofbauer, Gerald Prabitz, Josef Wallmansberger (eds.), *Bilder–Symbole–Metaphern. Visualisierung und Informierung in der Moderne* (Vienna: Passagen, 1995).

3 Symptomatic for a rather naïve euphoria, the description: 'Die Wissenschaft von der visuellen Wende' ('The study of the visual turn'), in: *Die Zeit*, 6 December 1996, 35. A more recent, trans-disciplinary discussion in the context of Science Studies: Caroline A. Jones, Peter Galison (eds.), *Picturing Science–Producing Art* (New York-London: Routledge, 1998).

4 As a general discussion of the cultural position of visualisation see: Johannes Domsich, *Visualisierung. Ein kulturelles Defizit? Der Konflikt von Sprache, Schrift und Bild.* Vienna-Cologne-Weimar: Böhlau 1991.

5 Still a fruitful gloss: Karl H. Müller, *Symbole, Statistik, Computer, Design. Otto Neuraths Bildpädagogik im Computerzeitalter* (Vienna: Hölder-Pichler-Tempsky, 1991).

6 Neurath himself referred to this connection time and again in his writings. For a systematic comparison of the relationship between pictorial statistics and Neurath's modern encyclopædia, see Karl H. Müller, *Symbole*, 10, and Dahms '"International Encyclopedia of Unified Science" als Torso' in Elisabeth Nemeth/Richard Heinrich (eds.), *Otto Neurath: Rationalität, Planung, Vielfalt* (Berlin: Oldenburg und Akademie Verlag, 1999), 184–227. For a research-oriented history of his life and

work, see Kurt Blaukopf, 'Kunstforschung als exakte Wissenschaft. Von Diderot zur Enzyklopädie des Wiener Kreises', in: Friedrich Stadler (ed.), *Elemente moderner Wissenschaftstheorie. Zur Interaktion von Philosophie, Geschichte und Theorie der Wissenschaften* (Vienna-New York: Springer, 2000), 177–211.

7 For the few biographical details we have cf. the entry on him in *Philosophen-Lexikon. Handwörterbuch der Philosophie nach Personen*, edited by W. Ziegenfuss (Berlin: de Gruyter, 1949), 395: 'Goldscheid, Rudolf, born 12th August in Vienna, died 6th October 1931 in Vienna. Sympathised with Monism. In 1909 he founded the German Sociological Association.'—With regard to the current research on Goldscheid, who was also a founder member of the Vienna Sociological Association in 1907, on social reform and social sciences see: Christian Fleck, *'Rund um Marienthal' Von den Anfängen der Soziologie in Österreich bis zu ihrer Vertreibung* (Vienna: Verlag für Gesellschaftskritik, 1990). And on fiscal sociology see especially: Rudolf Goldscheid and Josef Schumpeter, *Die Finanzkrise des Steuerstaates. Beiträge zur politischen Ökonomie*, edited by Rudolf Hickel (Frankfurt/M.: Suhrkamp, 1976). Ingrid Belke, *Die sozialreformerischen Ideen von Josef Popper-Lynkeus (1838–1921) im Zusammenhang mit allgemeinen Reformbestrebungen des Wiener Bürgertums um die Jahrhundertwende* (Tübingen: Mohr Siebeck, 1978).

8 Triggered by his article 'Die Pflanzstätten der Wissenschaft als Brutstätten der Reaktion', first published in: *Monistische Monatshefte* (Hamburg 1923), later in: *Arbeit und Wirtschaft* (Vienna 1926, vol. 4, issue 4). Also on this cf. *Wiener Internationale Hochschulkurse 1922–1971* (University of Vienna, undated).

9 Friedrich Stadler, 'Spätaufklärung und Sozialdemokratie in Wien 1918–1938' in: *Aufbruch und Untergang. Österreichische Kultur zwischen 1918 und 1938* (Vienna-Munich-Zürich: Europa Verlag, 1981). For a portrait of Goldscheid as part of the Vienna social and culture movement see the still valid Michael Hubenstorf, 'Sozialmedizin, Menschenökonomie, Volksgesundheit' in: *Aufbruch und Untergang*, 247–266.

10 Otto Neurath, 'Die Entwicklung des Wiener Kreises und die Zukunft des Logischen Empirismus', in: Neurath, *Gesammelte philosophische und methodologische Schriften*, vol. 2, edited by Rudolf Haller and Heiner Rutte (Vienna: Verlag Hölder-Pichler-Tempsky, 1981), 691 f.

11 'The Scientific Conception of the World: The Vienna Circle', in Otto Neurath, *Empiricism and Sociology* edited by Marie Neurath & Cohen Robert (Dordrecht-Holland: Reidel, 1973), Chapter 9.

12 Friedrich Stadler, *Studien zum Wiener Kreis. Ursprung, Entwicklung und Wirkung des Logischen Empirismus im Kontext* (Frankfurt/M.: Suhrkamp, 1997), (English edition: Vienna-New York: Springer 2001). Especially ch. 12 and the list of the Vienna Circle members who participated in the adult education in Vienna. On the early Vienna Circle before the First World War regarding popular education and social reform cf. particularly: Thomas Uebel, *Vernunftkritik und Wissenschaft: Otto Neurath und der erste Wiener Kreis* (Vienna-New York: Springer, 2000).

13 For a full account of the research on this see: *Wissenschaft, Politik und Öffentlichkeit im Kontext der „Wiener Moderne", 1890–1930. Literatur und Forschungsbibliographie*, edited by Österreichisches Volkshochschularchiv (Vienna, 2000). On this see also the periodical of the ÖVA: *Spurensuche. Zeitschrift für Erwachsenenbildung und Wissenschaftspopularisierung*. Vienna. See also: *Heureka! Das Wissenschaftsmagazin im Falter*. Vienna: Falter Verlag, and the series of publications (Vienna: Passagen Verlag) and the Newsletter *Moderne. Zeitschrift des Spezialforschungsbereichs Moderne—Wien und Zentraleuropa um 1900*. University of Graz. Especially: Günther Sandner, *Engagierte Wissenschaft. Austromarxistische Kulturstudien und die Anfänge der britischen Cultural Studies* (Wien-Berlin: Lit Verlag, 2006).

14 On his life and work see: *Arbeiterbildung in der Zwischenkriegszeit. Otto Neurath – Gerd Arntz*, edited by Friedrich Stadler (Vienna-Munich: Löcker, 1982). Otto Neurath, *Empiricism and Sociology*, edited by Marie Neurath and Robert S. Cohen (Dordrecht-Boston: Reidel 1973); Paul Neurath/Elisabeth Nemeth (eds.), *Otto Neurath oder Die Einheit von Wissenschaft und Gesellschaft* (Vienna-Cologne-Weimar: Böhlau 1994); Elisabeth Nemeth and Friedrich Stadler (eds.), *Encyclopedia and Utopia. The Life and Work of Otto Neurath (1882–1945)* (Dordrecht-Boston-London: Kluwer 1996); Nancy Cartwright, Jordi Cat, Lola Fleck and Thomas E. Uebel, *Otto Neurath: Philosophy between Science and Politics* (Cambridge University Press 1996); Elisabeth Nemeth and Richard Heinrich (eds.), *Otto Neurath: Rationalität, Planung, Vielfalt* (Berlin-Vienna: Oldenbourg und Akademie Verlag 1999); Elisabeth Nemeth, Stefan W. Schmitz and Thomas Uebel (eds.), *Otto Neurath's Economics in Context* (Dordrecht: Springer 2007). Most recently on Isotype: Otto Neurath, *From Hieroglyphics to Isotype. A Visual Autobiography* edited by Christopher Burke and Matthew Eve (London: Hyphen Press 2010).

15 Cf. Otto Neurath, 'Museums of the Future', in: *Survey Graphic*, 22/9 (1933). Published in Rudolf Haller/Robin Kinross (eds.), *Gesammelte bildpädagogische Schriften* (henceforth: *GbS*) (Vienna: Hölder-Pichler-Tempsky, 1991), 244–257.

16 On current research see: Thomas Uebel, *Vernunftkritik und Wissenschaft: Otto Neurath und der erste Wiener Kreis* (Vienna-New York: Springer, 2000).

17 Cf. Friedrich Stadler, 'Elemente einer zukünftigen Wissenschaftstheorie: Zur Interaktion von Philosophie, Geschichte und Theorie der Wissenschaften', in: Stadler,

Elemente moderner Wissenschaftstheorie, vii–xxvi.

18 'Otto Neurath, Empiricism and Sociology', Chapter 11, as well as the corresponding work on the theory of science from the perspective of the 'scientific world-view' up until the Encyclopædia in: Otto Neurath, *Gesammelte philosophische und methodologische Schriften*, (henceforth: *GpmS*) 2 vols. edited by Rudolf Haller and Heiner Rutte (Vienna: Hölder-Pichler-Tempsky, 1981); Otto Neurath, *Philosophical Papers 1913–1946*, edited by Robert S. Cohen and Marie Neurath (Dordrecht-Boston-Lancaster: Reidel, 1983).

19 This section essentially restates my *Studien zum Wiener Kreis*, ch. 12.3. On the growth and influence of pictorial statistics see: Gerd Arntz, *Kritische Grafik und Bildstatistik* (The Hague: 1976); *Gerd Arntz*, Monographie-Reihe Remscheider Künstler 2 (Remscheid, 1982); Robin Kinross, *Otto Neurath's Contribution to Visual Communication 1925–45* (Mphil. Thesis. Reading, 1979); Stadler (ed.), *Arbeiterbildung in der Zwischenkriegszeit*, 1982. For Otto Neurath's primary literature see: M. Neurath/R. S. Cohen (eds.), *Empiricism and Sociology;* Rudolf Haller/Robin Kinross (eds.), *Gesammelte bildpädagogische Schriften* (*GbS*) (Vienna: Hölder-Pichler-Tempsky, 1991). For an overview on this see: *Otto Neurath. Wissenschaftliche Weltauffassung, Sozialismus und Logischer Empirismus* edited with an introduction by Rainer Hegselmann (Frankfurt/M.: Suhrkamp, 1979).

20 Otto Neurath, *International Picture Language/ Internationale Bildsprache.* Facsimile reprint of the English edition of 1936 (Department of Typography & Graphic Communication: University of Reading, 1980). *Graphic Communication through ISOTYPE.* (Department of Typography & Graphic Communication: University of Reading, 1975).

21 On the biography specifically, and particularly on the 'Vienna Method', cf.: Paul Neurath, 'Otto Neurath (1882–1945). Leben und Werk', in: Neurath/E. Nemeth (eds.), *Otto Neurath oder die Einheit*, 13–96.

22 Otto Neurath, *Bildstatistik nach Wiener Methode in der Schule* (Vienna-Leipzig: Deutscher Verlag für Jugend und Volk, 1933). Published in *GbS*, 265–336.

23 Otto Neurath, *International Picture Language*; Neurath, 'Visual Education' (1937). Both in *GbS*.

24 Cf. E. Gillen's article in: *Politische Konstruktivisten. Die „Gruppe Progressiver Künstler".* (Cologne-Berlin: Neue Gesellschaft für bildende Kunst, 1975).

25 O. Neurath, *Empiricism and Sociology*, 227–248.

26 Particularly Neurath, *Modern Man in the Making.*

27 Gerd Arntz, *Zeit unterm Messer. Holz- und Linolschnitte* (Cologne: Leske Verlag, 1988).

28 Michael Twyman, 'Isotype und die Universität Reading', in: *Arbeiterbildung in der Zwischenkriegszeit*, 185–189.

29 Gerd Arntz, *Kritische Grafik und Bildstatistik* (The Hague-Cologne, 1976).

30 *Politische Konstruktivisten*, H. U. Bohnen, *Das Gesetz der Welt ist die Änderung der Welt. Die rheinische Gruppe progressiver Künstler (1918–1933)* (Berlin: Karin Kramer Verlag, 1976).

31 Arntz, *Kritische Grafik*, 47.

32 Especially with the periodical *Fernunterricht* and with articles in: *Die Volksschule* and *Die Quelle.*

33 Neurath, *GbS* 1991 (all subsequent references are taken from this).

34 Neurath, *GbS* (particularly the relevant publications of 1925–1946).

35 Neurath, 'Museums of the Future' (1933), in: Neurath, *Empiricism and Sociology* edited by Marie Neurath and Robert S. Cohen (Dordrecht: D. Reidel, 1973), 218 ff.

36 Neurath, 'From Hieroglyphs to Isotypes' (1946), in: Neurath, *Empiricism and Sociology* edited by Marie Neurath and Robert S. Cohen (Dordrecht: D. Reidel, 1973), 4–6. Now published as separate publication as Neurath (2010), see note 14.

37 Otto Neurath, 'Visual Education. Humanisation versus Popularisation', edited by Juha Manninen, in: Nemeth/Stadler, *Encyclopedia and Utopia*, 245–336. Following on from this is an overview by Reinhard Fabian on Otto Neurath's *Nachlass* in Haarlem (NL), 337–355.

38 Quoted from Neurath, *Empiricism and Sociology* edited by Marie Neurath and Robert S. Cohen (Dordrecht: D. Reidel, 1973), 231 f.

39 *Empiricism and Sociology*, 231 f.

40 Gesellschafts- und Wirtschaftsmuseum in Wien (Leipzig-Vienna): *Fernunterricht* (1931/32), continued under the name *Bildstatistik* (1932/33).

41 *Fernunterricht*, 1 February 1931.

42 Ibid., 11.

43 For instance in: *Bulletin of the World Association for Adult Education* (London, 1942). *Highway* (London, 1944): *The New Era* (London, 1944). *Health Education Journal* (London, 1944). *The Lancet* (London, 1945).

44 Otto Neurath, 'Visual Aids and Arguing' *The New Era in Home and School*, April 1944, vol. 25, no. 3, 51–61.

45 Cf. the corresponding articles in Section III. 'Pictorial Statistics – Isotype – Museology' in: Nemeth/Stadler, *Encyclopedia and Utopia.*

46 David Skopec, 'The Changing Media of Visual Statistics', and Angela Jansen, 'Isotype and Infographics', in: ibid., 143–166; Nader Vossoughian, *Otto Neurath. The Language of the Global Polis* (Rotterdam: NAi Publishers, 2008).

47 Along with his Isotype Institute in England Neurath had already produced Isotype filmstrips and films and Isotype animations in collaboration with Common Ground and Paul Rotha Productions. For current media research cf.: Kurt Blaukopf, 'The Shortcomings of the TV-Screen in Cultural Communication', in: Daniel Greenberger/Wolfgang Reiter/Anton Zeilinger (eds.), *Epistemological and Experimental Perspectives on Quantum Physics* (Dordrecht-Boston-London: Kluwer, 1999), 317–336.

48 Jeff Bernard/Gloria Withalm (eds.), *Neurath. Zeichen* (Vienna: ÖGS/ISSS, 1996). Jeff Bernard/Gloria Withalm/Karl H. Müller (eds.), *Bildsprache – Visualisierung – Diagrammatik* (Vienna: ÖGS, 1995 = *Semiotische Berichte* vol. 19, 1–4/1995). Jeff Bernard/Friedrich Stadler (eds.), *Neurath: Semiotische Projekte und Diskurse* (Wien: ÖGS, 1997 = *Semiotische Berichte*, vol. 21, 1/1997).

49 Cf. particularly the publications already mentioned above in note 13.

50 Robert Leonard, '"Seeing Is Believing": Otto Neurath, Graphic Art, and the Social Order', in: *Economic Engagements with Art*, edited by Neil De Marchi and Craufurd D.W. Goodwin (Durham and London: Duke University Press, 1999), 452–478. The 7th European Conference on the History of Economics 2001 in Montréal was likewise dedicated to the topic 'Economic Science and Visual Representation'. John O'Neill, *The Market. Ethics, Knowledge and Politics* (London-New York: Routledge, 1998). In May 2000 at the Vienna University of Economics and Business, during a symposium on 'European Society of Ecological Economics' there was a separate session on 'Concepts of Knowledge and Economic Thought by Otto Neurath and Josef Popper-Lynkeus'.

51 Motto to his book dedicated to 'Rudolf Carnap, teacher and friend': Willard Van Orman Quine, *Word and Object* (Cambridge, Mass.: MIT Press, 1960).

The Linguistic Status of Isotype

Christopher Burke, Reading

In a thorough study titled 'Neurath's theory of pictorial-statistical representation' (published over twenty years ago in *Rediscovering the forgotten Vienna Circle*) Karl Müller concluded that Otto Neurath never explicitly developed such a theory and questioned Neurath's claim that Isotype was a language, due to the weakness of evidence for this. In implicit agreement with Müller's analysis, this essay will draw on Neurath's correspondence and his 'visual autobiography' to show that he deliberately did not develop a theory of picture language, or even fully articulate a method, on the principle that it was too early in the history of visual education to make such definite statements. He also felt that such theorizing would restrict possible, future applications of Isotype.

There are some contradictions in the way Otto Neurath discussed Isotype, as perhaps there were in other areas of his work; Thomas Uebel has described him succinctly as 'a very contrapuntal writer'.[1] It seems almost to have been a principle of Neurath's to be self-contradictory (or at least equivocal). In his 1942 essay 'International planning for freedom' he quoted Conrad Meyer: 'I am not a wittily constructed work of fiction; I am a human being and full of contradiction.'[2] Neurath's habit of undermining certainty causes some difficulties of interpretation. He made statements claiming that Isotype was a kind of language, which should be in widespread use, yet he also admitted that it could never be a real language and he wanted to keep close control of how it was produced.

Neurath's book of 1936, *International picture language*, firmly established a claim of linguistic status for Isotype. The use of this phrase is partly

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explained by Neurath having written the book in C. K. Ogden's Basic English, which has a vocabulary of only 850 words to choose from. Nevertheless, Neurath stated in his introductory note that the rules he would explain in the book are 'in harmony with a complete system for an international picture language'. This is not something that he and his collaborators ever tried to develop, despite the claim for a system being made in the name Isotype itself—an acronym which stands for International System of Typographic Picture Education. In her account of how she invented this name, Marie Neurath confessed that it was not an 'entirely satisfactory solution'.[3]

The name Isotype replaced 'Vienna Method of Pictorial Statistics' (*Wiener Methode der Bildstatistik*) around the time that *International picture language* was being written, soon after Neurath and a group of close colleagues from the Gesellschafts- und Wirtschaftsmuseum in Wien had settled in the Netherlands. In correspondence at that time, Rudolf Carnap asked Neurath:

> What does 'isotyp' [sic] mean? Representation by means of a similar picture? For a logician it rouses the association: 'of the same logical type'. Wouldn't it be possible to find another word?[4]

Carnap referred here to an interpretation based on the Greek words 'isos' (the same) and 'typos' (type, symbol). Neurath replied:

> Isotype—the name for our picture language; we are glad we have it. Reidemeister [later Marie Neurath] developed it systematically: I-nternational S-ystem O-f Ty-pographic P-icture E-ducation. And it otherwise means: using the same types, which we in fact do. I hope it does not cause any great confusion among logicians.[5]

Neurath's last comment here—perhaps a little sarcastic in tone—indicates that he did not perceive Isotype as occupying the 'icy slopes of logic'; instead he welcomed the name as a kind of brand to effectively identify work produced at the International Foundation for Visual Education in the Hague. After leaving Vienna and losing the municipal subsidy given to the Gesellschafts- und Wirtschaftsmuseum, it was necessary to establish practice on a commercial basis. The Dutch Foundation struggled financially and, after two years in the Netherlands, Neurath wrote:

> But we can barely exist any longer, and don't know how things will go on, in spite of the positive attitude of important people towards our work, in spite of 'success' now again in educational circles. Just like our unified science has success—but it doesn't bring us one penny.[6]

Neurath may have been content to portray Isotype as a kind of 'system' and 'language' in order to enhance its appeal to potential clients during this difficult period.

Nevertheless, after the analytical debates about the use of language in the Vienna Circle, Neurath was naturally wary of using the term 'language' for referring to Isotype. He asked Carnap for advice on the matter during the writing of *International picture language*:

> I am treating the work of our Institute theoretically and call it 'International picture language'[.] [I] indicate rules which we use and also show how one 'stresses' something—that corresponds to stylistic rules of [letter]spacing [in gothic type] and underlining, etc.
>
> Now I would like to know how one should differentiate between the term 'script' and 'language'. In ethnology many speak of 'picture languages', others of 'picture script'. One speaks of Chinese script, although actually a language is meant whose translation into the spoken word is debatable.
>
> I would prefer using a terminology which is consistent with yours. Please make some remarks.[7]

Neurath probably sought consistency with Carnap's book *Logische Syntax der Sprache*, which had been published not long before this request.[8] Carnap replied:

> I use the term 'language' in the broadest sense. I have hardly used 'script' or 'script language'. I would possibly use these terms in such a way that 'script' or 'script language' designate a special variety of language, namely the written variety. A system of rules for the use of pictures (to express facts) is then a special type of language. Hence it seems to me that one can use the term 'picture-script' as well as the term 'picture language'.[9]

Neurath took this as a kind of approval for calling Isotype a language: 'I will use the term picture language as you have indicated', he told Carnap. Yet he

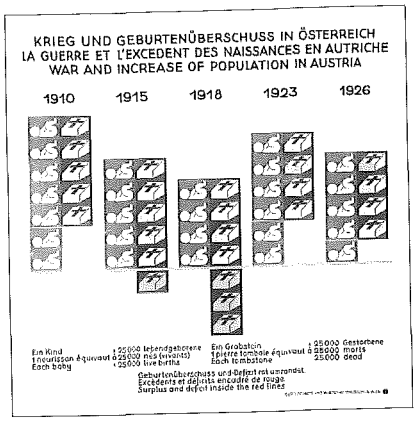


Fig. 1

War and increase of population in Austria. Exhibition chart made at the Gesellschafts- und Wirtschaftsmuseum in Wien, c.1928 (T3d). A horizontal axis is used to draw attention to a surplus in births or deaths. Although this axis does not strictly correspond to ground level, this association is created by the birth symbols stacking above it, while death symbols descend below it.

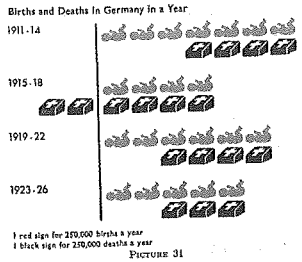


Fig. 2

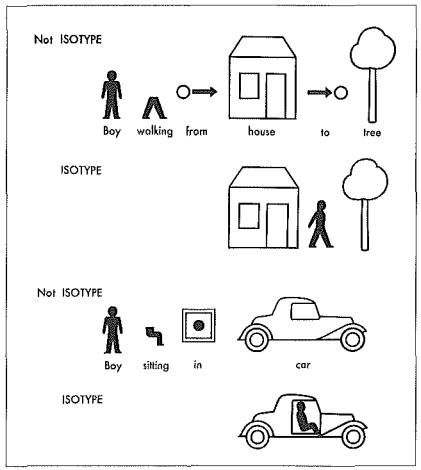
Births and deaths in Germany in a year, from *International picture language*, 1936 (it is an English-language version of a chart published in *Die bunte Welt*, 1929). Here the axis has been given a vertical orientation, reflecting the adoption of a general rule to arrange pictograms in horizontal rows. Neurath made a naturalistic argument for this: 'The horizontal row corresponds to the customary position of the objects. People, animals, and cars move horizontally over the earth's surface. It would be strange to arrange people one on top of the other.'[10]

was hesitant about taking this step, explaining that he had previously used only the term 'picture script' [*Bilderschrift*]. Indeed, in his longest and most detailed account of the Vienna Method—*Bildstatistik nach Wiener Methode in der Schule* (1933)—he seems quite deliberately to have used this term and avoided 'picture language' [*Bildersprache*]. To Carnap, he continued:

> ... it is naturally something else if there is a picture language with its own syntax, or a picture language without its own syntax. Translatable word for word, so to speak. The German script-language itself is different from the German speech-language. Above all in 'style', which is also language.[11]

Neurath pointed out in *International picture language* that Isotype could not translate verbal language 'word for word'; but it did have some basic syntactical rules, which were established during the Vienna period. The basic rule is that pictogram units should not be increased in size to indicate an increase in quantity, but should instead be repeated in greater numbers, at the same size. After initial years of experiment, it was also resolved to line them up in horizontal (not vertical) rows, with time running on the vertical axis. Arranged this way, Neurath likened the pictograms to letters composed in a printed line.[12]

Some examples were prepared around 1936 to show how statements such as 'boy walking through doorway' should be conveyed through Isotype, with counter-examples (figs 3 & 4). These make clear that Isotype has no components that are directly equivalent to words in many cases; but it would be difficult to interpret rules which dictate that these statements should be conveyed in precisely the approved configurations given here. Perhaps this



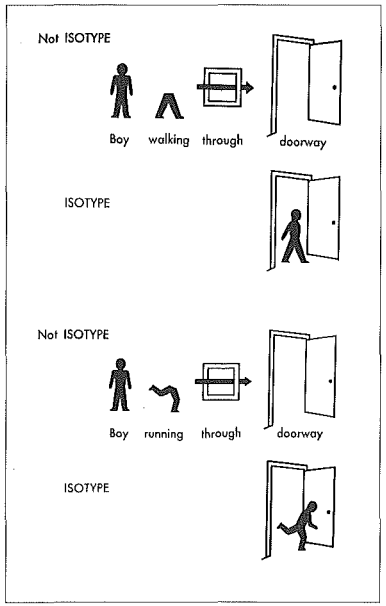
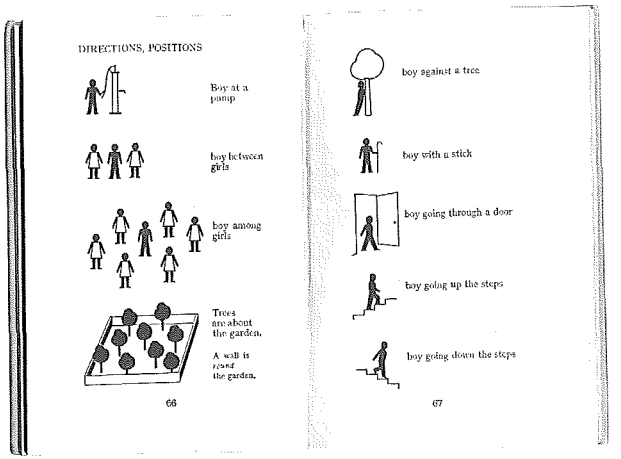


Fig. 3 & Fig. 4

Examples of 'not Isotype' and Isotype depictions of some simple operations. c.1936 (T1413 & 1414)



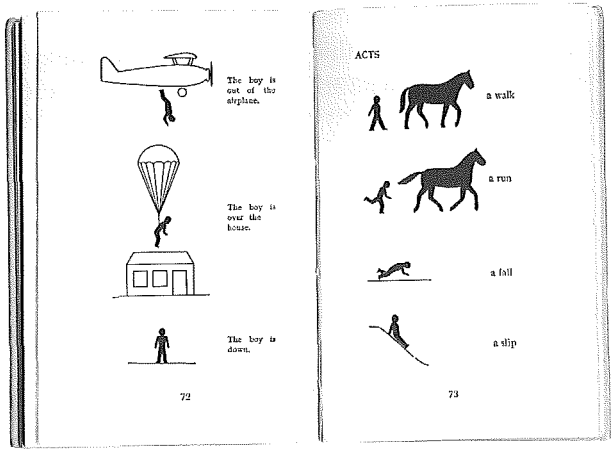


Fig. 5 & Fig. 6

Pages from *Basic by Isotype*
(London:
Kegan Paul, Trench,
Trubner & Co., 1937)

was the point—that there should always be flexibility to allow for economical (and creative) graphic renditions. (More examples of this kind appeared in *Basic by Isotype*, the book that was prepared alongside *International picture language*.)

Almost a decade after writing *International picture language*, Neurath continued to refer loosely to Isotype as a 'visual language' in a book titled 'Visual education', which he wrote towards the end of his life. He seemed to recognize the debatability of his usage, however:

> If one shows realistic pictures instead of using impressive sentences or expressions, one uses a language which is a rather vague one, but vagueness in itself is no objection as long as ambiguity is avoided.[13]

Contemporary with this, in his 'visual autobiography' titled *From hieroglyphics to Isotype*, Neurath clarified that Isotype was not a language but a 'language-like technique':

> There are many reasons why Isotype cannot be developed as a 'complete language' without destroying its force and simplicity. Our daily language, even in primitive societies, is to some extent richer than our Isotype representations can be, and one needs words added to the pictures.[14]

Around the same time he wrote to a colleague in England:

> I object to all attempts to look at Isotype as a a quasi-language in full dress. It is just my point to maintain, that Isotype is adapted to impressive presentation of relatively simple correlations. A full scheme of Hieroglyphics should frighten me.[15]

Neurath had admitted this in other words already in *International picture language*, calling Isotype a 'helping language' (in later writings he called it an 'auxiliary language').

While *International picture language* remains the best written account of Isotype, it should not be interpreted as a set of definitive statements that wholly encapsulate what was an activity of collaborative, graphic design. Taking that book as a summa ignores the rich and varied history of Isotype between 1924 and 1971, and encourages an appraisal of Isotype in purely conceptual terms. Neurath's epistemological (and economic) writings enrich an analysis of Isotype, without doubt; but he certainly never considered it as a philosophical exercise. He often commented to colleagues and clients that Isotype could not be fully explained but only demonstrated in action.

The makers of Isotype clearly did not want to construct a whole language; Isotype was instead an approach to design for education, with some linguistic aspirations. Its few basic rules provided a certain systematic aspect. Neurath hesitantly referred to 'Isotype vocabulary and the Isotype grammar, if one is allowed to use these terms in such a context'.[16] Some rough parallels with

language can be drawn: for instance, in the way that pictograms could be combined to create the equivalent of compound nouns. Also, by linguistic analogy, a certain significance was attached to changes in form or colour; they were not changed arbitrarily.

To some extent Isotype was defined by what it did not do—what was left out. There is a similarity here to the way in which Neurath simply left out specific words from his vocabulary when writing, in order to avoid certain complications. Isotype generally never shows things in perspective, for example, because Neurath thought that such naturalism detracted from the power of the simplified imagery.

In *From hieroglyphics to Isotype* Neurath stated that the Isotype team attempted to achieve a 'visual consistency' lacking in some previous efforts in visual communication. Yet, on the same page (103), he claimed that 'I think we were the first to evolve a theoretical framework of visualization'. This sounds suspiciously like the very thing which he criticized other people for doing, although it is perhaps a reasonable description of the broad rules formulated for Isotype. Such a phrase, added to claims for Isotype to be an 'international system' and a 'picture language', may encourage interpretation of it as having a utopian aspect. Karl Müller observed that Neurath thought 'full symbolic languages' were something desirable but not practicable.[17] There is no way of breaking down Isotype into definite components of meaning any more than verbal language could be, in Neurath's view:

> I cannot deny that many scientifically minded people do not like such a start full of vagueness; they would prefer—as I would prefer too, if I did not regard this wish as a utopian one—to start with exact initial definitions and atomic simple elements.[18]

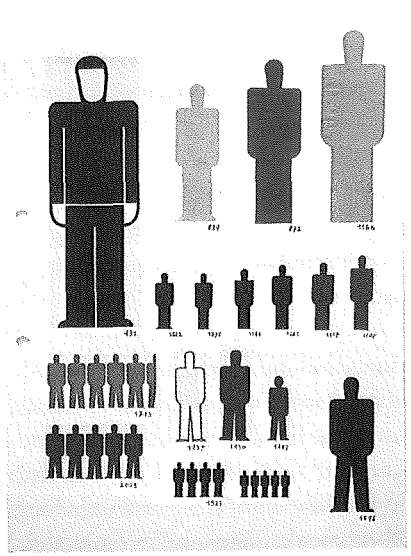
Isotype was not any kind of 'ideal language', which is what Neurath described Carnap as having attempted to develop in his book *Der logische Aufbau der Welt* (1928).[19] Neurath considered Carnap's formulations as inapplicable to the social sciences (the principal province of Isotype) because they did not reflect the necessary mixture of 'clean' and 'unclean' ways of thinking. In his autobiography Carnap recalled that Neurath insisted on the materiality of language:

> Neurath emphasized from the beginning that language phenomena are events within the world, not something that refers to the world from outside. Spoken language consists of sound waves; written language consists of marks of ink on paper. Neurath emphasized these facts in order to reject the view that there is something 'higher', something mysterious, 'spiritual', in language, a view which was prominent in German philosophy. I agreed with him but pointed out that only the structural pattern, not the physical properties of the ink marks, were relevant for the function of language. Thus it is possible to construct a theory about language, namely the geometry of the written pattern.[20]

Here is a significant difference between the views of Carnap and Neurath: Carnap's response, to dismiss the physical properties of graphic language as irrelevant, showed his vestigial attachment to the idealism of German philosophical tradition; Neurath had been occupied since the early 1920s with designing and producing graphic material and, for him, the particular form of ink marks on paper were not incidental—they were intrinsic to Isotype.

This difference between Carnap and Neurath emerged during the seminal 'protocol sentence' debate within the Vienna Circle. Neurath argued that 'What is first given us is our historical ordinary language with a multitude of imprecise unanalysed terms ["*Ballungen*"].'[21] In his view protocol statements were not intended as 'elementary statements'—'In this form they are even a protest against elementary statements.'[22] As an example he gave the sentence 'Otto observes an angry man': this was imprecise because 'angry man' is not precisely defined ('but "Otto" itself is in many respects an imprecise term', he added). 'We start by purifying this ordinary language of metaphysical components and thus arrive at the physicalist ordinary language. A list of forbidden words can serve us well in doing this.'[23] Such a 'physicalist language' is also served by using pictures instead of words: pictures make a direct, iconic connection to the physical world, not a symbolic one. Yet the Isotype pictograms representing 'man' or 'woman' are by nature imprecise—they are deliberately generic. In Neurath's terms, they are also '*Ballungen*', imprecise clusters of concepts.[24] The graphic simplification in Isotype is instrumental, and does not correspond to a reduction of connotation. Isotype pictograms are generalized pictures due to their simplicity. Neurath commented: 'The figures must not function as individuals, rather as symbols for a genus [*Gattung*].'[25]

Although Neurath recognized no direct descent of Isotype from either hieroglyphics or Chinese script, he found some analogies with these



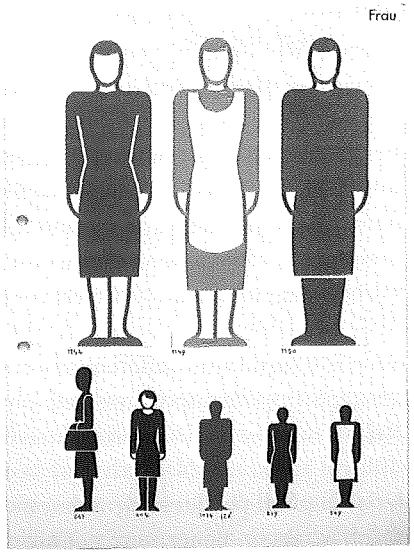


Fig. 7 & Fig. 8

Pages from the Isotype 'picture dictionary', with pictograms designed by Gerd Arntz in collaboration with Otto Neurath. 1930–4. The solid silhouette version of 'man' with legs together (top right of left sheet) was sometimes used to depict 'person' (both sexes).

historical 'picture scripts'.[26] He compared their advantages with those of alphabetic script:

> A people with a conceptual script (like the Chinese, for instance) has difficulties in creating a freely mobile symbolism; on the other hand, it runs less easily into the danger of talking philosophical nonsense. …
>
> … letters as signs without conceptual meaning are, however, well suited for a strictly scientific symbolism.[27]

Care must be taken in mapping Neurath's views about verbal language onto his work in picture language. There are some enticing similarities, but the shift from word to image is, in Isotype terms, a 'transformation' or metamorphosis [*Umwandlung*] of linguistic mode, which entails more differences than similarities. However, to make a crude analogy, Isotype charts could

be seen as a kind of graphic protocol statement lacking the rigour of the verbal kind defined by the bracketed qualifications about who exactly made the observation and when. Although Isotype charts bear the signature of the Isotype Institute (and before that the Gesellschafts- und Wirtschaftsmuseum or the Mundanæum), the origin and editing of the information contained in them is rarely made explicit: sources of statistics are often only given when a book appendix allows space, for example.

Neurath was not interested in analytical systems that pretend to classify whole languages. As Herbert Feigl noted, Neurath was 'skeptical if not outright opposed to' semantics as developed by Carnap.[28] In 'Foundations of the social sciences' he stated:

> I think that 'semantics', as evolved by Carnap and [Alfred] Tarski, will support many kinds of calculus analysis, but I feel uneasy when thinking of its application to empiricist arguments and the danger of slipping into 'ontological' ways of arguing.[29]

For the same reason Neurath had reservations about the theory of 'semiotic' (singular, not plural) expounded by the American philosopher Charles Morris in a long essay titled 'Foundations of the theory of signs' for the first volume of the *International Encyclopedia of Unified Science*. Neurath was editor-in-chief of this encyclopedia, although he seems to have left the editing of Morris's essay mainly to Carnap, who was assistant editor (along with Morris himself). Neurath gave Morris's essay the title 'Semiotic' in an initial contents list, having noted Morris's previous use of the word, but Morris resisted it as a title 'because the term is not known to many people', and instead proposed 'Theory of signs'. Neurath welcomed this as 'a real name of a science'. Yet he considered Morris to have gone too far in terms of constructing a system of classification: he agreed with Morris that one should try to 'systematize' as far as possible, without pretending to make a complete or final system—this was essentially the approach in Isotype—but it seemed to him that in Morris's study 'the classification exceeds the clarity that can be attained in this area at the present time'. 'I fear that too much terminology in an area that is so little developed does not have a clarifying effect.'[30]

It is perhaps significant that Neurath barely mentioned Morris or Semiotic[s] in his introduction to volume one of the *Encyclopedia*; he mentioned more favourably the linguistic discipline of Significs, which

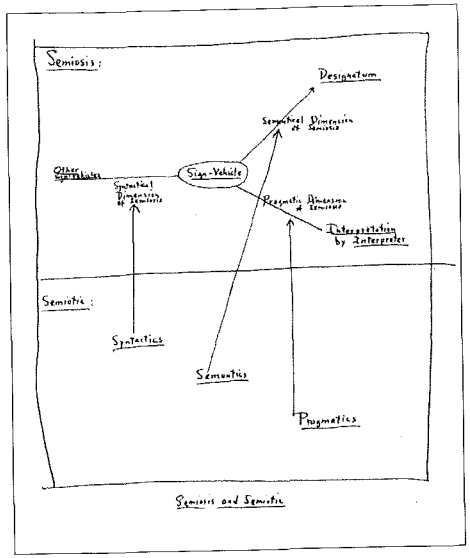
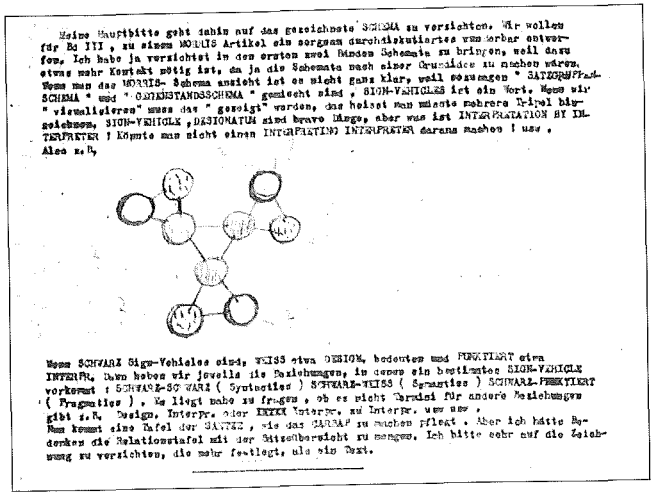


Fig. 9

A diagram by Charles Morris titled 'Semiosis and semiotic'. This was included in a letter he sent to Neurath, 3 February 1938. (VCA-m)



Meine Hauptbitte geht dahin auf das gezeichnete SCHEMA zu verzichten. Wir wollen für Bd III , zu einem MORRIS Artikel ein sorgsam durchdiskutiertes neu herbei entwerfen. Ich habe ja versichtet in den ersten zwei Bänden Schemata zu bringen, weil dazu etwas mehr Kontakt nötig ist, da ja die Schemata nach einer Grundidee zu machen wären. Wenn man das MORRIS- Schema ansieht ist es nicht ganz klar, weil sozusagen " SATZGEFÜGE- SCHEMA " und " GEGENSTANDSSCHEMA " gemischt sind . SIGN-VEHICLES ist ein Wort. Wenn wir " visualisieren" muss das " gezeigt" werden, das heisst man müsste mehrere Typen hinzeichnen, SIGN-VEHICLE ,DESIGNATUM sind brave Dinge, aber was ist INTERPRETATION BY INTERPRETER ? Könnte man nicht einen INTERPRETING INTERPRETER daraus machen ? usw . Also z.B,

Wenn SCHWARZ Sign-Vehicles sind, WEISS etwa DESIGN, bedeuten und PUNKTIERT eine INTERPR, dann haben wir jeweils die Beziehungen, in denen ein bestimmtes SIGN-VEHICLE vorkommt : SCHWARZ-SCHWARZ (Syntactics) SCHWARZ-WEISS (Semantics) SCHWARZ-PUNKTIERT (Pragmatics) . Es liegt nahe zu fragen , ob es nicht Carnapi für andere Beziehungen gibt z.B. Design, Interpr. oder INTERP Interpr. zu Interpr. usw usw . Wenn kommt eine Tafel der SATZES , wie das CARNAP zu machen pflegt . Aber ich hätte Bedenken die Relationstafel mit der Sätzeübersicht zu mengen. Ich bitte sehr auf die Zeichnung zu verzichten, die mehr festlegt, als ein Text.

Fig. 10

Extract from Neurath's reply to Morris, 14 February 1938, including his diagram based on Morris's concepts. Neurath's version tends toward Isotype in being purely visual, with separate verbal explanations. It also begins to resemble an atomic diagram. In the text below he appears to introduce the term 'design', but this is an abbreviation of 'designatum', as used by Morris. (VCA-m)

responded principally to the pragmatic aspect of language.[31] In his introduction Neurath offered an epigram that illuminates study of much of his work: 'One can love exactness and nevertheless consciously tolerate a certain amount of vagueness.' He continued: 'How can one combine such a critical and skeptical attitude with the unparalyzed driving power which is needed to attain success in social and private life?'[32]

Neurath was consistent in observing that visualization had strong limits—that it was capable of less complexity than verbal language. He discussed this matter with Patrick Meredith, a member of the advisory committee for the Isotype Institute in the UK. Meredith established a Visual Education Centre at University College, Exeter (in south-west England); he also became the first lecturer in visual education in Britain. He met several times with Neurath, and some of Neurath's ideas are clearly recognizable in short essays written by Meredith in the early 1940s. He described the work of his 'Visual Education Centre' as 'concerned with the bearing of three normative disciplines on visual production, namely logic, semantics and statistical theory'.[33] Neurath was doubtful about establishing visual education as some kind of academic discipline by pretending that it was more developed than it really was:

> I think the Visual Education business is in the beginning. It seems to be rather dangerous to create terms for such a provisional activity. The statements one wants to make are poor and few only. After some research work you will perhaps need a few terms.
>
> My answer is: try to discover how visual education goes on at the moment, particularly in certain disciplines. Even a first rather vague information would mean a lot, since one does not know anything about the state of affairs. From such research you will reach certain results and making descriptive statements, *perhaps*, *maybe*, you will use some expressions frequently, which afterwards will be fixed by use and then become elements of the normal discussion, but I think it hardly desirable to start with such phraseological attempts before any clear results have been reached. You see from my articles how careful I avoid to use particular terms. [sic] I try to remain within the daily life language realm. I avoid even acknowledged expressions of modern psychology, knowing how many misunderstandings may grow up from that. Therefore I suggest to speak simply and frankly of the problem without anticipating any classification or hypothesis.[34]

Neurath's resistance to Meredith's use of the phrase 'visual logic' led him to admit that 'logic' had been on his notorious list of 'dangerous' words since the Unity of Science congress of 1937, which, he conceded, put him in a difficult position: 'In short, I myself do not know how to apply the term properly, and therefore—against my intentions, because we speak of Logical Empiricism—I dropped the term altogether.'[35] By contrast he seemed content to use the word 'language' in a rather loose way, possibly expanding its definition, without fear of creating confusion.

Meredith claimed that 'visual language' is 'a richer and more powerful medium of expression than verbal language'—Neurath disagreed:

> ... you want to present our Isotype or Visual Education in general as something 'theoretically' better evolved than something else in the field of verbal presentation. *I cannot see that.* But I think you have the desire to give the Visual Education business some 'higher' marks than it deserves. You see such overstatements may induce people to reply and then we shall be in a bad position, because we cannot show how fine Visual Education is in supporting theoretical analysis—*it is not.*[36]

Neurath also objected to Meredith misrepresenting one of Neurath's ideas by stating that 'visual expression' is 'multi-dimensional':[37]

> you write, that Visual Education by means of its more dimensions is better adapted to the more dimensions of modern thinking. I said just the opposite. The visualization is based on three or two dimensions, that is sometimes an advantage from the viewpoint of impressiveness, compared with the writing appearance of one dimension.
>
> *But, scientific reasoning needs an indefinite number of dimensions, this is just given by our writing, but not by visualization.* The presentation is more impressive but is relatively *poor, poorer* than our language, and that is, I think one fair reason, why some people subconsciously and consciously are against visualization, I myself have this serious criticism.[38]

After Otto Neurath's death Marie Neurath continued to warn Meredith about being too theoretical (he appears to have been constructing an analytical framework called 'semagraphics'):

> I will tell you why I cannot see how your approach could help me any further. I cannot see how you can show, by making your structure in the epistemic space, whether a lesson or a chart or a chapter is good or bad educationally. It is the same with your semagraphics as far as I understand it. It seems to me that you can find a place for any type of representation, whether good or bad or senseless. Why then the whole trouble? Don't you want to find out what is good and what bad in visual education? Why not help to develop methods to find this out?
>
> This was what Otto tried to impress on you during the last long talk wasn't it?[39]

The Neuraths' priority was creating graphic material, not primarily analysing it. Their concern was a practical one—to design visual material that conveyed information clearly, and they were interested in research if it helped to show what was effective in practice. Indeed Neurath had approached the influential professor of psychology at the university of Vienna, Karl Bühler, about making some scientific studies with Isotype material.[40] He was open to research on the assumptions behind Isotype, commenting to Meredith: 'I would like to make experiments and research dealing with problems of "icons" and verbal expression. The borderline between word language and picture language is insufficiently analyzed.'

International system or proprietary technique?

In *From hieroglyphics to Isotype* Neurath reflected:

> The history of hieroglyphics covers a long period, while the history of Isotype as yet covers barely two decades. During this short time it has become somewhat stabilized and is now only changing like a language, which also alters and enriches its vocabulary, grammar and style. (104)

But, unlike most languages, it was intended for one-way communication. It was not a language offered for anyone to create statements for themselves. In terms of reading, Isotype should require little or no learning; Neurath hoped that looking at Isotype was not much different than looking at the real world. But creating statements with Isotype was complex and, in his view,

required a certain attitude—essentially that of Logical Empiricism. 'Isotype is not just the application of symbols [pictograms] to something,' he remarked to a colleague, 'it implies a particular attitude, which needs careful treatment before becoming successful.'[42] He explained to Patrick Meredith that 'Isotype education is similar to empiricist education and is connected with a certain alteration of attitude, teacher and pupils.'[43]

Neurath gave more details about this 'attitude' to R.W. Moore (headmaster of a well-known private school in England named Harrow):

> You see our educational tendency is to present problems in a simple way, not by transforming verbal generalizations again, but, as far as possible by presenting descriptive items, from *which the reader may infer a generalization*. Of course even that has not to be handled in a rigid way.
>
> We try to start from something you can understand as a plain man, without particular education. We think that one may present something of any problem, one can discuss properly, in this way—but *not the whole problem*. A selection is unavoidable because visual representation is something coarse and primitive.[44]

He summarized this approach to another colleague: 'The point is: in Isotype we avoid "analogies", we try to present either concrete factual items or symbolic relations.'[45]

The application of Isotype to consistent design and production of graphic information is accurately reflected by Neurath's description of it as a 'language-like technique'. It could be argued that it was a proprietary technique, due to the fact that it was never fully systematized, or even fully articulated. Neurath suggested that there was a secret ingredient in Isotype already during the Vienna period:

> For it is clear that the 'Vienna Method' is, unlike the usual graphic methods, not a machine into which one throws sequences of figures in order to get quantitative pictures. The 'Vienna Method' requires *creative* [*gestaltende*], *educational work*.[46]

Marie Neurath described the work of design in Isotype ('transformation') as requiring 'educational tact' [*pädagogischen Takt*].[47]

During the last years of his life Otto Neurath recognized that the Isotype method remained somewhat elusive:

> Up to now there is no Isotype curriculum in existence which would enable people to learn this new technique properly from the start. It is more or less routine work, based on a great many rules, the application of which depends upon a highly skilled judgement.[48]

But he did not accept others freely adapting Isotype principles. There was a right way to do it, in his view, which was partly covert: he insisted that any prospective Isotype 'transformers' should be trained only at the Isotype Institute. Neurath explained this to his son, Paul, who began to teach the visualization of statistics in the USA during the early 1940s:

> We devoted many years to Visual Education. Sometimes we thought, perhaps one could make the subject teachable in a simple way, but after experience and research we discovered that only a team of highly skilled people are able to make transformations and to create charts and models composed of standardized elements. Long training is needed, years.

He reiterated the point that he had made about the Vienna Method:

> We discovered that one cannot make *automatically* Isotype charts, as one cannot make automatically musical compositions, or architecture or something else, in spite of the fact, that there are rules which regulate the conventions.[49]

When discussing the same issues with Meredith, Neurath added that the matter 'touches many principles of the transfer of abilities and skill'.[50] He saw Isotype chart-making as a craft that could only be learned by apprenticeship.

Otto and Paul Neurath had a strong disagreement with each other about the propriety of Isotype—and their discussion of the matter is informative with regard to Isotype not being an easily teachable system. Otto Neurath criticized his son for pretending to teach a subject without sufficient experience of it; his disapproval was partly linked with his dislike of the adaptation made of Isotype in America by Neurath's former colleague Rudolf Modley. Paul Neurath showed a page from Modley's book *How to use pictorial statistics* (1937) to his students because Otto Neurath himself had not written a book on 'how to make' Isotype charts (*International picture language* is too full of equivocation to be such a book). His father explained to him the differences between conventional, schematic visualization and Isotype:

Fig. 11

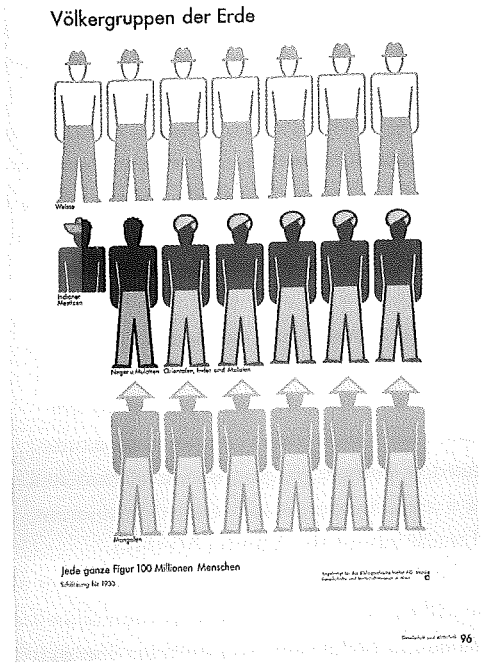


Chart 'Völkergruppen der Erde' (human groups of the earth) from *Gesellschaft und Wirtschaft* (1930). Estimated data for 1930; each whole figure represents 100 million people. This particular graphic solution for showing relative population is not as obvious as it may seem. An alternative design could have featured generic pictograms for '[hu]man' placed in rows on the particular areas of a world map to which they belong. Instead, a striking correlation emerges if humanity is grouped in three categories–'white', 'brown/black' and 'yellow' people (as Neurath called them). So the pictograms were designed (and coloured) to convey directly these racial distinctions, and simply lined up in three rows to emphasize the similarity in quantity between the groups. Neurath commented that most people believed wrongly that there were roughly three or four times as many 'yellow' people as 'white' in the world; but looking at this chart, he asserted, made it difficult to forget that there were roughly the same amount of each at that time.[51]

Visualization by means of *geometrical* devices is a work, which skilled people can learn, but visualization by means of Isotype is something wholly different, because here the *educational* decision enters the field. To present something impressively, implies dropping something, making rough figures instead of exact figures, but not in a systematized way, but from case to case. A technique of presentation very useful today may be not useful tomorrow … the mankind chart [fig. 11] very good as long as you get the three rows—fine. If alterations appear, perhaps the arrangement should be changed … *And that is something startling for many people.* The substitution of bars by rows of puppets becomes boring and if you want to be exact you are destroying the effect of Isotype. To explain these finesses needs an intense analysis—even if one devotes only three hours to the presentation of the results.[52]

A balance of unity with variety was essential to Isotype, in Otto Neurath's opinion, as he explained to Meredith:

> we always fear that the vivid and imaginative element of Isotype could be too much pedantically framed and transformed into a kind of litany … The combination of a unified language with a multiplicity of striking expressions, that is the secret of the Isotype habit.[53]

Variety was important in making each chart as individual as possible within the limits of Isotype because memorability was central to its educational aims. During the period of the Vienna Circle's linguistic debates, Neurath wrote with polemical overstatement: 'In language nothing but order is essential, and that is already represented by a sequence of signs in Morse code.'[54] It is clear, however, that while he may have considered order the only essential aspect of language, he did not consider it the only desirable feature. This applied to 'picture language' too:

> Isotype 'writing' is like writing a novel in any language. It is not sufficient—as everybody realizes—to know the words and the grammar; one also has to know how to select combinations of words to produce a striking result.[55]

He developed this point in correspondence with a colleague:

> I myself stress the point, that Isotype is mainly a technique of *educational style* and a highly complicated *grammar*. The elements are stable, but the wit is *in the arrangement*, like *Shakespeare* is in the arrangement not in the dictionary of our English language. Isotype is the name of this technique executed by a team of highly skilled people. … I should not speak of 'perfection'. The Isotype stock will be enriched, never finished …

Here Neurath added two further important observations: that Isotype should be open ended—an accumulative, encyclopedic enterprise; and that it

was a collaborative process of design and craft, not a fully theorizable system. All the skills involved—from analysing data to sketching graphic configurations, to cutting out pictograms and sticking them down as part of the final artwork—were important and had their place.

But the fulcrum of Isotype work was 'transformation', and it was this creative design work which Neurath deemed difficult to teach. 'It is hopeless, my dear, to *explain* Isotype to anybody', he declared to a colleague, 'it is important to get the possibility to *show* it.'[57] Paul Neurath wrote to his father of the difficulty he had in justifying this approach to his students:

> I use[d] to tell them, and this is a pretty verbatim quotation: As to the production of these types of [picture-statistical] graphs there are several opinions. The one held by the originator and main proponent of the method, and author of the books I have shown you, is that nobody can make satisfactory graphs of this type unless he has gone through several years of careful training in the outfit of the author. The method can not be learned from books, not from his own nor anybody else's. He says so on the basis of about twenty years' experience. Now I have my doubt in this opinion. [sic] And particularly do have doubt in general in the usefulness of any method, graphical or technical or sociological or anything, that can not be taught in other ways than by the originator in person, and that is therefore practically doomed to die with the author.[58]

This last observation proved to be rather prophetic. Isotype was inextricable from the economic, sociological and scientific preoccupations of Otto & Marie Neurath. When Otto Neurath died, Marie Neurath (as co-director of studies at the Isotype Institute) was able to carry on the work. Indeed, the role of the transformer had developed from Marie Neurath's work in the Vienna Method, and, after it was renamed Isotype, she remained the only one filling this role. She seems to have found nobody to train as her successor, and consequently Isotype work stopped when she retired. Nobody has since taken it up in the same way.

If the Neuraths had been more open to free adaptation of their method, it would perhaps have spread more widely, but also more thinly, in a diluted form. It may be possible to trace the influence of Isotype in the incorporation of pictograms into international signage—although this is not the primary influence that Neurath would have wished for. When asked if he would grant permission for Isotype pictograms to be used by others, Neurath replied:

> we feel very strongly that the effect of our method depends not only on the characters, but very largely on the way how they are used [sic], on the selection of representations, on the simplifications, and many other measures. [...] Therefore we cannot allow the use of the symbols if we have no influence on the entire layouts.[59]

Naturally, there was an aspect of protecting professional territory here, but it is perhaps this principle—that pictograms were not the whole point of Isotype—which prevented Marie Neurath from pursuing copyright procedures for Isotype pictograms when she was advised to do so after Otto Neurath's death.

Otto Neurath's dream of universal usage for Isotype and his simultaneous wish to have close control over it were, to a large extent, mutually preclusive. As with other modernist ideals (such as orthographic reform, for example), the individual proponents had no political power with which to enforce their proposals. There was some official sanction given to the Vienna Method in the USSR, where the Council of People's Commissars issued a decree that 'Dr Neurath's method of graphic representation of statistics is to be applied in all schools, trade unions, public and cooperative organizations'.[60] It is not clear to what extent this was enforced; in any case, Neurath would not have approved of an inflexible order to apply the Vienna Method to all kinds of information.

Neurath was in the same position with Isotype as with Logical Empiricism, or more precisely with the use of physicalist, verbal language: he could not institute them (and indeed did not wish to) but could only lead by example. He may have occasionally overstated his claims in these matters, but Neurath was more aware than most people of the difficulties of instituting reforms on a broad basis. Nevertheless, should Isotype be considered a failure for not achieving the true status of an 'international picture language', as Peter Weibel suggested in his paper at the International Wittgenstein Symposium 2010?[61] Judging by effective projects such as the 'Fighting Tuberculosis' exhibition, seen all over America in the late 1930s, or the civic education programmes in West Africa of the 1950s [see Eric Kindel's chapter in this volume], Isotype can be considered to have achieved significant practical success.

Should we expect Neurath's pronouncements on the international validity of Isotype to have been realized to a greater extent than his equally optimistic proposals for alternative forms of economy, or for a socialist order? Isotype was an early move away from 'mechanical objectivity' towards 'trained judgment' in scientific visualization, to use the terms suggested by Lorraine

Daston and Peter Galison in their fascinating book *Objectivity*. Daston and Galison address the vexed issue of failure:

> To contend that mechanical objectivity (or, for that matter, trained judgment) is a fraud and a delusion because it is never realized in purest form is a bit like making the same claim for equality or solidarity. These ethical values can change society without ever being perfectly fulfilled, and the same is true for epistemic virtues in science.[62]

Thanks to Robin Kinross and Elisabeth Nemeth.

Notes

1 Thomas E. Uebel, *Overcoming logical positivism from within: the emergence of Neurath's naturalism in the Vienna Circle's protocol sentence debate* (Amsterdam/Atlanta: Rodopi, 1992), 3.

2 'Ich bin kein ausgeklügelt Buch, Ich bin ein Mensch mit seinem Widerspruch' (from *Huttens letzte Tage*) in Neurath, *Empiricism and sociology*, edited by Marie Neurath & Robert S. Cohen (Dordrecht/Boston: Reidel, 1973), 429.

3 Marie Neurath & Robin Kinross, *The transformer: principles of making Isotype charts* (London: Hyphen, 2009), 47.

4 Letter Carnap to Neurath, 12 June 1935 (translation by Marie Neurath; Vienna Circle Archive [VCA], Noord-Hollands Archief, Haarlem, Neurath correspondence 227/8).

5 Letter Neurath to Carnap, 22 June 1935 (VCA).

6 Letter Neurath to Carnap, 30 April 1936 (VCA).

7 Letter Neurath to Carnap, 13 December 1934 (VCA).

8 Neurath recognized the importance of this book, and it made him conscious of his historical place in the Vienna Circle debates. After reading a draft before publication, he remarked to Carnap: 'I must now make a new place for myself in the world and I have a positive interest in my personal achievement being rather more precisely defined in your book.' Letter of 8 March 1934 (English translation by the author; Vienna Circle Archive microfilm [VCA-m], Institut Wiener Kreis, University of Vienna). This also reflects Neurath's preoccupation with making a living at this time; he even wondered about resuming an academic career. Indeed Carnap and Philip Frank made some effort to secure for him a professorship in Prague, but he was rejected on anti-semitic grounds.

9 Letter Carnap to Neurath, 19 December 1934 (VCA).

10 *Bildstatistik nach Wiener Methode in der Schule* (1933) in Neurath's *Gesammelte bildpädagogische Schriften*, edited by Rudolf Haller & Robin Kinross (Vienna, Hölder-Pichler-Tempsky, 1991), 287.

11 Letter Neurath to Carnap, 28 December 1934 (VCA-m).

12 *International picture language*, 20 & 32.

13 'Visual education', in *Encyclopedia and utopia: the life and work of Otto Neurath (1882–1945)*, edited by Elisabeth Nemeth & Friedrich Stadler (Dordrecht/Boston/London: Kluwer, 1996), 330.

14 *From hieroglyphics to Isotype: a visual autobiography* (London: Hyphen Press, 2010), 104.

15 Letter Neurath to R.W. Moore, 23 May 1944 (Otto & Marie Neurath Isotype

Collection; Department of Typography & Graphic Communication, University of Reading [henceforth IC] 1/10).

16 *From hieroglyphics to Isotype*, 102.

17 Müller, 'Neurath's theory of pictorial-statistical representation', in *Rediscovering the forgotten Vienna Circle*, edited by T.E. Uebel (Dordrecht: Kluwer, 1991), 232.

18 'Universal jargon and terminology' (1941) in Neurath, *Philosophical papers 1913–1946*, edited by Marie Neurath & Robert S. Cohen (Dordrecht/Boston: Reidel, 1983), 229.

19 Neurath cited from Thomas E. Uebel's translation in *Overcoming logical positivism from within*, 74.

20 Carnap, 'Autobiography' in *The philosophy of Rudolf Carnap*, edited by P.A. Schilpp (La Salle, Ill.: Open Court, 1963), 29.

21 'Protocol statements' (1932/3), *Philosophical papers*, 91.

22 'Pseudorationalism of falsification' (1935), *Philosophical papers*, 128. Neurath pointed out that Carnap's view of protocol sentences differed from his own on this point.

23 'Protocol statements', 91.

24 A similar suggestion is made by Michelle Henning in 'Living life in pictures: Isotype as modernist cultural practice, *New Formations* (no. 70, Winter 2011): 41–59. I am grateful to her for letting me read it in draft.

25 Neurath [uncredited], 'Form und Farbe der Mengenbilder des Gesellschafts- und Wirtschaftsmuseums', *Das Bild* (October 1929), 193.

26 *Bildstatistik nach Wiener Methode in der Schule*, 283; *From hieroglyphics to Isotype*, 103–4.

27 From two slightly variant translations of 'Wege der wissenschaftlichen Weltauffassung' (1930): the first paragraph is taken from *Empiricism and sociology*, 82; and the second from *Philosophical papers*, 46.

28 Feigl, 'The Wiener Kreis in America', in *The Intellectual migration: Europe and America, 1930–1960*, edited by Donald Fleming and Bernard Bailyn (Cambridge, Mass: Bellknap/Harvard University Press, 1969), 659.

29 'Foundations of the social sciences', *International Encyclopedia of Unified Science*, vol. 2, no. 1, 48, n. 19.

30 Letters: Neurath to Morris, 5 January 1938; Morris to Neurath 30 January 1938; Neurath to Morris & Carnap, 14 February 1938. (English translation by the author; VCA-m.) For more on the relationship between Neurath and Morris, see George Reisch, 'Disunity in the *International Encyclopedia of Unified Science*', in *Logical empiricism in North America*, edited by Gary L. Hardcastle & Alan W. Richardson (Minneapolis: University of Minnesota Press, 2003), 197–215.

31 The omission of Semiotic[s] and the favouring of Significs was repeated in Neurath's essay 'Universal jargon and terminology'.

32 'Unified science as encyclopedic integration', *International Encyclopedia of Unified Science*, vol. 1, no. 1, 21.

33 Patrick Meredith, 'The Visual Education Centre, Exeter', *Nature* (no. 3907, 16 September 1944): 355.

34 Letter Neurath to Meredith, 15 May 1944 (IC 1/35). Neurath had made a similar point previously in print, warning of the dangers of the 'hasty postulate' of 'complete definiteness'. ('Ways of the scientific world-conception', *Philosophical papers*, 45–6.) His scepticism was echoed fifty years later by the coiner of the phrase 'the pictorial turn', W.J.T. Mitchell, in *Picture theory: essays on verbal and visual representation* (Chicago: University of Chicago Press, 1994): '... settled answers of a systematic kind may be impossible. This may well be an introduction to a discipline (the general study of representations) that does not exist and never will.' (7) Mitchell continues: 'I am skeptical about the possibility both of transdisciplinary theory and of avoiding "bias" or achieving neutrality in the metalanguages of representation. Although I have great respect for the achievements of semiotics, and draw upon it frequently, I'm convinced that the best terms for describing representations, artistic or otherwise, are to be found in the immanent vernaculars of representational practices themselves.' (14–15, n. 10)

35 Unsent letter from Neurath to Meredith, 22 January 1944 (IC 1/35). 'Logic' is a surprising addition to Neurath's *index verborum prohibitorum*, which has been usefully reconstructed by George Reisch in 'Economist, epistemologist ... and censor? Otto Neurath's *index verborum prohibitorum*', *Perspectives on Science* (vol. 5, no. 3, 1997): 452–80.

36 Letter Neurath to Meredith, 15 May 1944 (IC 1/35). Neurath's erratic use of commas in English has been corrected here.

37 Meredith, 'Visual education in the war for health', *Health Education Journal* (vol. 1, no. 3, July 1943): 124–9.

38 Unsent letter from Neurath to Meredith, 22 January 1944. Neurath made a similar point in both 'Visual education' (320) and *From hieroglyphics to Isotype* (109), implying that his discussion with Meredith helped him to formulate his position.

39 Letter Marie Neurath to Meredith, 29 July 1946 (IC 1/35).

40 Letter Neurath to Bühler, 5 September 1937 (VCA-m). Neurath also discussed funding with the Carnegie Foundation (New York) to publish a book based on tests made with Isotype material. (Letter Neurath to Charles Morris, 6 January 1937; VCA-m.)

41 Letter Neurath to Meredith, 10 June 1941 (IC 1/35).
42 Letter Neurath to H.E. Kleinschmidt, 8 July 1945 (IC 1/46).
43 Letter Neurath to Meredith, 20 July 1944 (IC 1/35).
44 Letter Neurath to Moore, 27 December 1944 (IC 1/10). Moore had mentioned reservations about Isotype in a lecture at the Royal Society, London.
45 Letter Neurath to F.R. Cowell, 13 March 1944 (IC 1/8).
46 'Bildstatistik nach Wiener Methode' (1931), *Gesammelte bildpädagogische Schriften*, 185.
47 Marie Neurath, 'Bildpädagogik', *Die Erziehung* (Jg. 7, H. 5, 1932): 315.
48 *From hieroglyphics to Isotype*, 102.
49 Letter Otto to Paul Neurath, 27 February 1944 (Nachlaß Otto & Marie Neurath, Österreichische Nationalbibliothek [henceforth ÖNB]).
50 Letter Neurath to Meredith, 24 October 1941 (IC 1/35). See also 'Visual education', 319.
51 'Bildstatistik nach Wiener Methode' (1931), *Gesammelte bildpädagogische Schriften*, 184.
52 Letter Otto to Paul Neurath, 15 October 1945 (ÖNB).
53 Letter Neurath to Meredith, 27 January 1941 (IC 1/35).
54 'Sociology in the framework of physicalism' (1931), *Philosophical papers*, 62.
55 *From hieroglyphics to Isotype*, 102.
56 Undated letter Neurath to H.E. Kleinschmidt [1945] (IC 1/46).
57 letter Neurath to H.E. Kleinschmidt, 8 July 1945 (IC 1/46). By contrast, Carnap wrote of 'transformation rules', which he equated to 'logical rules of deduction', and he considered them 'completely formulable in syntactical terms'. *Logical syntax of language* (London: Kegan Paul, Trench, Trubner & Co., 1937), 2.
58 Letter Paul to Otto Neurath, 21 December 1945 (ÖNB). (This was the day before Otto Neurath died, so he did not receive the letter.) The occasionally emotional content of this letter reveals that there were deeper, personal aspects to the disagreement between father and son, which are beyond the scope of this paper.
59 Letter Neurath to Mr James (Calcium Chloride Association, Detroit), 26 November 1941 (IC 1/4).
60 'Museums of the future', *Survey graphic* (no. 9, 1933): 479; see also 'Bildstatistik nach Wiener Methode in der Sowjetunion' (1932) and 'Die pädagogische Weltbedeutung der Bildstatistik nach Wiener Methode' (1933), *Gesammelte bildpädagogische Schriften*, 207 & 241.
61 Weibel, 'Bildsprache und wissenschaftliche Visualisierung', ALWS Kirchberg, 10 August 2010. Weibel contended further that Neurath did not grasp the 'digital revolution'—but the digital revolution occurred long after Neurath's death. Should Johann Gutenberg be similarly criticized, despite the benefits that printing with movable type has brought us for more than half a millennium?
62 *Objectivity* (New York: Zone books, 2007), 377. Daston & Galison's description of the expert with trained judgment corresponds precisely to the Isotype transformer: 'The expert (unlike the sage) can be trained and (unlike the machine) is expected to learn—to read, to interpret, to draw salient, significant structures from the morass of uninteresting artifact and background.' (328). There are some intriguing parallels between the historical, visual material examined by Daston & Galison and Neurath's own selection in *From hieroglyphics to Isotype.*

Unless otherwise stated in captions, all images are taken from the Otto & Marie Neurath Isotype Collection; Department of Typography & Graphic Communication, University of Reading, UK.

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'Words Divide, Pictures Unite.' Otto Neurath's Pictorial Statistics in Historical Context[1]

Sybilla Nikolow, Bielefeld

In keeping with his principle that 'metaphysical terms divide, scientific terms unite' Otto Neurath (1882–1945) wrote in 1931 in the German teacher's journal *Die Volksschule*:

> Finally it should be noted that the picture education, especially the pictorial statistics, are of international importance. Words carry more emotional elements than set pictures, which can be observed by people of different countries, different parties without any protest; Words divide, pictures unite.[2]

For the primary aim to communicate empirical based observations Neurath believed his method of pictorial statistics to be a useful tool to transmit rational information across barriers of class, culture and education most effectively.

In figure 1 overleaf one sees Otto Neurath, two years before his untimely death in 1945, in front of a statistical chart on the occasion of an exhibition at the London cinema screening of the documentary *The World of Plenty*. The film was produced by British director Paul Rotha in cooperation with Neurath.[3] In this film animated statistical charts were extensively used to explain the complex cycle of food production and subsequent distribution by the nutritionist Boyd Orr. In addition to that Neurath's method was used as a voice-over in the film to help ordinary people to understand the figures behind the statistics. Like in other image-guided displays the pictures here were indeed capable of uniting the spectators, but not of speaking for themselves. Neurath's method, however, had a discursive element. His statistical

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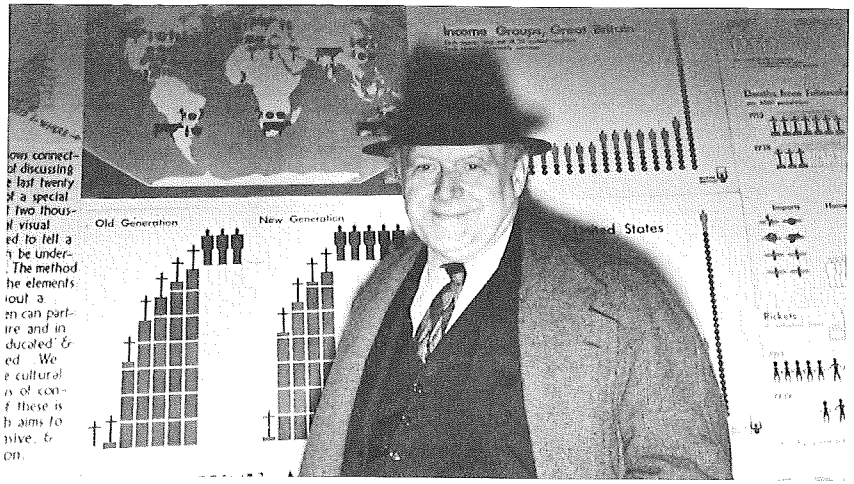


Fig. 1

Otto Neurath in November 1943,
The Otto and Marie Neurath Isotype Collection (reprinted by permission of the Department of Typography & Graphic Communication, University of Reading)

charts were meant to encourage a discussion on the information displayed.

Following Neurath's famous slogan 'words divide, pictures unite' I will start with a brief comment on the labelling of his pictorial statistics as language. Yet the main part of my paper will focus on two overlapping historical aspects of his pictorial work in Red Vienna, rooting in his philosophical and educational intentions. To sum up my argument I will use the example of the peoples of the world in his chart collection *Society and Economy* published in 1930 to show in greater detail how Neurath's philosophical and pictorial work went hand in hand.

Labelling his system as an International Picture Language as he did in his booklet from 1936[4], when he changed the name of his technique from Vienna Method of Pictorial Statistics into **I**nternational **S**ystem of **TY**pographic **P**icture **E**ducation (short **Isotype**), did not mean that Neurath claimed a general superiority of his system over natural languages.[5] Moreover, he did not want his image-guided displays to communicate through visual tools alone. Isotype was developed as an educational aid and instrument for

teachers to train the spectators to comprehend complex information. It was by no means intented that the spectators would design their own charts. Neurath was aware of the fact, that images are polysemous and need to be complemented by other media to become comprehensible. The design of the charts was a very complex task, because it required a particular expertise.

Isotype was developed closely along the writing system. The pictorial charts include words and numbers as in headings and legends to give precise information about the displayed subject. The symbols themselves were arranged in lines and columns like in writing and charts. Neurath's pictorial statistics required a structured observation. Isotype was supposed to facilitate a strong empiricist view on the social order. It was primarily intended to appear in various educational contexts, like reading newspapers, school lessons, lecture halls or films as well in exhibitions. At least the first contact with this kind of visual material was monitored by trained teachers, who assisted the audience in absorbing complex information. In books and newspapers the pictorial statistics were explained by the corresponding text. In other situations a voice guided the acquisition of facts.

Seen from the production side one must say that charts were intended to make social reality comprehensible by generating social facts, which were mostly—but not exclusively—based on quantitative information. Neurath's aim was to give access to expert information and to base public discourses on visual arguments. Isotype was an auxiliary device to observe the social order in a pertinent way. Neurath intended the pictures to unite the audience because the encoding of their visual arguments was supposed to work—generally speaking—regardless of the viewer's background.

Flying over the Earth with Bird-like Empiricist Eyes

As a social engineer Neurath transcended the confusing variety and complexity of the social world. He did not let himself become confused by the chaos of individual impressions, but rather developed a way of observing patterns of social order and behaviour that could signify relevant global changes in time and space. His perspective was bird-like, with the exception that he flew from the North and West to the South and East. Likewise he developed the following thought experiment in explaining how one should view the expansion of worldwide capitalism in 1928:

> If one could only fly over the Earth and show everybody, Chinese gardeners live side by side in old fashion. Next to them a capitalist germ cell which puts its feelers out into the country! See the factory chimney smoking! Ships come and go. And in the North, nomads and tribes of hunters who don't know anything of a capitalist order even though they sell furs to entrepreneurs. A sharpened eye would be able to grasp this. All of this can be grasped and represented in pictures![6]

The charts show what his sharp empiricist eyes have seen, especially how different elements constitute a social phenomena or how persons, objects and things are linked together, which he claimed to be the only legitimate objects of research in the social sciences published in the Vienna Circle manifesto in 1929 as well in his *Empirische Soziologie* in 1931 and in his writings in picture education.[7]

Neuraths occupation with pictorial statistics is closely connected to his philosophical work. Thomas Uebel commented that his method contributed to building the foundations of the Scientific World-Conception, but not merely in a one-way direction.[8] Simon Shaffer underlined his argument that during the 20th century the public had a tremendous impact on what was regarded science by referring to the Viennese Museum of Society and Economy as institution that served as an instrument for the Vienna Circle in general and for Neurath in particular to transmit the right image of science to the public, thus fighting metaphysical tendencies as well as irrational and religious belief.[9] Neurath's method was intended to fix information in the mode of protocol statements, that is, to register all variations of a phenomenon in time and space. It became the public trademark of a non-disguised application of the scientific attitude to reality. Elisabeth Nemeth has convincingly shown how Neurath in his early foundation of social science was looking for a way to compare heterogeneous entities in a precise way without reducing the subject to one single denotation and how to use the example to compare two pictures to explain his method.[10]

Neurath's philosophical work and political activities went hand in hand with his occupation with the pictorial statistics (in figure 2, statistical publications among his books and editions are set in bold italics). Neurath designed the Viennese method in line with his Scientific Conception of the World, which he was advocating as a left-winger of the Vienna Circle and the Unity of Science Movement.[11] I agree with Peter Galison and Robert

Otto Neurath in Red Vienna

1920	Secretary General of the Research Institute for Gemeinwirtschaft
1922	Secretary General of the Austrian Union of Settlements and Allotment Gardens
1922	*Gildensozialismus, Klassenkampf und Vollsozialisierung*
1924	Foundation of the Museum for Settlement and Town Planning in Vienna
1925	Foundation of the Museum of Society and Economy in Vienna
1928	Foundation of the Vienna Circle
1928	*Lebensgestaltung und Klassenkampf,* ***Die Gewerkschaften***
1929	*Wissenschaftliche Weltauffassung* (with Hahn and Carnap), ***Die Bunte Welt***
from 1929	*Schriften zur Wissenschaftlichen Weltauffassung* 1-11 (1929-1937)
1930	***Gesellschaft und Wirtschaft***
from 1930	*Erkenntnis* 1-8 (1930-1938)
1931	*Empirische Soziologie*
from 1931	Foundation of Museums in Moscow, London, Amsterdam, New York
1932	***Technik und Menschheit***
1933	***Bildstatistik nach Wiener Methode in der Schule***
1933	*Einheitswissenschaft und Psychologie*

Fig. 2

Historical chart of Neurath's publications and activities.

Leonard, who consider Neurath's preoccupation with pictorial statistics as the visual pendant of his philosophical program to renew philosophy on an empirical and rational basis.[12] The defined rules of his method, like the simplicity, uniformity and meaningful distinctions of his symbols as well as his syntax, only allow him to display visual arguments that meet the limited standards of protocol sentences. Neurath's pictorial statistics display a social order in which phenomena were strictly specified through temporal and local functions. As Neurath said, one would not be able to design pictorial statistics according to the Viennese method for meaningless, all-up or religious statements and beliefs.[13]

A Museum of the Future

The institution that allowed Neurath to develop his method was the Viennese Museum of Society and Economy (fig. 3). This institution and Neurath's Viennese Method of Pictorial Statistics were specific outcomes of Red Vienna's housing and settlement movement of the early 1920s (see also figure 2). As general secretary of the Austrian Union of Settlements and Allotment Gardens, Neurath organized an extensive education program, including lectures and courses for settlers as well as very popular public exhibitions on housing, town planning and building techniques.[14] From 1923 on he arranged for the teaching activities of the Union to take place under the roof of the Settlement and Town Planning Museum. It held exhibitions but also functioned as a centre of practical advice for settlers. In 1924 Neurath approached the municipality of Vienna with the idea of expanding this institution and renaming it Museum of Society and Economy in order to be able to organize even larger exhibitions on much broader social and economic issues.

It opened officially in January 1925. Besides a section on Settlement and Town Planning, which was inherited from the earlier institution, it had two new departments: 'Arbeit und Organisation' [Labour and Organization] and 'Lebenslage und Kultur' [Life Circumstances and Culture].[15] In contrast to the traditional museums of his time, which exhibited numerous unique artefacts and curiosities, Neurath's museum concept was different and more challenging. It was neither a place where objects were collected for their peculiarity nor a building with exhibition rooms. It was a workshop for the production of didactic material. This material was displayed in a spot, where people had to pass it by on their way to the administrative offices. Since each current permanent exhibition located in the foyer of the New City Hall, people had to pass it by on their way to the administrative offices, thus allowing them to become acquainted with the displayed material in way that was not as intimidating as a museum might have been. Satellite exhibitions were displayed on the outskirts of Vienna.



Fig. 3

Advertisement of the Museum of Society and Economy,
The Otto and Marie Neurath Isotype Collection (reprinted by permission of the Department of Typography & Graphic Communication, University of Reading)

He conceptualised his institution as a 'museum of the future'. It should be organized, he claimed in his article in *Survey Graphic* in 1933, around the presumed interests of the citizen seeking explanations for social and other important issues of the day.[16]

In his workshop he strived to manufacture charts for exhibitions as one might manufacture cars or books in series of identical copies:

> To speak of the museum of the future is like speaking of the automobile of the future. Automobiles are manufactured in series and not produced one by one in a smithy. The idea that every museum ought to contain unique exhibits has come to us from the past. [...] It was the same at one time with books: some famous manuscript entered into a collection, a unique treasure; but today, there are ten thousand reproductions of the same manuscript. In the future, museums will be manufactured, exactly as books are today.[17]

For Neurath museums of the future were to be able to manufacture their exhibitions anywhere and publish copies of their artefacts for any media, instead of displaying unique objects. His model of production for the Viennese method was the modular assembly system.

Representing the World Population via Pictorial Statistics

Looking at one particular example, allows one to better understand how Neurath's principles were incorporated into his pictorial statistics in collabo-

ration with his colleagues at the Viennese Museum of Society and Economy. Figure 4 is part of the global collection 'Society and Economy' including 100 coloured charts showing the distribution of populations, natural resources, economic products as well as social, political and cultural aspects of life in time and space.[18]

The result of Neurath's bird-like flight over the Earth results for instance in a snapshot of the peoples of the world in 1930: showing three main groups, represented in white, yellow and dark colours. One basic figure of a man of the same size, body shape and gender is used because Neurath believed that all humans belong to the same kind. The signs were understood as signatures of objects and phenomena that should be represented. Following his basic principle that nothing seems to be more dangerous than a symbol that tells the observer more than the designer wants to express[19], he disapproved of too much detailed realism in the expression, polysemous display or meaningless graphical information. He thus clearly disassociated his visual method from art, where the focus was on individualistic expression. In Neurath's pictorial statistics all its graphical characteristics were supposed to be exclusively of informational value.[20]

In order to take into account the human diversity, he clustered groups of people together by colouring their skin and focusing on hats. The upper row shows the Europeans and their emigrated descendents in white. The second depicts the American Indians in red, Africans in black, and Oriental and Indian people in brown. The lower row, finally, represents the Chinese, Mongols, Japanese and Asians in yellow. In his choice of colours he followed the general tradition in representing human diversity, but avoided the supposedly clear race classifications of his time. He used the more neutral term of 'population groups', largely defined in social anthropology.

The figures were structured in series, designating a certain number of people being part of one group on a scale of 100 million people. Neurath's chart not only portrayed statistics in the picture, but also gave the observer a visual argument regarding the equilibrium between the political and economic leading world of the West and the North (upper row), the colonial world of the South (mean row) and the rising powers of the East (lower row). The pictures were part of Neurath's colonial political education on the occasion of the International Socialist Workers' Congress 1928 in Brussels. In the corresponding article Neurath referred to the globalization of capital and the resulting problems for the international working class.[21] In showing

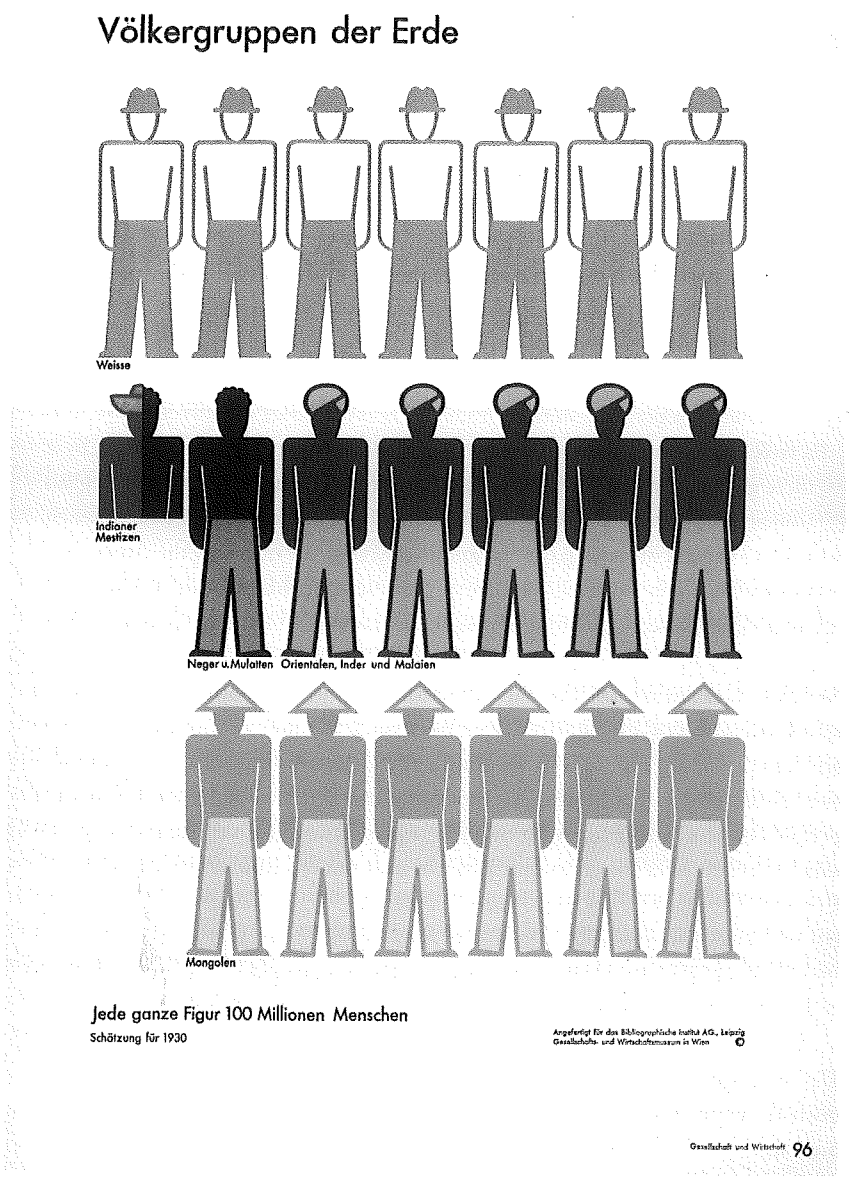


Fig. 4 **Peoples of the World** from *Gesellschaft und Wirtschaft* (1930), Plate 96

that the world population splits in three groups of almost same size, among them the Chinese who were fewer than expected, he intended to rationalize political discourse by restricting himself to pure observational facts. The big task—as he said in his article—was to persuade the workers from the West (especially in Germany and Austria, who had no first-hand experience with colonialism) that the cattle breeders from the East were neither a danger nor strangers, but came from the same social class, and that workers around the globe should make a united front against the exploitation of worldwide capitalism.

As early as 1926 Neurath had recognized how crucial his visual vocabulary was for the depiction of the international working class by graphical means:

> It is difficult to describe workers from different countries in different ways. It is a striking feature of our age that clothing becomes more similar, so that, by a mere glance, it is difficult to distinguish a German from a French or an English worker. The same is the case with the entire population. It is not wise to reach back to the old ideas of past eras and to describe, for example, the Americans as wearing a grey cylinder, a goatee or other strange things, or the Germans as wearing a pointed cap. Modern people are not aware of these differences![22]

Neurath was aware of the fact that for semiotic reasons stereotyping and standardization of his pictures were necessary to make communication across borders possible. The search for cultural independent symbols was obviously not trivial and perpetuating stereotypes. In fact, the representation of the peoples of the world for a pictogram representing human mankind in 1930 was the result of a much longer process and not his final solution at all.[23]

'We could not photograph social objects even if we tried.'

The example also demonstrates how Neurath mediated between a more naturalistic representation, such as used in physical anthropology to represent humans by using photographs, and a more abstract pure schematic depiction through words, numbers or graphs that only experts could decipher. With his pictorial statistics Neurath wanted to achieve the same effect that was already

common practice in, for instance, biology and physics, namely the production of pictures with a camera to which objectivity, authenticity and realism were attributed. In his paper on the museum of the future he justified his method in the following way:

> To come to the point, an abstract formula is educationally as useless as is a naturalistic reproduction. What we need is a schematic representation that can be immediately understood. We could not photograph social objects even if we tried. They can be demonstrated only through symbols. It is because this is not an easy task that it has so long remained unfulfilled.[24]

For epistemological as well as educational reasons, Neurath viewed the existing graphical methods for visualizing statistics as unsuitable. He repeatedly argued that in most of the cases curves and diagrams would misrepresent exactness with regard to social facts that had not been empirically proven.[25] Neither were mere abstract representations the solution due to their incomprehensibility for the layman. Especially in Neurath's own field of expertise, the social sciences, in which the principles of the Vienna Circle were even less accepted, he introduced his pictorial method as prescription to produce facts that were based on observational statements and to make clear-cut statements on heterogeneous entities like populations.[26]

Neurath's plan to democratize the global order through the use of Isotype in the communication of anything anywhere failed in its pretentious totality. Like contemporary pictorial systems, they work where people of different cultures need orientation in space, for instance, at the airport or in a refugee camp. Other useful applications are the labelling of consumer goods and instruction manuals. These examples demonstrate how for well-defined purposes image-guided displays can bridge cultural differences and complement the Babylonian confusion caused by everyone speaking his/her own natural language. If we study Neurath's case in its historical context we see how innovations in pictorial systems were deeply connected with ideas to modernize science and society.

Notes

1 I want to thank Elisabeth Nemeth for inviting me to the Workshop at the Wittgenstein Symposium 2010 in Kirchberg. Preliminary results of this paper were presented at the departmental seminar in the Max Planck Institute for History of Science in Berlin (Dept. III) in November 2009 and at the Panel on 'Creating a World Population: The Global Transfer of Population-Control Technologies in the Twentieth Century' of the *Historikertag* in Berlin in October 2010. I thank the participants of both meetings for helpful comments. For access, help in evaluating and permission to reproduce archival material from the Otto and Marie Neurath collection of the Isotype Institute at the Department of Typography & Graphic Communication, the University of Reading I am indebted to Chris Burke and Eric Kindel. For their help with the translation I thank Birgit Kolboske and Marc Weingart.

2 Otto Neurath, 'Bildstatistik nach Wiener Methode', *Die Volksschule* 27 (1931): 569 (reprinted in *Otto Neurath. Gesammelte bildpädagogische Schriften*, edited by Rudolf Haller and Robin Kinross (Wien: Hölder-Pichler-Tempsky, 1991: 180), my translation.

3 Eric Knight and Paul Rotha, *World of Plenty. The Book of the Film* (London: Nicholson & Watson, 1945), Tim Boon, 'Agreement and Disagreement in the Making of World of Plenty', in *Nutrition in Britain. Science, Scientists and Politics in the Twentieth Century*, edited by David F. Smith (London/New York: Routledge, 1997), 166–189.

4 Otto Neurath, *International Picture Language* (London: Keagan Paul, 1936), translated by Marie Neurath and reprinted in Neurath 1991, *Bildpädagogische Schriften*: 355–398).

5 Otto Neurath, *International Picture Language* (as in note 4), 373.

6 Otto Neurath, 'Kolonialpolitische Aufklärung durch Bildstatistik', *Arbeit und Wirtschaft*, 1928, 15: 677 (reprinted in Neurath 1991, *Bildpädagogische Schriften*: 130), my translation.

7 [Hans Hahn, Otto Neurath and Rudolf Carnap], *Wissenschaftliche Weltauffassung. Der Wiener Kreis* (Wien: Arthur Wolf, 1929), reprinted in: *Otto Neurath. Wissenschaftliche Weltauffassung. Sozialismus und Logischer Empirismus*, edited by Rainer Hegselmann (Frankfurt am Main: Suhrkamp, 1979: 81-101, English translation in Otto Neurath. *Empiricism and Sociology*, edited by Marie Neurath and Robert S. Cohen (Dordrecht/Boston: D. Reidel Publishing Company, 1973: 301–318), Otto Neurath, *Empirische Soziologie. Der wissenschaftliche Gehalt der Geschichte und Nationalökonomie* (1931, reprinted in: *Otto Neurath. Gesammelte philosophische und methodologische Schriften*, edited by Rudolf Haller and Heiner Rutte (Wien: Hölder-Pichler-Tempsky, 1980, Vol. 1: 423–527, English translation in Neurath 1973, *Empiricism and Sociology*: 319–421), Otto Neurath, *Bildstatistik nach Wiener Methode in der Schule* (Wien/Leipzig: Verlag für Jugend und Volk, 1933), reprinted in Neurath 1991, *Bildpädagogische Schriften*: 265–336.

8 Thomas Uebel, 'Arbeit am "Unterbau" der Wissenschaftlichen Weltauffassung', *Grazer Philosophische Studien* 41 (1991): 235-243.

9 Simon Schaffer, 'What is Science', in: *Science in the Twentieth Century*, edited by John Krige and Dominique Pestre (Amsterdam, 1997: 33).

10 Elisabeth Nemeth, 'Gesellschaftliche Tatbestände sichtbar machen. Otto Neurath über den Gegenstand der Wirtschaftswissenschaften und seine Visualisierung', in: *Philosophie an der Schwelle zum 21. Jahrhundert*, ed. by Ewa Czerwinska-Schupp (Frankfurt am Main: Peter Lang 2003: 181–208), Elisabeth Nemeth, 'Visualising Relations in Society and Economics. Otto Neuraths Isotype-method Against the Background of his Economic Thought', in: *Pointure du symbole*, edited by Jean-Yves Beziau (Paris: editions Petra, 2011: forthcoming).

11 For a more detailed account see Sybilla Nikolow, 'Aufklärung durch und mit Beobachtungstatsachen. Otto Neuraths Bildstatistik als Vehikel zur Verbreitung der wissenschaftlichen Weltauffassung des Wiener Kreises', in: *Wissenschaft und Öffentlichkeit als Ressourcen füreinander. Studien zur Wissenschaftsgeschichte im 20. Jahrhundert*, edited by Sybilla Nikolow and Arne Schirrmacher (Frankfurt am Main: Campus, 2007: 245–272).

12 Peter Galison, 'Aufbau/Bauhaus. Logical Positivism and Architectural Modernism', *Critical Inquiry* 16 (1990): 709–752. Robert J. Leonard, '"Seeing is Believing". Otto Neurath, Graphic Art, and Social Order', *History of Political Economy* 31 (2000) (Special Issue: Economists and Art. Historically Considered): 452–478.

13 Neurath 1936, *International Picture Language* (Neurath 1991, *Bildpädagogische Schriften*: 373).

14 Nader Vossoughian, *The Language of the Global Polis* (Rotterdam: NAi Publishers, 2008): 54–58.

15 Otto Neurath, 'Gesellschafts- und Wirtschaftsmuseum in Wien', *Österreichische Gemeinde-Zeitung* 2 (1925), 2: 1–12, (Neurath 1991, *Bildpädagogische Schriften:* 1–17, English translation of this article in: Neurath 1973, *Empiricism and Sociology*: 214–218).

16 See for Neurath's concept from a contemporary museological view: Hadwig Kraeutler, *Otto Neurath. Museum and Exhibition Work* (Frankfurt am Main: Peter Lang, 2008).

17 Otto Neurath, 'Museums of the Future', *Survey Graphic* 22 (1933), 9: 458

(reprinted in Neurath 1973, *Empiricism and Sociology*: 218–223).

18 *Gesellschaft und Wirtschaft. Bildstatistisches Elementarwerk. Das Gesellschafts- und Wirtschaftsmuseum in Wien zeigt in 100 farbigen Bildtafeln Produktionsformen, Gesellschaftsordnungen, Kulturstufen, Lebenshaltungen.* (Leipzig: Bibliographisches Institut, 1930). For a more detailed description of this collection see Sybilla Nikolow, '*Gesellschaft und Wirtschaft.* An Encyclopedia in Otto Neurath's Pictorial Statistics from 1930' in: *European Modernism and the Information Society. Informing the Present, Understanding the Past*, edited by W. Boyd Rayward (London: Ashgate Publishing, 2008): 257–278.

19 Otto Neurath, 'Schwarzweißgraphik', (1926, reprinted in: Neurath 1991, *Bildpädagogische Schriften*: 55). Presumably based on Ludwig Wittgenstein's bonmot 'Wovon man nicht sprechen kann, darüber muss man schweigen.'

20 Neurath 1933, *Bildstatistik*, see Neurath 1991, *Bildpädagogische Schriften*: 279–284).

21 Neurath 1928, *Aufklärung* (Neurath 1991, *Bildpädagogische Schriften*: 126–132.

22 Otto Neurath, "Statistische Hieroglyphen", (1926, reprinted in Neurath 1991, *Bildpädagogische Schriften*: 43), my translation.

23 For a detailed discussion of the graphical representation of the population groups see Sybilla Nikolow, 'Gestaltete Bilder und visuelle Argumente. Die "Völker der Erde" in Otto Neuraths Bildstatistik und "*Isotype*"', in: *Bild und Gestalt. Wie formen Medienpraktiken das Wissen in Medizin und Humanwissenschaften?*, edited by Frank Stahnisch and Heijko Bauer (Hamburg: LIT Verlag, 2007): 229–243.

24 Neurath 1933, *Museums of the Future*: 462.

25 Neurath 1926, *Hieroglyphen* (Neurath 1991, *Bildpädagogische Schriften*: 44), Marie Reidemeister, "Die Kunst der statistischen Darstellung" *Kulturwille. Monatsblätter für Kultur- und Arbeiterschaft*, 4 (1927), 9: 194–5.

26 It was Paul Rotha who understood Neurath's visual arguments displayed in his charts as clear-cut statements that he used in his documentaries. Paul Rotha, 'Films and Other Visual Techniques in Education, 1946', in: *Rotha on the Film. A Selection of Writings about the Cinema* (London: Faber and Faber, 1953): 89.—For Rotha's documentaries see also Tim Boon, *Films of Fact. A History of Science in Documentary Films and Television* (London: Wallflower Press, 2008).

OttoNe urath: Mapping the City as a Social Fact?

Sophie Hochhäusl, Ithaca, NY

Introduction

Architects are trained to distinguish between two kinds of maps: representational ones and those that serve as heuristic devices. While representational maps are usually drawn to make observations more accessible to a larger audience, the map as an architectural tool, serves as a device for design thinking. By means of drawing space it makes relationships visible that could not have been conceived without drawing. When deploying such maps, architects pay close attention to the particularities of space, because insight can only be gained when non-spatial observations are put in relationship to a certain terrain. Its synergy generates new content, meaning, knowledge and possible design solutions.

Austrian philosopher and economist Otto Neurath (1882–1945) was famous for his engagement with representational maps. He revolutionized the discipline of chart making by finding a way to create picture statistics and quantitative maps that were accessible to a larger public. In this paper however, I will argue that Otto Neurath's map *City Planning* served not only as one of the first well-accessible socio-political maps of a city, but that it was in effect also a heuristic device.

Originally crafted in color, *City Planning* (fig. 1, overleaf) was edited to appear in red, black and white, accompanying Neurath's text 'Visual Representations of Architectural Problems', in *Architectural Record* in July 1937.[1] The text and the 1937 map were a direct reaction to a similar and in effect more extensive mapping operation pursued by CIAM IV (*Congrès Internationaux d'Architecture Moderne*, International Congresses of Modern Architecture) in 1933. Nonetheless it was Neurath who first illustrated the socio-political map for urbanism according to graphic rules and with a

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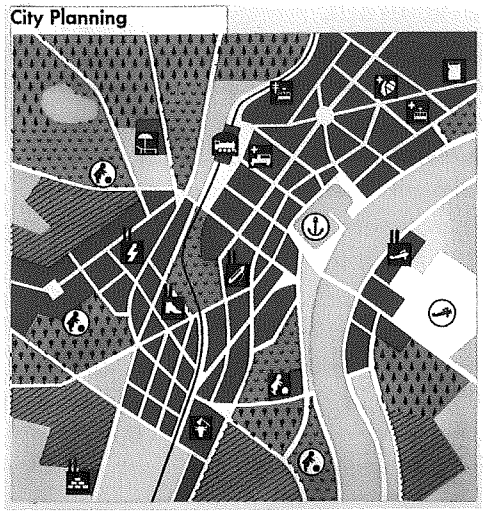


Fig. 1

City Planning,
Basis to the 1937 Map, 1937, source: Otto and Marie Neurath Isotype Collection, Department of Typography & Graphic Communication, University of Reading, UK, 5/18 2047.

graphic vocabulary that possessed a consistent logic and even syntax. In addition, I will explore to which degree Neurath perceived of the city as an agglomeration of social facts and in how far his socio-political map contributed in planning the city on such basis.

In order to create this map, three main fields of expertise came into play. First, Neurath's specific views on urbanism were different from those of most architects'. A second necessary expertise to Neurath's undertaking was the ability to graphically craft abstracted data—the *transformation*, which was invented at Neurath's 'Museum of Society and Economy' (*Gesellschafts- und Wirtschaftsmuseum*). Thirdly, in search of 'humanizing' knowledge, Neurath hoped that by making information graphically available, he would enable all people to 'participate in a common culture', eliminating 'the canyon between educated and uneducated people.'[2]

CIAM however, was a catalyst for creating the 1937 map as well, in that it triggered Neurath's further research in illustrating the city. When in 1937 his map finally appeared, it marked the culmination of Neurath's search for simplicity in the context of a spatial discussion. The map was however also the last to ever accompany one of Neurath's texts on architecture and urbanism and it ended Neurath's public theorizing of the city, which had lasted for two decades with the exception of the Bilston experiment.[3]

Rem Koolhaas's AMO (research unit of OMA, Office for Metropolitan Architecture) is the most prominent architectural think tank promoting the use of the map as tool as well as representational device in a contemporary context. Through their heavy publication activities and their particular architectural wit, AMO has fostered an interest in mapping that is now found in architecture schools all around the world. Although Koolhaas never cited Neurath, some aspects of AMO's maps are strikingly similar to the ones produced by the Museum of Society and Economy. So when I first decided to assess socio-political mapping and its application to architecture it was precisely to understand this missing piece: how did socio-political mapping in architecture first emerge, which connotations did it possess, which goals did it initially pursue, did Neurath have an influence on the contemporary debate on mapping and if so, how?

Otto Neurath's Urbanist Convictions
The Austrian Settlement and Allotment Garden Association

The first and most fundamental component to the 1937 map *City Planning* was Otto Neurath's distinct perception of urbanism. To Neurath the Modern city was an economic organism. But unlike many of the Modern figures in architecture that either rationalized city building by economic means, or subordinated the production of city planning to the economy of the industrialized world, Neurath perceived economic strategies as a means to substantiate a lively urbanism. Neurath's conviction that life in a city could largely benefit from the forces that shaped it, was based on his knowledge of economic relationships.

When Neurath collected images of harbors, grain silos and factories in 1925 for instance, he did not necessarily admire them for their machine æsthetics, as modern architects did at the time.[4] For Neurath, ports, warehouses and elevated railway tracks represented the global industry, in which he believed lie the foundations for a socially improved Modern city.[5]

> What does the city of the future look like? Above all, it is shaped by the modern, large scale industries of global trade. The city of the future is characterized by harbors, railway stations, silos, warehouses, factories, sweeping platforms of elevated traines, and ironworks. [...] But how will the residential dwellings be distributed?[6]

Hence, to Neurath the city was an agglomerate of economic relationships and such institutions, and housing maintained a crucial position amongst them. Furthermore, they had to be connected via transportation routes, which he also saw as interwoven with sociological and anthropological components. Cities were spaces where cultural exchange took place, where people met in plazas and in coffee houses, where they demonstrated and went to school, where they were hospitalized, enjoyed a walk in a park, or swam in a public pool.[7] When looking at urban fabric, Neurath saw it as a unity between architecture and organization.[8] And he realized this unified vision between architecture and organization when he became the secretary of the 'Austrian Settlement and Allotment Garden Association' (*Österreichischer Verein für Siedlungs- und Kleingartenwesen*).

During the years of WWI 'wild settlements' had emerged on the outskirts of Vienna, when people in search of food and shelter had started to cultivate small gardens and build provisional barracks. The Austrian Settlement and Allotment Garden Association finally came into existence in the early 1920s to unite the 230 dispersed settlement clubs. Neurath's great achievement was to mend it into an efficient operation while still maintaining the settler's principle of self-help.

Due to his knowledge in economies and organization, Neurath put a system in place that allowed the large building enterprise the settlement movement had become to be governed by three core agendas: economical, political, and educational ones. In particular these agendas were all shaped around the concepts of 'communal economy' (*Gemeinwirtschaft*) and community (*Gemeinschaft*).[9] This meant that the settlers where still involved in building their own houses, even when architects designed them, and that each settler kept 'a piece' of all communal facilities. In addition, educational material was provided within the association to inform and publicize the achievements of the settlers. Often this included extensive exhibitions and magazines.

In comparison to other housing typologies, later pursued in 'Red Vienna', the settlement movement perceived of itself not necessarily as a strictly urban form of living. Houses were rarely higher than two stories—as the chief architect of the Association's *Siedlungsamt*, Adolf Loos had proclaimed—and they always maintained a close connection to their gardens, where they tilled vegetables. Often houses even had small stables or barns.

It was with the settlement movement that the unity of organization and urban strategies came to full bloom. For Neurath economical and political enterprises truly were as important as the objects—the urban elements—they



Fig. 2 **Shadow looming over new Settler Houses**, 1925–1932, source: N-15, N-Files, Otto and Marie Neurath Isotype Collection, Department of Typography, University of Reading, Reading, UK.

created. And the hidden organization that lived behind all elements of a city was also what had to be drawn out and explored in Neurath's 1937 map, and what would take his urban project to a next step.

In terms of housing, Neurath always favored settlements over multi-storey dwellings, but over time his receptiveness to other urban conceptions grew. He started to recognize that settlements could not be employed everywhere, since they were not as dense as the communal projects the city of Vienna started to realize. He also underlined that *Gemeinschaft*, thus formally articulated differently than in the settlements, was also generated in the municipal dwellings. He wrote: 'In the public dwellings of Vienna's municipality emerges a new common life. The common courtyard serves the play of children, on summer evenings young and old possibly even dance to the sound of the loudspeaker.'[10] He also noted that the diverse proposals for common living, worked out by many different architects in Vienna encouraged beneficial pluralism.[11] This notion of pluralism in urban planning was connected with his philosophical perception of coherentism and logical empiricism. Coherentism advanced the idea that truth was a compound of entire systems, but could also be ascribed to its individual propositions. However, scientific

opinions differed on the question of whether coherentism allowed many possible systems of truth or only a single one. Neurath believed that whatever decision one made 'lay in the 'path of life' chosen by the decision maker.'[12]

Therefore, a city had to encourage various models to solve problems, so a collective decision could be made by many people on the basis of what they found appropriate for their ways of life and their needs. This attitude foreshadowed Neurath's notion of the purposes of picture statistics. By showing various statistics (aspects of reality) chart by chart, they encouraged their viewer to draw his or her own conclusion.

Otto Neurath's Graphic Convictions
The Search for Simplicity

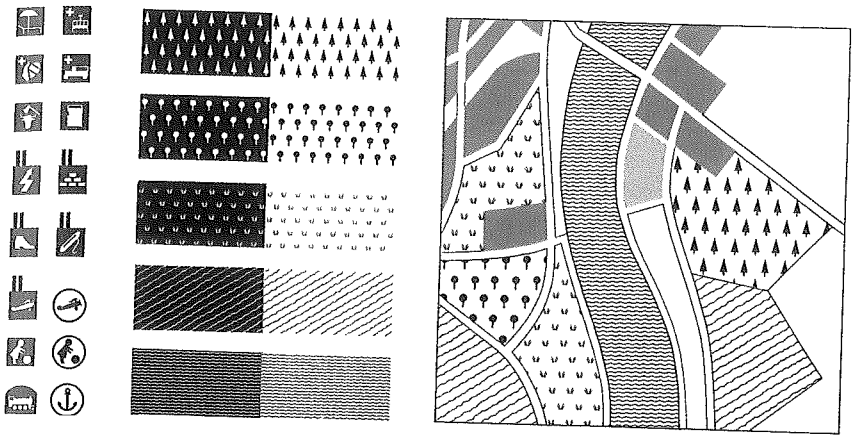
Since Neurath perceived of the Modern city as an economic organism, he had to find a way to illustrate the 'invisible forces' that governed it. To facilitate this comprehension, which could potentially transgress borders and social status, he strove for a universal language: the language of picture statistics.[13]

In fact, for exhibitions of the settlers a visual chart collection of their achievements was established. In 1925 a permanent Museum emerged from this, soon called 'Museum of Society and Economy' (*Gesellschafts- und Wirtschaftsmuseum*). This Museum became the home of picture statistics, where the graphic depiction of data was tested and refined.

Most crucial to creating quantitative charts was the role of the transformer —the statistical and graphic personnel that translated data into the quantitative map. Charts at the Museum were not only created according to æsthetic judgment and graphic knowledge, but were also mathematically precise although they were rounded off.

The graphic history of the 1937 map, *City Planning*, was threefold, since the map consisted of pictograms, patterns made of symbols and spatial parameters.

I.S.O.TY.P.E. (International System of TYpographic Picture Education) symbols usually showed quantities by the repetition of a singular symbol, rather than by scaling in size. While in the 1920s quantitative charts were mainly characterized by arrays of symbols, which actually represented quantities, a main shift occurred in the early 1930s when symbols started to be paired. Until then 'factory' and 'shoe' for example, were represented as two



Figs. 3, 4, 5 **Main Symbols, 'Various ISOTYPE Symbols', 'Various ISOTYPE Patterns', 'Second Version of a Section of the same (1937) Map'**, ca. 1937, source: 'Visual Representation of Architectural Problems', Otto Neurath, *Architectural Record*, 1937, 57–58.

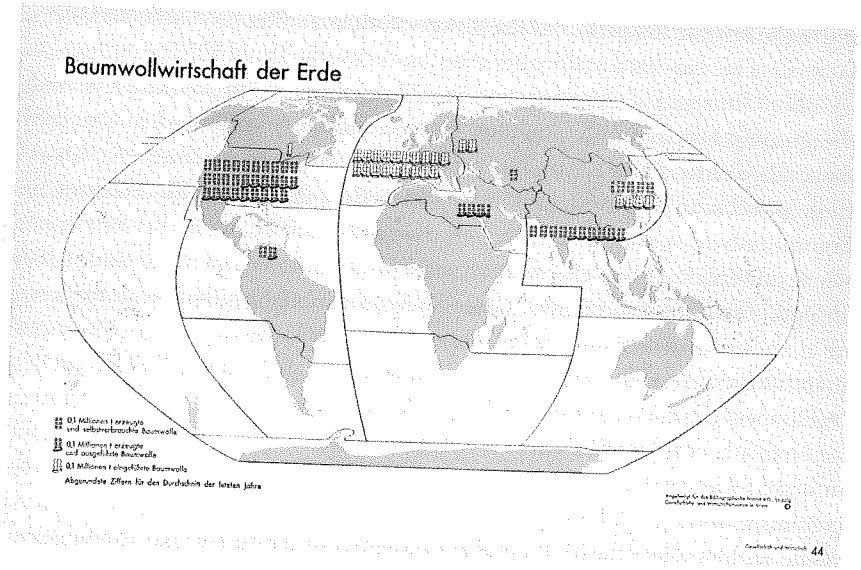


Fig. 6 **'Baumwollwirtschaft Chart 44'**, ca. 1929–1930, source: *Gesellschaft und Wirtschaft*.

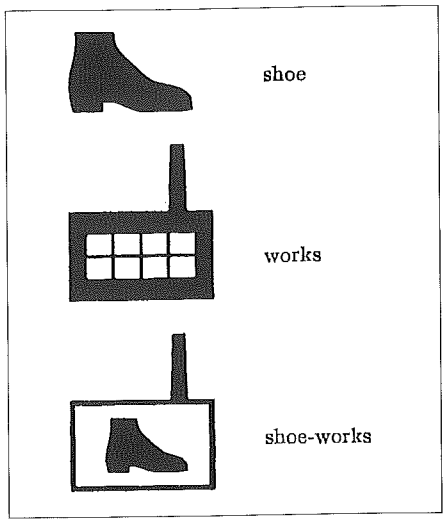


Fig. 7

Paired Symbols, 'Picture 17'
source:
Otto Neurath, *International Picture Language*, Kegan Paul, Trench, Trubner & Co, London, 1936, 51.

separate symbols, had two separate meanings and usually indicated a quantity of shoes or factories when multiplied. By the early 1930s however, symbols started to appear in pairs, and the merge of shoe and factory indicated, 'shoe factory'. This fundamentally added to the nature of ISOTYPE.

While the history of pictograms is well documented in Neurath's writing, the graphic history of the hatches, the second entity employed in the 1937 map, is less clear. From an architectural stand point, they represented a breakthrough because they bridged the symbol to the plan. They allowed the symbol not only to signify quantities within space, but to actually become space when multiplied. They efficiently represented the fabric of rural and urban space to the 'uneducated eye'. Color solids, and technical hatches composed of horizontal, vertical and inclined lines, were employed in other architectural maps at the time, but they were never nearly as comprehensive as Neurath's 'wallpapers', as he liked to call them.

Neurath employed his quantitative maps to depict information in an unbiased way, as done with geographical maps,[13] and his aim was for them to contain a catalogue of universal signs as neutrally as in geographical maps, yet he seldom worked with the actual spatialties of a city. For one, the implications of actual spatialties of the city and their illustration required a degree of technical or architectural craftsmanship that was too complex for the 'ordi-

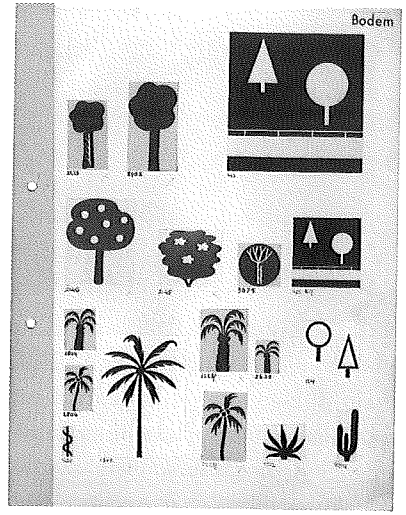


Fig. 8

'Bodem', Gound,
source:
Gerd Arntz Archive, Gemeentemuseum, The Hague, Netherlands, Folder 8.

nary man' to decipher. In order to illustrate simple facts Neurath decided to dismiss actual geographical charts and decided to work with cartograms.

In the appendix of *Gesellschaft und Wirtschaft* Neurath argued that 'the cartographic depiction of the atlas was adjusted to match the picture statistics.'[15] They were intentionally 'not geographical maps, but only cartograms'.[16] Furthermore, the Museums' town plans rarely contained more than one geographical layer, which was also usually highly abstracted. Neurath insisted that quantitative information was to be kept completely separate, once a map reached a more detailed level of abstraction. According to Neurath, town plans should only 'explain the character of a district, but not its exact location or disposition.'[17]

This shows that it was not until the 1937 map that Neurath thought in depth about how to map socio-political factors onto space. Before then, these two layers were consciously kept apart. Pairing layers stood at the end of a long process. Although the segregation of space from statistical information might have fostered better understanding of the chart, it also testifies to Neurath's underestimation of space's dispositions and its resulting complexities.

Since the cartograms consciously followed the laws of the pictogram, they never inherited the properties of a real diagram. Besides Neurath's notion of pluralism the concept of the social silhouette is crucial for investigating Neurath's resistance to spatial praticularities, which are essentially design

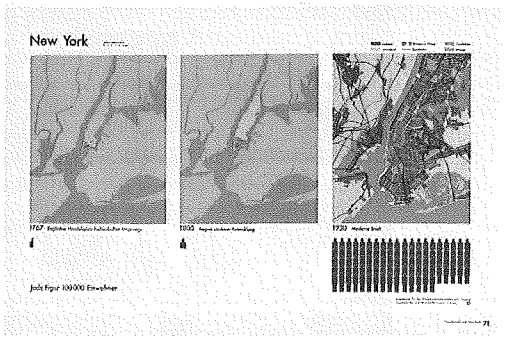


Fig. 9

'New York, Chart 71',
ca. 1929-1930,
source: *Gesellschaft und Wirtschaft.*

strategies.[18] The social silhouette promotes that certain aspects of life ought to be only depicted in single charts, so that they do not lead the reader to false conclusions. In *The International Encyclopedia of Unified Science* (1944) he states:

> Various nations have different mortality rates; one cannot say that where the mortality rate is higher, we may also expect a lower standard of public health. It may be that in one nation the percentage of old people is extraordinarily high and, therefore, the national mortality rate may also be very high, even if in all age groups the mortality rates were lower than in other nations. The silhouette of mortality rates would tell us what the situation is.[19]

This is precisely why Neurath wanted to illustrate every single category by itself. Only in their collectivity would the charts create a social silhouette that would show a more holistic picture of social interconnectivities. In contrast to architects, Neurath, the philosopher, could perceive the city as the cognitive construct of manifold social relations that it was. He was freed from the burden of having to coerce it with the specificity that a design task demands.

But it is also for this reason, that Neurath's maps were representational tools, but rarely heuristic instruments. Because only in mapping various spatial aspects within one realm design solutions can be derived.

With the 1937 map Neurath did not mean to arrive at design conclusions, but he did start to map multiple apects in one city plan. In addition, he achieved what he had always wanted and what no architect had accomplished before him: to illustrate socio-economic forces within the city with the same objectivity as the geographical map.

Otto Neurath's Pedagogical Convictions
From Picture Statistics to Picture Education

Neurath's ultimate goal always was to enable everyone to 'participate in a common culture' and he fought to eliminate 'the canyon between educated and uneducated people.'[20] In this search of 'humanizing' knowledge therefore, graphic education had to be scientifically and pedagogically probed in relation to the intended audience. The vehicle for this refinement became the Museum[21]—it was where new tools were invented and tested.[22] And they travelled from there, as exhibitions, catalogs and matrices, to museums and into classrooms.

While the invention of new media for ISOTYPE did not change the language of picture statistics much, they were additional instruments through which this language could be articulated. Concretely, this meant a shift from exhibiting solely quantitative maps on paper, toward providing a set of items that could be used to inform the broad public, ranging from magnetic boards to short films and the Museum itself.[23] The alteration from using solely charts towards a wide variety of media was also reflected in a change of name: the word Bildstatistik (picture statistics) was replaced by *Bildpädagogik* (picture pedagogy) better known as *Picture Education*. *Picture Education* was also written as P. E. to form i.s.o.ty.P.E. abbreviation.[24]

Between 1925 and 1932 the 'Museum of Society and Economy' started an extensive collection of their own commissioned photographs.[25] As a result of the Museum's collaboration with Vienna's 'Professional Support Bureau and the Viennese Chamber of Labor' employees at the Museum studied the life of the worker and labor environments meticulously. But staff of the Museum did not only go out to picture work environments, prospective wage earner were also invited into the Museum to gain an overview of various job possibilities.[26] Progressive sequences—lantern slide shows—of work scenes were also depicted which created a narrative on the duties of the hairdresser, the locksmith, the optician, the tailor, the carpenter, the blacksmith and the factory worker.[27] These small narratives were headed by a title and a credit slide as well as a 'lead image.'

The most interesting results however were possibly achieved during the Museum's work with students. By the end of the 1920s, picture education became a part of the Viennese school reform. Initiated by the social-democratic government of Red Vienna, the school reform tried to weed out antiquated teaching methods that were considered debris of the monarchy.

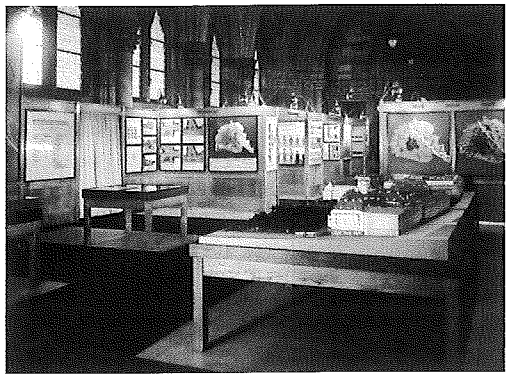


Fig. 10

Media, Relief Chart and Models at Neues Rathaus, Vienna, 1925–1932, source: N-1750 N-Files.

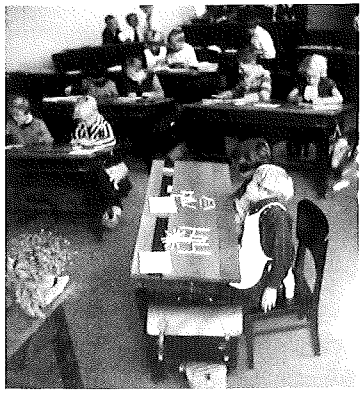


Fig. 11

Children Building Arntz Symbol, Vienna, 1925–1932, source: N-979, N-Files.

The Vienna method was from then on probed in various school types, but mostly in *Hauptschulen* (middle schools: 10–15 year olds), elementary schools (6–10 year olds) and kindergartens (3–6 year olds). While different teaching materials were used to engage various age groups, drafting of picture statistics was taught at all levels. Surprisingly, this led to the understanding that picture statistics were often more easily appropriated and correctly employed by younger students.

When confronted with drawing the statistical chart, 'How many children stayed at home on the weekend and how many went outside?' Neurath remarked that teens were inclined to solve these problems in an all too detailed and naturalistic way, if the instructor did not specifically request symbolic depiction.[28] He attested on the drawings:

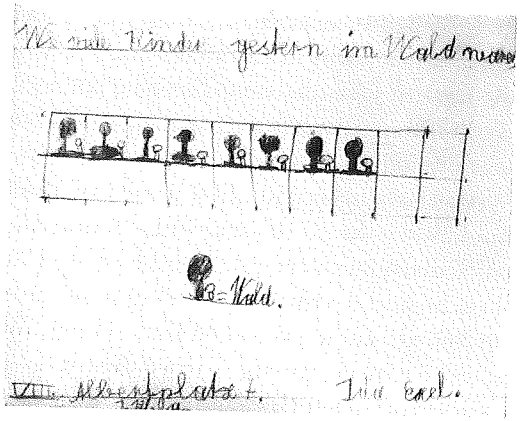


Fig. 12

Sunday in the open-air, approximately 6 years old, Vienna, 1925–1932, source: N-546, N-Files.

> In an all-girls' class, for instance, one will find series: of (drawn) girl-(figures), whose little dresses feature all kinds of details. Braids and such animate the composition. The girls, who stay at home, look outside the window, whose drapes are affectionately drawn out. The lead images give reason for picturesque activity. All too easily they lose the character of statistic free symbolism.[29]

The technique of drawing picture statistics, however, proved apt for children in elementary schools. Research in child psychology had shown that during the years of elementary school and earlier, children were very capable of inventing symbols and designing them in an abstract way.[30] Neurath attested to this in *Bildstatistik und Schule*:

> In one [...] case a child indicated the 'Sunday in the open-air' with the tree symbol adjacent to a mushroom symbol, omitting [the symbol] of children walking outside. Asked why he chose the tree and the mushroom, he answered absolutely in terms of best picture education: the tree alone could indicate a park in Vienna; with the mushroom it becomes clear that it is a forest.[31]

In general, children quickly grasped the method of drawing quantitative rather than geographical maps. However, ISOTYPE was still not for everybody. Neurath knew and actually intended this. It was not taught in gymnasiums, secondary schools or at universities, it was kept from institutions that drew on the upper class. First and foremost, ISOTYPE was provided to those

who needed it most, a non-specialist audience. And in this instance, the apparent simplicity of the Vienna Method was unique; because it empowered the weak, it gave the ones who could not read the chance to participate, and it considered the adult just like the child and those with any kind of disadvantage or disability.[32]

When the school material started to travel, so did the Museum's exhibitions. And it was for this reason that some rather famous architects took notice of Neurath and invited him to be the first non-architect member to advise them on how to create a didactic map of the city.

Nobody knew what they were getting themselves into, until after they boarded a steam ship that carried them toward Athens and the most defining congress of architecture and urbanism of the 20th century: CIAM 1933.

CIAM as Catalyst for the 1937 Map
Neurath and 'The Functional City'

CIAM IV, titled 'The Functional City', took place on the cruise ship SS Partis II en route from Marseilles to Athens between July 29 and August 12, 1933.

With the goal to map 32 cities in terms of housing, working and leisure zones as well as routes of transportation, the CIAM architects were drawn to Neurath's expertise on cartograms and they hoped he would help them to enhance their visual language for illustrating the city. Neurath on the other hand was attracted to CIAM as a platform, because it presented an opportunity to launch an interdisciplinary professional language on a large scale. In addition, Neurath was in close contact with the architects Josef Frank and Magarete Schütte-Lihotzky, who both belonged to the CIAM's left wing. Therefore the original CIAM declaration, drafted by one of CIAM's left wing members, resonated with Neurath's understanding of urbanism. It stated:

> The idea of modern architecture includes the link between the phenomenon of architecture and that of the general economic system. Town planning is the organization of the functions of collective life; the redistribution of land, the indispensable preliminary basis for any town planning, must include the just division between the owners and the community of the unearned increment resulting from works of joint interest.[33]

With CIAM IV however, its left wing became less influential.

The election of the Dutch architect and city planner Cornelis Van Eestern as CIAM's chairman in 1930 was crucial to CIAM politics, because he symbolized the neutral compromise between the opposing (Swiss)-German and (Swiss)-French camps. While the (Swiss)-French camp headed by Le Corbusier thought of architecture more along the lines of Fordist production and æsthetics, the (Swiss)-German camp, including Hannes Mayer and Hans Schmidt, perceived the architectural tasks at hand in purely functionalist terms. Some of the left wing camp certainly also dismissed capitalist modes of architectural production. Van Eesteren's mild nature and his will to mediate between different actors contributed to his aptness as chairman.

A further quality that prepared Van Eesteren for the preparations of CIAM IV was his double role as architect and urban planner. In 1929 we was called to serve in the Urban Development Section of Amsterdam's Public Works Department where he started to work on an extension plan for the city. For this purpose he drew out maps generating a comprehensive design strategy. Since Van Eesteren had completed three model maps for the city of Amsterdam, it was sensible to use their logic and organization as the basis for maps of 'The Functional City.'[34]

The first map in 1:10,000 sought to show existing conditions in a city, recording industrial and housing zones, as well recreational areas. The second map, drawn at the same scale, analyzed transportation networks, and the third, at 1:50,000, captured 'the city in its regional setting, including areas of public and private open space, and additional information on all four [Corbusian] functions of dwelling, work, recreation and transportation.'[35]

Van Eesteren created the model maps and 72 symbols that would help clarify the given information. At a preparatory meeting in Berlin, during which the Berlin Building Exposition took place, a contribution of the 'Museum of Society and Economy' received special attention from the CIAM members due to its comprehensive designs. It was then that Sigfried Giedion suggested collaborating with non-architect specialists for CIAM IV, namely Otto Neurath.[36] Although preliminary meetings between Neurath and Van Eesteren had taken place before 1933, Giedion notified Neurath to join the congress on the Patris at last minute.

Van Eesteren had done his best to develop a comprehensive graphic system in preparation of the congress. He was, however, unable to unite his 72 symbols in a coherent way and mixed conventional architectural drawing

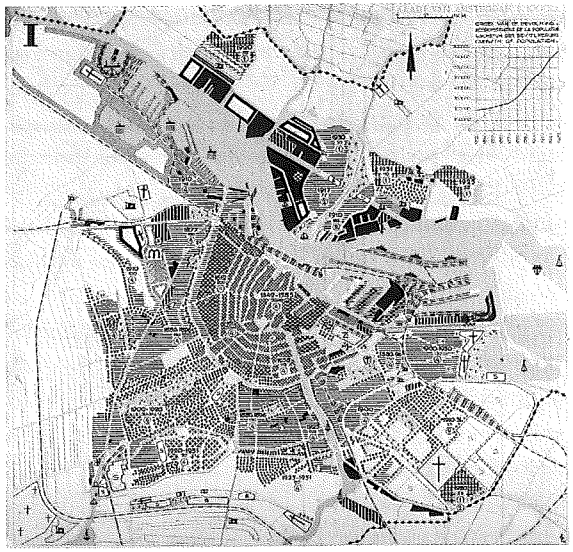


Fig. 13

'CIAM Model Map I', Cornelis Van Eesteren, CIAM, 1931, source: gta Archive, CIAM Archive, ETH Zurich.

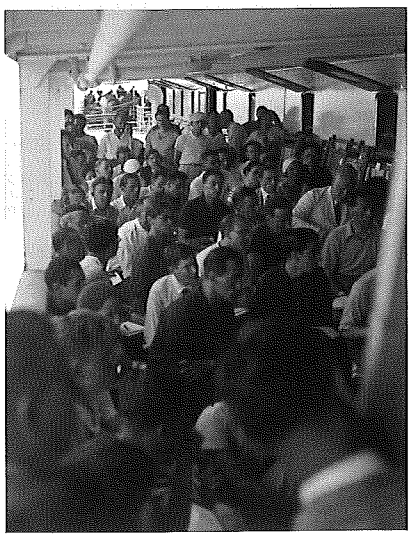


Fig. 14

CIAM Delegates on Board of the Patris, 1933, source: gta archive, CIAM Archive, ETH Zurich.

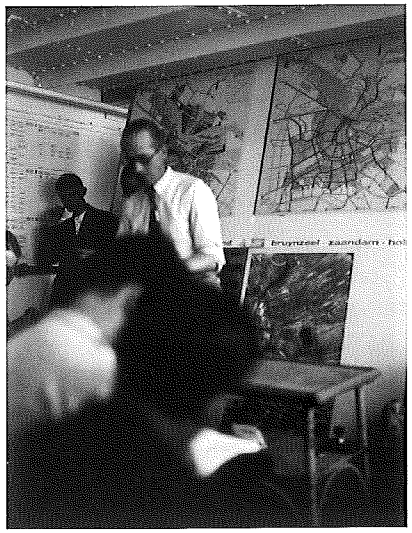


Fig. 15

Le Corbusier on Board of the Patris, Background, Three CIAM Model Maps, 1933, source: gta archive, CIAM Archive, ETH Zurich.

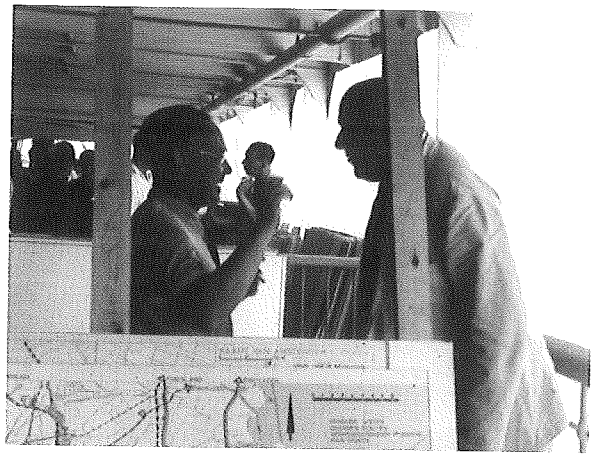


Fig. 16

Sigfried Giedion and Otto Neurath, 1933, source: gta archive, CIAM Archive, ETH Zurich.

methods with symbols. Therefore Van Eesteren hoped that Neurath's speech would clarify certain graphic hurdles. This was especially important since the beginning of a publication of CIAM's maps was anticipated as soon as the CIAM delegates would return from the Congress. Neurath's speech was held in Athens on August 4, where the maps were exhibited at the Athens' Polytechnic University.

The Patris left Marseilles on July 29, 1933. The first three days on board were dedicated to discussions and analyses of the delegations' maps. Le Corbusier held an introductory speech, addressing the question of how the maps could achieve at concrete conclusions.

The next day, Cornelis Van Eesteren addressed the relationship of effective illustrations of urban analyses and their translation into design proposals in his speech 'Methoden des funktionellen Städtebaus (Methods of Functional City Planning)'.[37] He explained how data had been extracted and to which urban proposals these analyzes led. He accompanied his lecture with the extension plan for the city of Amsterdam as an example.
On the collection of data, he said:

> In the extension plan, one only has to take into consideration the entities that require an advantageous position in relation to the entire body of the city. These are the objects that appear insular in every city: hospitals, mental institutions, cemeteries, crematories, etc.[38]

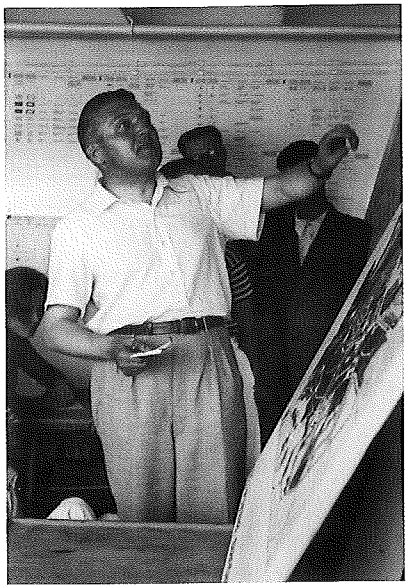


Fig. 17

Cornelis Van Eesteren, In the Background his Symbols, 1933, source: gta archive, CIAM Archive, ETH Zurich.

But he also stated:

> On the basis of technical details, like railways and shore connections, solutions were found and extensive reports were drafted. For the expected population a prognosis was made and a minimum as well as a maximum were determined, for both cases the plan should propose housing possibilities.[39]

His speech was followed by Neurath's 'L'urbanisme et le lotissement du sol en representation optique d'après la méthod viennoise' (*Town Planning and Lot Division in terms of Optical Representation Following the Viennese Method*).[40] Neurath's answer to mapping densities in a city was still what he had always pledged: they should not be mapped into the drawing, but they should be shown in a separate supporting chart. Presenting the image 'Men Living on a Unit of Space in Town', he reiterated:

> If one wants to show the density of inhabitants in the large cities of the world using our method, they would be characterized by monuments, for example, Paris by the Eiffel Tower and Notre Dame, London by the bridge over the Thames, etc. The population density will be represented by black or colored figures. At first glance, one will notice that while in Anglo-Saxon cities, for example, there are fewer inhabitants per 100 square meters than in the cities of Central Europe. I do not enter into considerations of whether dwelling in one- or two- floor buildings determines this situation.[41]

This solution was of course disappointing to the architects, because it did not allow for density to have a spatial implication. Neurath also insisted that actual maps did not even have to be drawn up at all and that cartograms served the cause of mapping the city even better than maps with spatial precision.

> It is not always necessary to show these graphics on geographical maps; it often suffices to use geographical diagrams. The diagram facilitates observation. I think that we could better represent many facts studied at this congress through similar diagrams [to the ones I've shown] rather than through plans or geographical maps.[42]

To some, this statement must have felt disconcerting, since they had spent days and weeks in preparation of their precise city maps.

At last Neurath showed plans on the city development in Damascus, produced for the Atlas *Gesellschaft und Wirtschaft* in 1930, to illustrate the topic of the Congress more closely. These maps were however lacking any kind of paired information like combinations of spatial implications and symbols, or implied socio-political and demographic data.

But Neurath's speech, despite its lack of new insight, was of course accurate in its criticism of the CIAM maps. It identified their shortcomings by calling out their lack of a uniform system of symbols. Furthermore, it pointed out that they were not apt for the public at large. To remedy this, Neurath suggested the usage of wallpaper cut outs and symbols on paper, which schools had been able to order through the Museum.

Although Neurath's speech was disappointing, he was elected to serve on various committees and a collaboration between CIAM and the Museum in Vienna was planned before returning to Marseille. On August 12, upon arrival in Marseille, a first meeting of the publication commission, consisting of Van Eesteren, Sigfried Giedion, László Moholy-Nagy and Otto Neurath took place. Earlier the English delegation had questioned the 'scientific

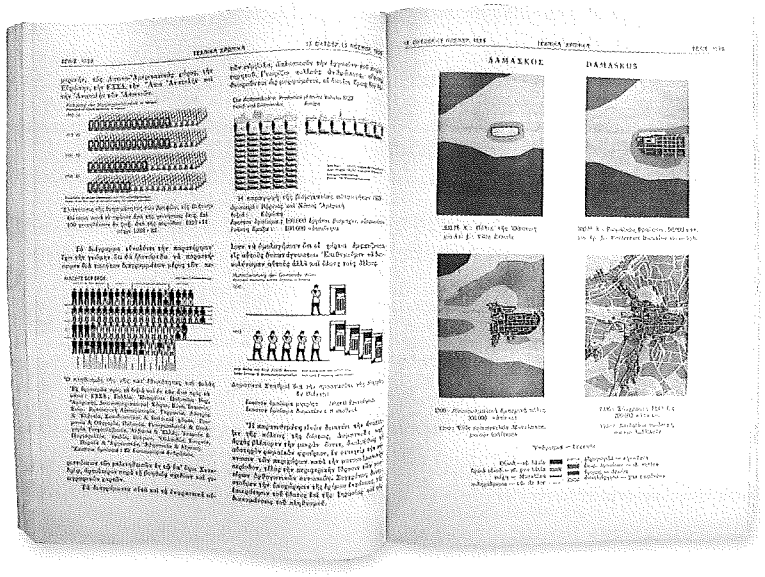


Fig. 18 **Left Hand: Charts of Damascus,** ca. 1929–1930,
source: *Technika Chronika*, gta archive, CIAM Archive, ETH Zurich.

legitimacy' of CIAM's resolutions, which also affected this first meeting.

For Neurath illustrating CIAM's resolutions was a chance to spread his international language of signs widely. Therefore he wanted to rework some of the Congress' material. Giedion's idea, however, was that only the Congress material should be used, so that the Congress could proceed faster. This caused a dispute between Neurath and the architects.

Neurath, on one hand, advised that the resolution should be shown in simple statements with newly produced fragments of plans illustrating the resolution's singular focal points.[43] Moholy insisted that CIAM's maps were 'impressive' and best displayed the resolution's origin as well as its process. In conclusion, the commission decided that a small publication should contain the resolution with 'images and explanations' and that the larger publication required 'in depth reassessment with perfect optical representations'.[44]

In the near aftermath of the congress, Neurath was eager to get to work. Van Eesteren, however, wrote a letter to Moholy-Nagy confessing that he was really happy Moholy had 'so actively participated in the congress', in particular

in a conversation with Neurath, because otherwise they 'would have certainly fallen victim to his rather limited system'.[45]

An upheaval occurred in November of 1933, when Neurath was notified late of the second get-together in Paris. He issued a short letter to Le Corbusier's CIRPAC (*Comité international pour la résolution des problèmes de l'architecture contemporaine*) voicing his discontent.[46] When he did not hear back from CIRPAC for three weeks, he finally decided to confide in Van Eesteren: 'Please tell me how all of this should be understood in your opinion. If prominent members of your CIRPAC do not attach importance to the collaboration with us, I would prefer to withdraw my institute, but not without maintaining a personal friendly memory of you and your kind way of conduct with us.'[47]

Nobody replied to Neurath until five months later. During this time Van Eesteren was serverly sick. When he finally wrote back in May of the following year, he stressed, however, that as soon as Neurath made concrete suggestions on the basis of the plan of Amsterdam, he would still present these results to CIRPAC.[48] A meeting between Van Eesteren and Neurath followed this letter.

During the months of Van Eesteren's sickness, Neurath had his own problems. In the winter of 1933/34, he left Vienna for a visit at the 'Isostat' in Moscow. In February, the Austrian Civil War broke out. Representatives of the Viennese social democratic government and those affiliated with it were imprisoned. When the police came to search Neurath's office at the 'Museum of Society and Economy', Marie Reidemeister warned Neurath not to come back to Vienna and they arranged to meet in Prague, from where they immigrated to Holland and finally settled in The Hague.

Van Eesteren was honest in giving Neurath a second try in 1934. In a letter to Giedion, issued a couple of days after his meeting with Neurath in Amsterdam in May, he wrote that he was still of the opinion that 'something must grow' from the collaboration between the congress and Neurath.[49] Concretely, he thought of the exhibition 'The Functional City' that he planned to show in Amsterdam where the next CIRPAC meeting would take place. He still hoped that Neurath could advance his symbols for city planning.

In preparation for an exhibition titled 'The Functional City' which was held in Amsterdam in 1935, Neurath's interest and Van Eesteren's enthusiasm for the collaboration rekindled. They met frequently between October 1934 and February 1935. Neurath tried to work on the symbols and maps, indentifying some of the major spatial problems. 'One should possibly combine

density of population, number of apartments, floor heights etc. [by means of symbols]' Neurath wrote.[50]

The final death blow to the collaboration came with a presentation Neurath gave for the architecture collective 'de 8' which included Van Eesteren. The meeting did not draw much attention and many architects left displeased with Neurath's speech.[51] Neurath on his part, was highly disappointed that Van Eesteren did not show up. He wrote a last letter stating that he was very sorry about his absence, because Van Eesteren 'was always so mediating.'[52] He concluded: 'Everything can be solved given some consideration, but neither is it only a graphic task nor is it solely that of an architect; it requires an intermediary ... TRANSFORMATION ... But this is an old song I have already whistled and jingled to you in different variations.'[53] 'The Functional City' exhibition in Amsterdam opened in July of 1935. Neurath was never credited anywhere, although some charts were modeled after his suggestions.

Why did this collaboration between Neurath and CIAM fail so catastrophically? For one, Enrico Chapel has very precisely assessed the complication of Neurath targeting a different audience than CIAM. He stressed that from the beginning, Neurath and the CIAM architects aimed at diverse target groups and they also 'expected totally different reactions.'[54] Chapel continues:

> Neurath invented his system within the framework of a global visual communication programme, with a view to 'humanize' knowledge for the greater benefit of the general public; the architects sought to internationalize an established body of knowledge; their principal targets were the decision-makers in the field of urban production.[55]

This is certainly relevant, since Le Corbusier for example conceived of the purposes of CIAM IV transnationally. This 'meant working closely with large interests with the capital to implement his overarching vision of social and architectural transformation' as Mumford has argued in his *CIAM Discourse on Urbansim*.[56] But in general the architects wanted to pride themselves with their technical expertise and with the fact that they had found the means of representation that were specific to their discipline. Again, Enrico Chapel has put it precisely in saying:

> In the first place, one should not underestimate the difficulty of applying a pictorial method that was not designed with town planning in mind [...] This system, which visualized social phenomena and economic data, failed to account for a whole range of dimensional and more generally spatial parameters, which are nonetheless indispensable to any study carried out prior to the intervention of urban space.[57]

Kees Somer supports Chapel's assessment in stating that the CIAM architects saw their maps 'as practical instruments' and 'their attention remained focused, on the reality of urban planning, which they had investigated with an immediately operational purpose: the improvement of the planning and design of the environment in which people live.'[58] These observations are crucial because they precisely describe the difference between the map as an architectural heuristic device and the map as representational medium: and this is the divide that could not be overcome by Neurath and the architects in the framework of CIAM IV.

The 1937 Map—*City Planning*
From *City Planning* to *Architectural Record*

In 1937, two years after the end of his failed collaboration with CIAM, Neurath published his first socio-political map of a town, originally titled *City Planning*. The title is more charged than one might assume at first glance, as it suggests a concern with actual 'planning' rather than just a sober analysis, which would have been the typical mode of operation for Neurath.

The great breakthrough of the 1937 map was the overlap of spatial parameters with hatches and pictograms. This overlap was certainly missing in the map of Damascus that Neurath had presented on the Patris, and it was also missing in all his quantitative charts of the world. While the ISOTYPE symbols presented altered concise syntax, the 1937 map also effectively clarified how to successfully employ 'wallpapers' and how to abstract spatial implications. In fact, the 1937 map was one of the first that mapped space with precision, which eventually enabled it to show first traits of the map as architectural tool.

Admittedly, when comparing Neurath's map to Van Eesteren's model map I of Amsterdam, Neurath's approach in mapping the city still looks relatively abstract. But given a closer reading it becomes apparent that Neurath actually managed to supersede Van Eesteren's approach in creating an insightful tool.

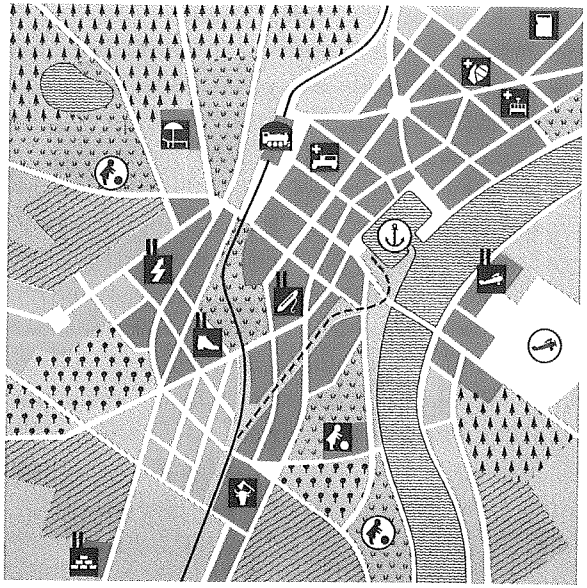


Fig. 19

The 1937 Map, 1937, source: *Architectural Record*, July, 1937, 56.

Among CIAM's three model maps, model map I of Amsterdam lends itself best to a comparative study, because it depicts existing conditions in a city and accounts for housing, work and leisure zones in a manner closest to the content of Neurath's map.

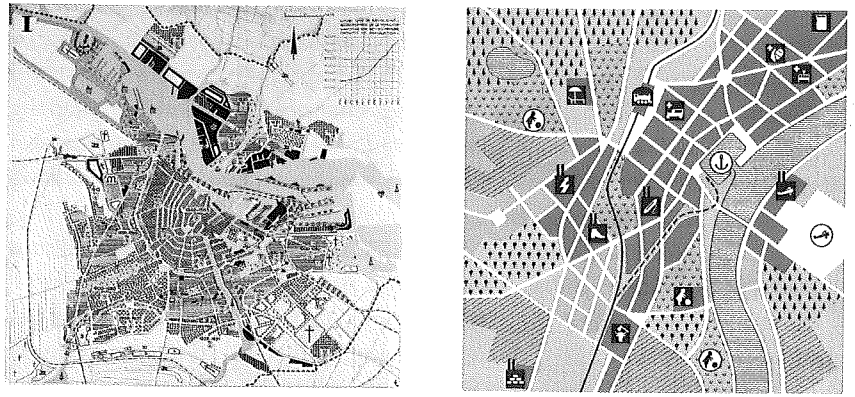


Fig. 20 **'CIAM Model Map I' and 1937 The Hague Map Comparison**

In a first and most obvious instance Neurath's hatches are more developed than Van Eesteren's. ISOTYPE hatches could be inverted due to their simplicity and indicate two different, but clearly speled out things in one map. Van Eesteren's hatches on the other hand employed a multitude of different manners of hatching, so that his charts became impossible to read without an index.

The indication of density was not successfully addressed by either map. Van Eesteren used numbers to indicate additional social factors in the plan, but they did not provide a general understanding of the relationship between statistics and space. Neurath, on the other hand, did not even try to address this issue, since he stayed true to his principle that quantitative information should be kept separate from the map. 'Architects who are always closely connected with making floor plans and maps mostly intend to show social facts on maps, but in a great many cases we have to give preference to other methods of representation', he criticized in *Architectural Record*.[59] In his text Neurath reiterated this by showing density charts of different cities, something he had already demonstrated on the Patris by the example of Damascus.

On a second level, the comprehensiveness of Neurath's symbols was also greatly improved, since a way was found to differentiate various types of buildings by simple means. Houses, factories, and big halls like railway stations could be distinguished by the basic shape of their symbols. Whether a space was located outdoors or indoors was indicated by black and white backgrounds.[60] In addition, Neurath gave his symbols a background so they could be read as a symbol only. He also showed them in elevation, which made them clearly more abstract and identifiable as a symbol.

Van Eesteren's symbols on the other hand, are 'driving' or 'floating' in all kinds of directions, which makes the plan very literal. In addition this makes it difficult to understand what the symbols imply: is this a real ship or is this an area for ships?

And thirdly, there was the issue of spatial abstraction, which had always been Neurath's weak point. When analyzing Neurath's map the discrepancy in scale is unsettling. The map seems to depict an urban environment and it indicates urban institutions (hospital, factory) yet the size of the city seems too small, too trimmed, to be an actual city.

Unfortunately Neurath did not often discuss maps individually, in fact there is no hint in the literature that the 1937 map derived from a real city. The general assumption has always been that it is a generic representation.

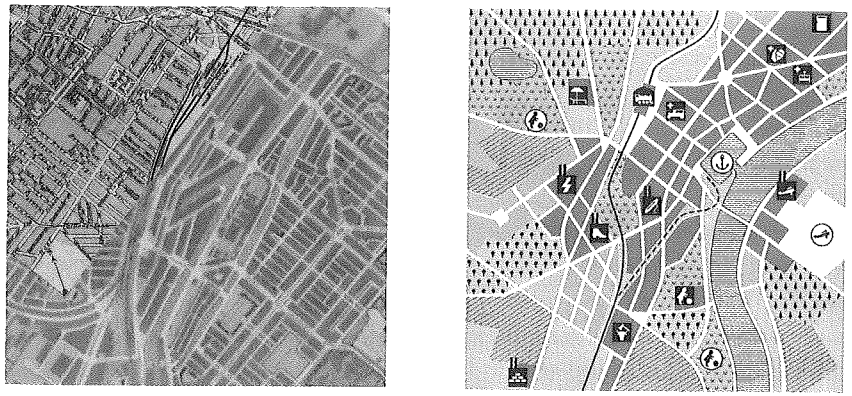


Fig. 21 **The Hague 1930 and 1937 Map Comparison**

This is logical, since Neurath argued for years that rules in city planning were best illustrated by means of showing small generic parts or cut-outs. Yet, how does one illustrate a generic city or invent a city from scratch? This would seem to be a fairly complicated task for someone who had no such specific training.

What counters the generic theory is that Neurath usually drew from actually found social and economic facts. So why would he make an exception with the city? Why would he not treat the city as a spatial social fact? In addition, the 1937 map clearly seemed to be 'Neurath's attempt at [contrasting] the language of "The Functional City"' and that would suggest working with an actual city.[61] After all, CIAM specifically set out to map more than thirty actual cities in the world. But as for being the illustration of a real city, the 1937 map was too out of proportion, and as generic it was too specific.

It seems that to some extent both theories are applicable: The 1937 map is indeed generic, but there is reason to believe that the generic cut-out was drawn on the basis of a significant city. It was a city meaningful to Neurath, a city that made sense in contrast to Van Eesteren's Amsterdam, namely The Hague, Neurath's new city, the city where he continued his legacy.

It seems that in the end Neurath realized that spatial givens were important to take into consideration, even when depicting the city. However, he kept this realization a secret, because it was most important to emphasize that such

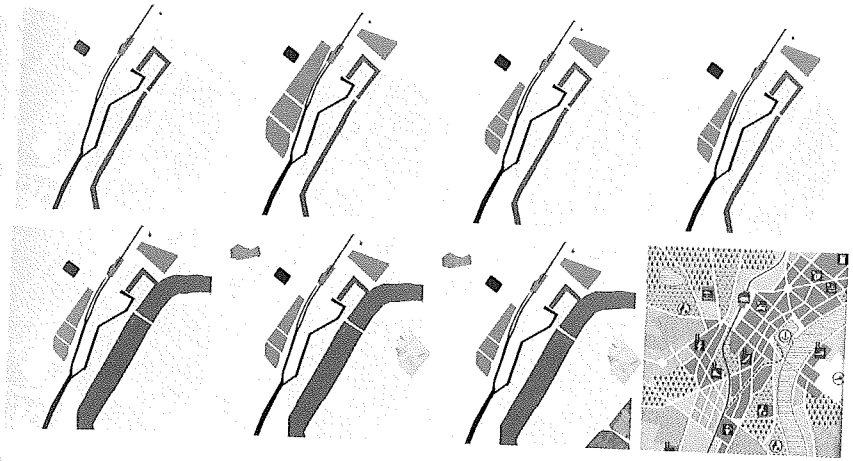


Fig. 22 **Transformation,** all figures drawn on the basis of the 1930 plan of The Hague, 2010, source: Sophie Hochhäusl.

infrastructure could exist with slight differences in every city in the world.

In order for the map to be a valid response to CIAM it needed to be a place that possibly incorporated all aspects of 'The Functional City'; housing, workplaces, recreational areas and various transportation networks. Obviously, such a place was hard to find in only a small cut-out of a city. Therefore modifications had to be made: spatial transformations.

The charts above, first depicting an actual plan of The Hague and lastly depicting the 1937 map, suggest that the trained statistical *transformers* were able to transform the particularities of space. They seem to suggest that from the actual city, a good *transformer* would move on to draw out a larger city block and scale it down. Then the *transformer* might morph a river into a sidewalk and some housing blocks into a river. The *transformer* might also copy an airfield from the far south of the city and insert it straight up north into the fictional city, where it fit best alongside a major transportation route. Then, he might also do the same with a lake from the outskirts of the city. Finally, the *transformer* could start drawing out actual greenery in the city. He might also invent some greenery and reshape some housing blocks and move them to where they fit best. And if he is a gifted *transformer*, he will eventually arrive at a generic city.

The combination of spatial implications and socio-political factors alone was one big step, but to actually work on the basis of a real city while at the

same time making such spatial transformations signifies one step towards the operative. Van Eesteren was never able to improve his symbol dictionary despite his dedication. Neurath alone did make a step forward: he started to develop his first and last map of a city and moved toward city planning.

But let me be clear: Neurath never did one thing: he never combined quantitative and spatial maps. That would have been a too suggestive move, inviting seductive design conclusions and singular decisions. So when the question was posed in the beginning if Neurath perceived of the city as an agglomeration of social facts, then the answer is yes, he did. He believed that these social institutions in a city could and had to be mapped in the city, that in fact they needed to be drawn out so that people could come to an understanding of their built environment. But still, he never thought of the maps, as means of making precise design decisions.

Nonetheless he illustrated in the generic map of The Hague a city how he envisioned it: as small town by the water, fifty percent greenery, fifty percent urban fabric, possibly reminiscent of the Viennese settlement movement. But Neurath also stressed the city's important institutions: working areas and leisure zones, hospitals, kindergartens and playgrounds as well as factories. And they were integrated in housing zones, in great contrast to how the CIAM architects had envisioned the city during CIAM IV. More than only creating an altered illustration of the city, Neurath also represented a piece of the city as he projected it.

Neurath referenced the CIRPAC in this text only once, in a footnote. He stated that ISOTYPE standardization could be compared 'with various attempts at architectural representation, e.g. with the stimulating proposals of the CIRPAC made by Van Eesteren.'[62] It is unclear if that mention was really meant as a tribute to the 'stimulating proposals', or if it was meant to parallel his own work to that of CIAM, mention of it, he might have felt, was long overdue.

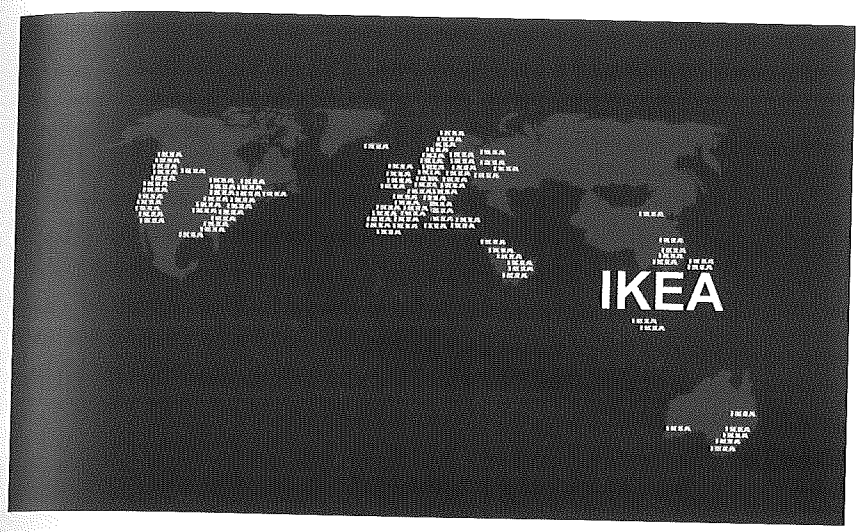


Fig. 23 **World of IKEA,** Image courtesy of AMO.

Postscript

In an interview conducted for this research on Neurath, Rem Koolhaas confirmed that he was familiar with the work of Arntz and Neurath and that he had been influenced by it. On occasion AMO's maps even seem to have much in common with Neurath's maps, although AMO's certainly uses both, operative maps as a means of design, and those that communicate precise statements about the world.

'But doesn't a liquid, completely globalized world, also require more liquid maps?' I asked Koolhaas during the interview, 'ones that apply a fundamentally different logic, than the ones from the 1920s and 30s.'

'How would you imagine that?' he asked me. 'Are they in real time, are they alive?' And then he answered:

> The promises of the digital are short-lived. In many cases before the promise can establish itself, the decadence of it already prevails, or the commercial prevails, or the trivial prevails. It has been an incredibly difficult domain in which to retain precision and to retain integrity. In certain cases exactly against this fluidity and against this immediate abuse of every idea, that the Internet [...]

> seems to suggest, [we create maps that are] at least momentary freeze frames of particular conditions.[63]

'I think we [make maps] … as interpreters at a moment of great political and ideological confusion' Rem Koolhaas said at the end of the interview. 'To some extent we adopt a language, not so much ironically, as a statement that there once was clarity, but the clarity is currently gone.'

Sometimes I wonder what Neurath and Van Eesteren would say if they saw that today 'their maps' have finally been altered for making precise statements, while at the same time being effective design tools. I think they would be very satisfied. Only Otto Neurath might ask Rem Koolhaas, about his ultimate purpose.

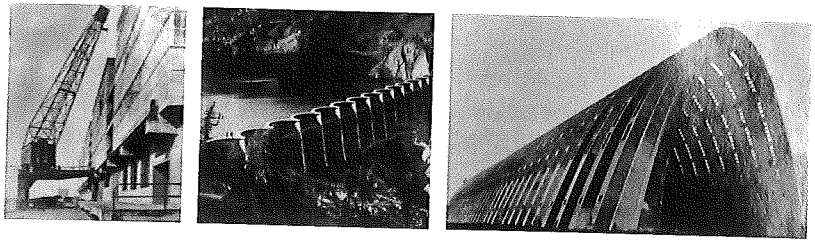
Notes

1 Otto Neurath, 'Visual Representation of Architectural Problems', *Architectural Record*, July 1937: p. 56–61.

2 Otto Neurath, 'Visual Education: A new Language', *Survey Graphic* (1937): 25. 'When will the Middle Ages be at an end? As soon as all men can participate in a common culture and the canyon between educated and uneducated people has disappeared.'

3 Sybilla Nikolow, 'Planning, Democratization and Popularization with ISOTYPE, ca. 1945. A Study of Otto Neurath's Pictorial Statistics on the Example of Bilston, England', *Induction and Deduction in the Sciences, Vienna Circle Yearbook 11* edited by Elisabeth Nemeth and Friedrich Stadler (Dordrecht, Boston and London: Kluwer Academic Publishers, (Dordrecht: Kluwer Academic Publishers, 2003), 299–329.

4 These are all photographs of other photographs or publications that Otto Neurath collected in the N_Files. These are N_421, N_425, N_430. ISOTYPE Archive, Department of Typography, University of Reading, Reading, UK.



5 Otto Neurath, 'Städtebau und Proletariat', *Der Kampf*, (1923): 240.

6 Otto Neurath, 'Städtebau', 240. 'Wie wird die kommende Stadt aussehen? Vor allem arbeitet an ihr die moderne, großorganisierte Industrie, der weltumspannende Handel. Hafenanlagen, Bahnhöfe, Silos, Lagerhäuser, Fabriken, kühn geschwungene Hochbahnen, Eisenkonstruktionen kennzeichnen die kommende Stadt, Wolkenkratzer recken sich stolz empor, an bestimmten Stellen durch bestimmte Zwecke bedingt, einem Gesamtbild unter Umständen durchaus harmonisch eingefügt. Wie aber werden die Wohnungen verteilt sein?'

7 Otto Neurath, 'Städtebau', 240. 'Es geht darum, nicht nur die Industrie- und Wohnbauten richtig zu verteilen, Wohnungen mit den Verkehrswegen richtig zu verknüpfen, es geht auch darum, das so Geschaffene architektonisch harmonisch zusammenzuführen, die Stadt als eine einzige architektonische Einheit anzusehen!'

8 Otto Neurath, 'Städtebau', 240. 'Was für Architekturideen leben nun in den

Architekten und Organisatoren, was für Architekturideen werden von den breiten Massen aufgesogen?'

9 For a detailed discussion on the notions of *Gemeinwirtschaft* and *Gemeinschaft* see Nader Vossoughian's chapter 'Community', in Nader Vossoughian, *Otto Neurath: The Language of the Global Polis* (Rotterdam: NAi, Punlishers 2008)

10 Otto Neurath, 'Kommunaler Wohnbau in Wien?', *Die Form* (1931), 52. 'In den Volkswohnungsbauten der Gemeinde Wien beginnt ein neues Gemeinschaftsleben. Der gemeinsame Hof dient dem Spiel der Kinder, an Sommerabenden tanzt Groß und Klein wohl gar nach den Klängen eines Lautsprechers.'

11 Otto Neurath, 'Kommunaler Wohnbau', 52. 'Die Neubauten zeigen die verschiedensten Formen, wie sie eben entstehen, wenn in toleranter Weise die breiten Scharen der freischaffenden Architekten sich betätigen können … .'

12 Andreas Faludi. 'Otto Neurath and Planning Theory', in *Encyclopedia and Utopia, The Life and Work of Otto Neurath (1882–1945)*, edited by Elisabeth Nemeth and Friedrich Stadler (Dordrecht, Boston and London: Kluwer Academic Publishers, 1996), 208.

13 Otto Neurath, 'Die pädagogische Weltbedeutung der Bildstatistik nach Wiener Methode', Die Quelle, (1933): 209. 'Die internationale Bedeutung dieser Methode beruht unter anderem darauf, dass wie die Erfahrung zeigt, die gleichen Bildertafeln in verschiedenen Ländern verwendet werden können. Die Bilder sind geeigneter als Worte, eine Menschheitskultur vorbereiten zu helfen. Worte trennen – Bilder verbinden.'

14 Otto Neurath, 'Autobiography', 100. 'When controversial problems are presented in print, people expect some kind of bias from the outset, in a way which they would not expect from looking at geographical maps. Isotype is bound to be as neutral as maps and to provide material for free discussion from any point of view. Isotype symbols have fewer positive or negative associations than the printed or written words of a language. You cannot write in a neutral way without being boring, but you can present a neutral picture which is nevertheless attractive.'

15 Otto Neurath, 'Grundsätzliches zur Kartographie': *Gesellschaft und Wirtschaft, Bildstatistisches Elementarwerk*, (Leipzig: Bibliographisches Institut A. G., 1930): 102.

16 Otto Neurath, 'Grundsätzliches', 102. 'In diesem Bildstatistischen Elementarwerk gibt es keine geographischen Karten, sondern ausschließlich Kartogramme, um Eintragungen vorzunehmen oder bestimmte Tatsachen zu veranschaulichen.'

17 Otto Neurath, 'Grundsätzliches', 102. 'Auch die Stadtpläne sollen nur den Charakter der Stadtteile, die Verschiebungen der Lage kennzeichnen, nicht aber genaue Lokalisierungen ermöglichen. Die kartographische Darstellung des Atlas wurde ausschließlich der Bildstatistik angepasst.'

18 Otto Neurath, Rudolf Carnap, Charles Morris, eds., *International Encyclopedia of Unified Science, Foundations of the Unity of Science, Volumes I-II of the Encyclopedia* (Chicago: University of Chicago Press, 1944)

19 Otto Neurath, Rudolf Carnap, Charles Morris, eds., *International Encyclopedia*, 33.

20 Otto Neurath, 'Visual Education', 25.

21 Whenever I have capitalized the word 'Museum' it means that I am referring to the 'Museum of Society and Economy'.

22 Otto Neurath, 'Gesellschafts- und Wirtschaft im Lehrbild', *Österreichische Gemeindezeitung*, May 1, 1927, 44. 'Man muss nun darangehen, festzustellen, welche Lösungsweisen uns zur Verfügung stehen, es muss der Bereich der Darstellungsarten abgegrenzt werden. Leuchttafeln, Magnetkarten, Zeichenfilme, die alle bedürfen methodischer Pflege. Man muss allmählich feststellen, was man so darstellen kann, was nicht; welche Vorteile das ruhende statistische Bild vor all dem hat. Die Wirkung von statistischen Bildern, die abwechselnd aufleuchten, ist noch allzuwenig untersucht.'

23 Nader Vossoughian has described this notion in detail. Nader Vossoughian, *Otto Neurath: The Language of the Global Polis*, (Rotterdam: NAi Publishers, 2008), 79.

24 Otto Neurath, 'Bildhafte Pädagogik im Gesellschafts- und Wirtschaftsmuseum in Wien', Museumskunde, Neue Folge III (1931): 125–9. Neurath used the term Bildstatistik all throughout the 1920s and well into the 1930s. Although pedagogy had always been an element of Neurath's aspirations, it became the most important goal in the early 1930s when *Picture Education* replaced *Picture Statistics* for the first time in an article's headline in 'Bildhafte Pädagogik'. For the change in artice headlines see Robin Kinross, index to Band 3 *Gesammelte bildpädagogische Schriften*, by Otto Neurath, edited by Rudolf Haller and Robin Kinross (Vienna: Hölder-Pichler-Tempsky, 1991) v–vi.

25 Otto Neurath, 'Bildhafte Pädagogik', 128. 'Das Gesellschafts- und Wirtschaftsmuseum beschränkt sich nicht auf Bildstatistik, es hat in seinen Werkstätten mit seinen Mitarbeitern noch eine Reihe musealer Hilfsmittel geschaffen, wie neuartige Karten in ungewöhnlichen, pädagogisch wirksamen Ausschnitten (Projektionen), technische Bildtafeln, insbesondere zur Rationalisierung großzügige Holzmodelle für seine Abteilung Wohnung und Städtebau, auf durchsichtigem Material Grundrisse übereinanderliegender Stockwerke, Magnettafeln zur Eintragung wechselnder Mengen; auch die Photographie wird zur Charakterisierung viel herangezogen.'

26 See Note to Illustration 2.24 and 2.25 in N. Vossoughian, *Global Polis*, 77.

27 Images are at the Otto and Marie Neurath Isotype Collection, University of Reading,

Department of Typography.

28 Otto Neurath, *Bildstatistik nach Wiener Methode in der Schule*, (Vienna and Leipzig: Deutscher Verlag für Jugend und Volk, 1933), 39. 'Bilder der 10–14jährigen zeigen deutlich, wie die Aufgabe immer naturalistischer gelöst wird, wenn man nicht ausdrücklich die symbolische Darstellung verlangt.'

29 Otto Neurath, *Bildstatistik in der Schule*, 39–40. 'In einer Mädchenklasse z. B. sieht man Reihen von Mädchen, deren Kleidchen allerlei Details aufweisen. Zöpfe und anderes belebt die Situation. Die Mädchen, welche daheim bleiben, blicken etwa zum Fenster hinaus, dessen Gardinen liebevoll ausgemalt werden. Die Führungsbilder geben Anlass zu malerischer Betätigung. Allzuleicht verlieren sie den Charakter statistikfreier Symbolik.'

30 Otto Neurath, *Bildstatistik in der Schule*, 36. 'Während auf den unteren Stufen die Kinder, wie dies den Erfahrungen der Kinderpsychologie entspricht, sehr geeignet sind, Symbole zu erfinden und vereinfacht zu entwerfen, drängt sich auf höherer Stufe, insbesondere knapp vor der Pubertät, der Naturalismus vor, welcher die mannigfaltige, reiche Darstellung bevorzugt.'

31 Otto Neurath, *Bildstatistik in der Schule*, 39–40. 'Mit 6- und 7jährigen wird Bildstatistik anfangs am besten in der Weise betrieben, dass man Beispiele wählt, in denen ein Zeichen einen Gegenstand darstellt … Es wird z. B. die Frage aufgeworfen: Wie viele Kinder waren am letzten Sonntag daheim, wie viele im Freien. […] Die Erfindung von Zeichen ist auf dieser Stufe sehr aufschlussreich; […] In einem anderen Fall hat ein Kind den "Sonntag im Freien" mit einem Baumsymbol, verbunden mit einem Pilzsymbol gekennzeichnet, unter Weglassung der Kinder, welche ins Freie wandern. Gefragt, weshalb es den Baum und den Pilz gewählt habe, antwortete es durchaus im Sinne bester Bildpädagogik: Der Baum alleine könnte einen Park in Wien bedeuten, durch den Pilz wird klar, dass es ein Wald sein soll.'

32 Otto Neurath, 'Visual education', 28. 'This visual method has special uses in teaching public health lessons, child care, safety, and so on, adults and to children, and in teaching retarded or handicapped children. The International Foundation for Visual Education is working along these lines in many countries.'

33 Kenneth Framton, 'Introduction', in Eric Mumford, *The CIAM discourse on Urbanism, 1928–1960* (Cambridge and Massachusetts: MIT Press, 2000), xi.

34 For a detailed description of how the three CIAM model maps came into being see Kees Somer, *The Functional City: The CIAM and Cornelis van Eesteren, 1928–1960* (Rotterdam: NAi Publishers, 2007), and Eric Mumford, *CIAM*.

35 Eric Mumford, *CIAM*, 62–63.

36 Sigfried Giedion, 'Letter to Cornelis Van Eesteren, 21. 12. 1931', CIAM Archiv, 42-K-1931, Eidgenössische Technische Hochschule, Zürich, Switzerland. 'Vielleicht ist die erste Karte mit den Verkehrszeichen, die sich oft ähnlich sehen, nicht ganz leicht lesbar. Die zweite Karte jedoch ist beim ersten Anblick klar. Vielleicht sollten wir in Zukunft mit Spezialisten von Zahlenzeichen und Statistiken zusammenarbeiten. Wir wollen den Direktor des Wiener Gesellschaftsmuseum, Dr. Neurath, nach Zürich kommen lassen, da er meines Wissens über die grösste Erfahrung auf diesem Gebiete verfügt (erinnerst du dich an die Wandtafeln der österreichischen Abteilung der Berliner Bauausstellung?)'

37 Cornelis Van Eesteren, 'Methoden des Funktionellen Städtebaus', *Technika Chronika*, (1933): 1150. 'Über die Methoden städtebauliche Erscheinungen zu fassen, über die Erscheinung an sich und über Wege welche zum städtebaulichen Entwurf der Stadt der Zukunft führen, werde ich jetzt sprechen.'

38 Cornelis Van Eesteren, 'Funktioneller Städtebau', 1152. 'Im Generalplan hat man nun die Lage der grossen Einheiten anzudenken welche eine gute Situation im Bezug auf den ganzen Stadtkörper verlangen. Es sind dies Objekte, die in jeder Stadt vereinzelt vorkommen wie: Krankenhäuser, Irrenhäuser, Friedhöfe, Krematorien u. s. w.'

39 Cornelis Van Eesteren, 'Funktioneller Städtebau', 1152. 'Ausführliche demographische Studien wurden gemacht. Über Technische Einzelfragen, wie Eisenbahn, Uferverbindung, kam man zur Lösung und wurden ausführliche Berichte aufgestellt. Für die zu erwartende Bevölkerungszahl wurde eine Prognose aufgestellt und ein minimum und ein maximum festgestellt, für welche beiden Annahmen der Plan Wohnmöglichkeit bieten soll.'

40 Neurath's speech was printed in *Technika Chronika* which is available at the gta archive at the ETH, Zurich.

41 Otto Neurath, 'L'Urbanisme', 1153. 'Si l'on veut montrer la densité d'habitation dans les grandes villes mondiales d'apres notre méthode, celles-ci seront caracterisées par des médaillons, p. e. Paris par la tour Eiffel et Notre Dame, Londres par le pont sur la Tamise, etc. La densité d'habitation sera représentée par des figurines noires ou colorées. A première vue on constatera alors que dans les villes anglo-saxonnes p. e. il y a par 100 m^2, moins d'habitants que dans les villes d'Europe Centrale. Je n'entrerai pas dans des considérations pour savoir si le fait de l'habitation sur un seul ou sur deux étages détermine cette circonstance.'

42 Otto Neurath, 'L'Urbanisme', 1153–4. 'Il n'est pas toujours nécessaire de presenter ces graphiques sur des cartes géographiques; il suffit souvent d'employer des schémas géographiques … Le schéme facilite l'observation. Je pense que nous

pourrions mieux représenter une quantité de faits étudiés à ce Congrès par des schémas semblables, plutôt que par des plans et des cartes géographiques.'

43 Marie Reidemeister, 'Protocoll of the Publication comissions' meeting 12.8.33., Attachment Otto Neurath Letter to Sigfried Giedion, 19.8.1933', 1–2, CIAM Archiv, 42-K-1933, Eidgenössische Technische Hochschule, Zürich, Switzerland. 'aussprache ueber die veraenderung der bisherigen karten. M sehr dafür, weil eindrucksam und werdeprozess steigend. N sehr dagegen, weil vollkommenstes gezeigt werden soll einfache relationen der resolution an vereinfachten ausschnitten besser demonstrierbar. Zusammenarbeit zuerich, amsterdam, wien mit M., G., vE vermitteln, man einigt sich darauf, dass entwicklung der arbeit gezeigt wird mit beispielen aus karten, und zwar faelle groesster mannigfaltigkeit und faelle, die zu besonderer kritik anlass geben, um eventuell die notwendigkeit der mundaneumsarbeit zu entwickeln. M und vE betonen, dass das chaotische der stadt gezeigt werden soll.'

44 M. Reidemeister, 'Protocoll', 2. 'Die grosse publikation nach gruendlicher durcharbeitung mit vollkommener optischer darstellung.'

45 Cornelis Van Eesteren 'Letter to Lazlo Moholy-Nagy, 4.9.1933', Vienna Circle Archive, 232, Noord-Hollands Archief, Haarlem, The Netherlands. 'Ich bin wirklich sehr froh darueber dass du den congress mitgemacht hast, nicht nur weil du einen schoenen congres-film gemacht hast und den schoenen fotos die wir noch zu sehen bekommen werden, aber vor allem weil du an der congres-arbeit so activ teil genommen hast. Von neuem hat es sich bewiesen, dass an unserem congres auch uns nahestehende nicht-architekten teilnehmen muessen. Besonders ist mir in erinnerung geblieben wie activ du an der besprechung mit Neurath teilgenommen hast—worin du immer das menschliche und psychologisch richtig wirkende in der diskussion nach vornen gebracht hast, sonst waeren wir sicher zu viel dem etwas begrenzten system Neurath's zum opfer gefallen. Du wirst bemerkt haben, dass ich waehrend den ganzen verhandlungen versuchte deine und Neurath's ideen fruchtbar aufeinander einwirken zu lassen, da ich davon fuer die publikation dieser congres-arbeit viel erwarte. Ich hoffe auf deine weitere schoepferische mitarbeit an der congressarbeit. Es wird noch viel noetig sein um mittel und wege zu finden um die wuensche zu verwirklichen.'

46 Otto Neurath, 'Letter to C.I.R.P.A.C., 24.11.1933', CIAM Archiv, 42-K-1933, Eidgenössische Technische Hochschule, Zürich, Switzerland.

47 Otto Neurath, 'Letter to Cornelis van Eesteren 5.12.1933', Vienna Circle Archive, 232, Noord-Hollands Archief, Haarlem, The Netherlands. 'Bitte sagen Sie mir wie das alles Ihrer Meinung nach zu verstehen ist. Wenn prominente Mitglieder Ihres CIRPAC auf die Zusammenarbeit mit uns keinen Wert legen, würde ich es

vorziehen, mit meinem Institut auszuscheiden, nicht ohne Ihnen und Ihrer liebeswürdigen Art des Verkehrs mit uns eine persönliche freundliche Erinnerung zu bewahren.

48 Cornelis Van Eesteren, 'Letter to Otto Neurath, 2.5.1934', Vienna Circle Archive, 232, Noord-Hollands Archief, Haarlem, The Netherlands.

49 Cornelis Van Eesteren, 'Letter to Sigfried Giedion 10.5.1934', Vienna Circle Archive, inv.nr. 232, Noord-Hollands Archief, Haarlem, The Netherlands. 'Neurath. [...] Ausgangspunkt ist immer noch, dass aus der zusammenarbeit zwischen kongres – und neurath etwas wachsen muss, sei es dass ... neurath so vollständig ist, dass wir damit erreichen (wovon ich noch nicht ueberzeugt bin) was wir vorhaben – oder dass wir daraus etwas neues wächst. Neurath hat die absicht nach london zu gehen und ich würde es begrüssen, wenn in diesem sinne mit ihm umgesprungen würde. Ich halte es für wichtig zu versuchen, dass wir mit ihm zu etwas kommen, du weißt aus barcelona wie kritisch ich seinen damaligen vorschlägen gegenüber stand, aber perönlich mit ihm zu etwas zu kommen, halte ich für möglich.'

50 Otto Neurath, 'Letter to Vornelis Van Eesteren 21.11.1934', Vienna Circle Archive, 232, Noord-Hollands Archief, Haarlem, The Netherlands. 'Wir haben die Zeichensache nun wieder um einiges gefördert. Die Schwierigkeit beruht darauf für eine bestimmte Art der Darstellung die Zeichen festzulegen, als damit Zeichen zu bekommen, die auch für andere Plandarstellungen verwendbar sind. Man soll womöglich Bevölkerungsdichte, Wohnungsanzahl, Stockwerkshöhe usw. kombinieren können und sowohl für jede Kombination zu Zweien, als auch zu mehr ein brauchbares Bild bekommen, das optisch orientiert.'

51 Kees Somer, *Cornelis van Eesteren*, 179.

52 Otto Neurath, 'Letter to Cornelis Van Eesteren 20.2.1935', Vienna Circle Archive, 232, Noord-Hollands Archief, Haarlem, The Netherlands. 'Es war mir sehr leid, dass Sie nicht kamen. Sie sind immer so sänftigend. So vertrat ich mit freundlicher Unerbitterlichkeit das Prinzip, man müsse alles, was der Darstellung für eine etwas breitere Oeffentlichkeit dient, so gut pädagogisch bearbeiten, als es möglich ist. Die zögernde Zustimmung und geringe Bereitschaft BILDPÄDAGOGIK als eine Spezialität anzuerkennen ist mir vertraut.'

53 Otto Neurath, 'Letter to Cornelis Van Eesteren 20.2.1935', Vienna Circle Archive, 232, Noord-Hollands Archief, Haarlem, The Netherlands. 'Es lässt sich bei einiger Überlegung alles wirksam lösen aber das ist nicht nur eine graphische Aufgabe , so wenig es nur eine Architektenaufgabe ist , es bedarf der Dazwischenschaltung der TRANSFORMATION, das ist der bildpädagogischen Analyse und Richtung-gebung. Die Bemerkung, dass der Architekt nicht so

viel Zeit für solche Sachen haben könne, beantworte ich mit dem Hinweis darauf: er solle auch die Zeit nicht auf so was verwenden, sondern das eben hiefür ausgebildeten Spezialisten über-lassen. Das ist aber das alte Lied, das ich Ihnen in verschiedenen Variationen schon vorgepfiffen habe und vorgeklimpert habe.'

54 Enrico Chapel, 'Otto Neurath and the CIAM – The *International Pictorial Language* as a Notational System for Town Planning', in *Encyclopedia and Utopia, The Life and Work of Otto Neurath (1882–1945)*, edited by Elisabeth Nemeth and Friedrich Stadler (Dordrecht, Boston and London: Kluwer Academic Publishers, 1996), 'Town Planning', 175.

55 Enrico Chapel, 'Town Planning', 175.

56 Eric Mumford, CIAM, 20. 'But avoiding revolution, of course meant working closely with large interests with the capital to implement his overarching vision of social and architectural transformation. Such interests transcended national borders, and he was prepared to welcome capitalist internationalism in the service of social rationalization and reform along Taylorist lines.'

57 Enrico Chapel, 'Town Planning', 173.

58 Kees Somer, *Cornelis van Eesteren*, 179.

59 Otto Neurath, 'Architectural Problems', 58. 'Architects who are always closely connected with making floor plans and maps mostly intend to show social facts on maps; but in a great many cases we have to give preference to other methods of representation. We must avoid accumulating maps showing social data; it is more instructive to combine maps and pictographs. This leads us to a use of a symbol dictionary which contains symbols applicable to both maps and pictographs. This is the basis of visualization more widely applied.'

60 Otto Neurath, 'Architectural Problems', 59. 'The symbol, representing stations, factories, kindergartens, and other buildings are in black with a white design in the middle.'

61 Nader Vossoughian indicated that the 1937 map was Neurath's way of illustrating the functional city in his subtitle to 4.4., N. Vossoughian, *Global Polis*, I however, think Neurath solutions really wanted to contrast the Functional city.

62 Footnote to Otto Neurath, 'Architectural Problems', 57. 'See examples in Otto Neurath, *Basic by Isotype*, Kegan Paul, London, 1937, We can couple ISOTYPE standardization with various attempts at architectural representation, e. g. with the stimulating proposals of the CIRPAC made by Van Eesteren.'

63 Interview with Rem Koolhaas, April 13, 2010, see Appendix B, Sophie Hochhäusl, 'Otto Neurath – The Other Modern: Proposing a Socio-Political Map for Urbansim', (MA Thesis, Cornell University, 2010).

Rondom Rembrandt and Beyond:

On Otto Neurath's Isotype Contributions to Visual Communication and Museum Learning

Hadwig Kraeutler, Vienna

In the interwar years of the 20th century, the philosopher, sociologist, and economist Otto Neurath (Vienna 1882–Oxford 1945) gained international recognition for his (r)evolutionary approaches to employing museums and exhibitions as instruments of enlightenment and empowerment. Neurath, convinced that in what he called the 'Era of the Eye' visual means would provide powerful and egalitarian modes of communication, wrote in 1925:

> [M]odern man is conditioned by the cinema and a wealth of illustrations. He gets much of his knowledge during leisure hours in the most pleasing way through his eyes. If one wants to spread knowledge, one should use means similar to modern advertisements.[1]

Neurath founded and directed the *Gesellschafts- und Wirtschaftmuseum* (GWM, Social and Economic Museum, 1925–1934), part of the new structures to help carry through the socialist politics of the Red Vienna. Neurath's key innovation in this context was the Vienna Method/Isotype,[2] a method to systematically think about and prepare predominantly visually structured informational settings, for which he introduced the expression 'visual language'. Isotype-work—in its full visionary scope—would mean carefully designed, 'orchestrated' settings for communication (museum, exhibition, film, book, wall-chart, etc.) using 'collages' of graphic, pictorial and other representations (text, image, object, media) in international cooperation for visual education.

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'The Mind's Eye': Visualizing the Non-visual and the 'Epistemology of the Line'

Sybille Krämer, Berlin

'The Mind's Eye' and Planarity

We live in a three-dimensional world; and yet, within this world we are surrounded by two-dimensional planes. We encounter them as images, book pages, displays, maps, movie screens, and computer screens. The fundamental evolutionary logic of technical devices tends towards a 'flattening out'; the end result of technological innovation is often the plane. Two-dimensional planes are ubiquitous; we are so familiar with them that we are hardly aware of the remarkable form of spatiality they constitute. *Surfaces* confront us as the outer skin of voluminous bodies; a 'depth' therefore always corresponds to a surface. A plane, however, is something extended *without* the dimension of depth. Indeed, we treat surfaces *as if* they were planes. We do this especially when the function of a surface consists in rendering images or inscriptions visible. Their importance in carrying out this latter action cannot be overestimated: could the invention of the inscribed surface, we are tempted to ask, perhaps have meant for the mobility and creativity of the mind what the invention of the wheel meant for the mobility and productivity of the human body?

What are the consequences for thought of introducing this artificial form of two-dimensional spatiality into the process of cognition? What does it mean for the acquisition and justification of knowledge?

Ever since the 'iconic turn'[1] challenged the claim to absolutism of the 'linguistic turn', it has been widely understood that images initiate not only æsthetic

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but also cognitive experience.[2] This symposium also attends to the debate on epistemic intuition and visual thought. However, our focus in this paper lies less on visuality and iconicity per se, and more on the idea that both are necessarily linked to *spatiality*.[3] We use spatial relations in order to depict epistemic, non-spatial states of affairs and to carry out palpable cognitive operations within those states. This offers a key to understanding the productivity of our thinking in terms of the 'extended mind'.[4] Thus, we must examine iconicity both *structurally*, that is, as it is deployed through planar *spatiality*, and *functionally*, which is to say, in regard to its perceptive-tactile *operativity*. The 'mind's eye' does not look *behind* appearances, it does not *penetrate* surfaces down to their hidden structures, but rather acts in cooperation with the writing and drawing hand *upon* the plane.

The Cartographic Impulse

Within the spectrum of knowledge-generating forms of visualisation, ranging from the X-ray to computer simulations, one subset, comprising notations, lists, tables, diagrams, graphs and maps, belongs in a category we may term 'operative iconicity'[5]. We call this subset 'the diagrammatical'; we call its members 'inscriptions'. Its lowest common denominator is the inscribed plane that emerges from the interaction of point, line and plane. Out of this graphism arises what we will call the 'epistemology of the line'.[6] As we will see, this epistemology has important consequences for the subject at hand: the epistemic activity of the diagrammatical does not only characterise scientific knowledge, but also philosophy.[7] What remains so far absent from the literature on epistemology is a reconstruction of the explicit and implicit diagrammatical dimensions of philosophy, which are not restricted, as is often assumed, to Charles Sanders Peirce.[8] The following considerations are meant as a contribution to filling this absence. Their guiding hypothesis is that traces of a 'cartographic impulse' can be found even (or especially) within the tradition of philosophic reflection.

What, in turn, do we mean by 'cartographic impulse'? To clarify this question, let us consider the peculiar representational conditions of maps.[9] Through mapping, a three-dimensional territory that is largely difficult to view as a whole is translated into a readily comprehensible, two-dimensional plane. A real space of our lifeworld is transformed into the virtual space of

a topographical map.[10] To accomplish this, a number of conceptual steps must be taken: first, the mapmaker must examine his subject from a highly external point of view, one that makes an overview possible in the first place. Then, a method of projection as well as a scale must be chosen. The purpose of the map is to make an unfamiliar terrain accessible to a user as a space of movement and action. This is, however, only possible through indexicality: by means of indexicality, a real person, a user, can transform him- or herself into a virtual point on the map. Only when this latter condition is fulfilled does the map become not only a representational object, but also an instrument for orienting oneself for action.

We thus encounter a decisive difference between two modalities of space in the use of maps: the difference between a virtual *configurative space* and a real *action space*. The map itself is exemplary of a configurative space in which places are arranged by their topographical order and determined by their relations to other places. The synchronic, synoptic nature of a configurative space presumes that the user's position is outside of the configuration. But a map enables its users to act in the real space of the lifeworld. The action space comes into being by means of these activities, performed by the user, who has now also become a participant within the space. It is brought forth by the movements of actors and for its duration remains limited to the completion of these actions. Orienting oneself with maps using virtual, two-dimensional configurations makes real, three-dimensional spaces of movement accessible. The symbolic configuration space that a map provides is meant to be transformed into a real space of activity. This also means that something is a map only when it is in use, only as the means of transforming arrangements into movements. Otherwise, the map remains merely an image, a structural picture.

Thus, when we speak of a 'cartographic impulse' in philosophical and epistemic respects, we mean graphic arrangements that can be transformed into a space of intellectual activity. Cognition is thus conceivable as spatially-oriented movement. Hence Kant's provocative question: *What does it mean to orient oneself in thinking?*[11]

Epistemology of the Line

How, then, do diagrammatical arrangements manage not only to represent space, but also to produce movements of thought within it? In order to answer

this question, we must clarify what 'epistemology of the line'[12] means. Let us recall that diagrammatical inscriptions, including notations, tables, graphs, diagrams, and maps, are based on the interaction of point, line and plane. In the following, we will concentrate on the line, although these considerations are also applicable to the phenomenon and concept of the point.

Considerable epistemic potential is already nested within the simple act of drawing a line. This potential reveals itself in two binary oppositions: it is at once sensual and non-sensual; it is both a dependent trace and a free design. These seeming paradoxes merit more detailed description:

(i) **Perceptible/intelligible:** The stroke on the page is perceptible; it is virtually two-dimensional; the subtle individual characteristics of the line's course carry æsthetic weight. Yet within a schema of notation, diagram, or map, the stroke is *valued* as a one-dimensional line, representing a state that is therefore not perceptible, but rather only intelligible or ideal. *Idealisation and flattening out* are closely related. In the empirical stroke, we see a non-empirical line; in a phenomenon, we see a concept. The activity of the 'mind's eye'[13] depends upon this 'seeing-in'. It is connected with the tactile handling of the continuous line: perceptivity and tactility are combined.

(ii) **Trace and Outline:** The stroke is the result of a gesture; the succession of a temporal action is carried over into the simultaneity of a spatial structure. As a trace of a gesture, the line has the potential to be determined and to become the image of something. At the same time, the stroke is always a free form with which a 'Not-Yet' can be conceptualised, plans can be made, or something unreal or even impossible can be drawn up. *Heteronomy and autonomy* are combined: transmission and creativity are intertwined in the line's productivity.

It is in embodying these functions that the line acquires its epistemic significance. In the tension between the hand that *does* and the eye that *sees*, the stroke constitutes the elementary action of operative iconicity. The plane of inscription creates a space for the movement of thought in which theoretical entities are made visible and thus manageable. The perceptual nature of this act may be described as suddenly being able to see a non-empirical state of affairs within empirical arrangements. With regard to tactility, it means that operations of configuring and reconfiguring graphical markings simultaneously carry out

ideal/intellectual operations. The interstitial world of planar inscriptions mediates between intuition and thought; it intellectualises intuition and sensualises thinking. In brief: *we think on paper*.

Plato's Simile of the Divided Line

Let us put our theoretical considerations to a practical test by attempting to reconstruct the diagrammatical structure of some instances of philosophical thought. We will demonstrate that the cartographic impulse and the space produced diagrammatically for the movement of thinking are both operative phenomena within philosophy; we will show how they are put into place within the structure of thought. We shall begin with Plato and then proceed to Wittgenstein.

In the *Republic* (*Politeia*, 509d–511e), Plato develops what is known as the 'Simile of the Divided Line', in which Socrates orders the ontological structure of the world according to a relationship between original and image, further organizing this into sub-categories by degrees of knowability. To reproduce this structure, one must draw a line and divide it into two unequal sections, such that the smaller section depicts the visible and the larger section the intelligible. These two sections should then each be re-divided in the same proportion as the original division. A four-part division of realms of being is thus created, which at the same time embodies a series of levels of cognitive knowledge with a progressively increasing degree of theoretical clarity.

Within the region of the visible, the lowermost realm is comprised of images, shadows and reflections, which correspond to the epistemic state *eikasia*, that is, conjecture. The next section of the visible encompasses the originals of these copies, the objects, plants and animals. The cognitive activity corresponding to these is *pistis*, faith or belief. Together, these two levels form the domain of 'doxa', that is, opinion. In the third subsection, which opens up the realm of the intelligible and thus of the 'episteme', reside general concepts and mathematical objects. The form of knowledge here is *dianoia*, that is, reasoning. The fourth section, in turn, is concerned with ideas as true being understood through *noesis*, the act of pure reason, which for Plato constitutes the highest form of understanding.

We must now take a closer look at the third level, where Plato locates mathematical objects, for him the proto-form of all scientific objects. As Plato

characterizes this form of cognizance, mathematicians use visible objects as images representing invisible ideas: while mathematical speech and proofs necessarily refer to perceptible figures such as particular circles or numbers, they deal not with these concrete figures, but rather with the general concepts 'circle' or 'number', which are themselves not visible, but rather purely intelligible. The form of cognizance of *dianoia* treats the visible as the perceptible imaging of something that is purely intelligible. It is thus the distinctive feature of mathematical knowledge to depend indispensably on the sensory representation of its theoretical objects and at the same time always to remain conscious of the difference between the intuitive and the purely intelligible. This prevents images from becoming illusions.

In all modern editions, Plato's Simile of the Divided Line appears only in verbal description. But perhaps the oldest extant copy of the *Republic*, contained in a manuscript held in Paris,[14] does in fact contain a diagrammatic representation of Socrates' four divisions of knowledge.

Three aspects of Plato's use of images are instructive from a diagrammatological perspective.

(1) *Iconicity as ontological principle*: In contrast to the hostility towards images often attributed to Plato, and to which philosophy's larger suspicion of images was casually able to attach itself, it must be noted that iconicity is in fact the inner principle of Platonic ontology and epistemology. For Plato, everything that is real is defined by its capacity to be depicted by images. Even the highest level of being—the Forms—are introduced as originals, and thus as templates, for pictorial copies. Degrees of reality are held up against the measuring stick of the original-copy relationship. Correspondingly, Plato first introduced to philosophy the term theoria, which originally meant 'viewing of a festive performance.'[15]

(2) *Differentiation between the visible and the intelligible; bridging of this differentiation*: Plato differentiates categorically between the perceptible and the intelligible, and thereby introduces a distinction that was for 2000 years to form the lifeblood of philosophy. The Simile of the Divided Line inaugurates this differentiation. At the same time, however, it identifies an area of epistemic activity—*dianoia*, characteristic of mathematics and the sciences—in which this difference is intentionally bridged, in that sensory objects are recognized as depicting the non-sensory. Decisive here is the fact that the sensory objects deployed in thinking are neither a final product nor an end-stage, but rather are passed through en route to that which is not perceptible, but rather only intelligible. The bridging function of this third level, conceived of as an 'interstitial world', is the enabling factor behind movements of thought.

(3) *Spatiality of thinking*: Plato views cognizance as an activity characterized by an implicit spatiality. Thinking is directional; this direction is defined by the cartographically arranged space of the Simile of the Divided Line and can be characterized as an ascent, that is, a rise through ascending levels. Thus is the Allegory of the Cave in the next book of the *Republic* a continuation of the Simile of the Divided Line by other means:[16] it visualizes not abstract lines but rather the concrete situation of a cave, and knowledge is here imagined as an ascent out of the cave and into daylight. This inherent spatiality corresponds to the methodical manner in which Plato, in the act of applying his own approach, deploys configurations of lines to visualize his own philosophy.[17] In this regard, we can infer from the spatial-visual arrangement and extension of line segments their ontological and epistemic meanings. For Plato himself, the diagrammatic scene becomes the medium of philosophical insight. The diagram functions as an instrument for making evident a philosophical world-image.

Possible Connections

It is no coincidence that Plato's visualisation of a philosophical world image is paralleled slightly later by the drawing of a geographical world image by the Greek mathematician, astronomer, and geographer Ptolemy. Ptolemy left a *Guide to Geography* ('Geographiké')[18] which is deeply instructive in its diagrammatics. It contains, for example, a map that depicts the entire known world from an external observational standpoint—an achievement made possible only by the innovative conical projection method Ptolemy himself developed. He also introduced lines of latitude and longitude to form a homogenising system of geographical coordinates. The majority of his Atlas was created from one table, which indicated the respective degrees of longitude and latitude for 8000 localities. The world was thus depicted as a planar distribution of places arranged in a numerically determinable relation to one another. As there was no reliable process for reproducing maps in antiquity, Ptolemy developed a 'do-it-yourself' method: he designed a rubric for travellers

to make their own maps. Based on his written table and innovative projection method, every reader was able, at least in theory, to draw a map corresponding to his desired itinerary. Ptolemy's work traverses various forms of diagrammatical representation: it is variously embodied in geometrical drawings, written-out tabulations of locations and pictorial maps. At the same time, his *Guide to Geography* does not simply embody an image of the world, but rather serves as an operation manual for producing world images.

The relationship between philosophy and geography has been little analysed. In passing we can briefly mention that placed next to the ancient parallel between Ptolemy and Plato, the Early Modern duo of Mercator and Descartes is no less instructive. It is unfortunately beyond the scope of this paper to explore the many correspondences between their work.

Wittgenstein

We shall now jump across the centuries to Wittgenstein. Is there a cartographic impulse articulated in Wittgenstein's thought as well? And can its presence shed an instructive light on Wittgenstein's way of thinking?

Let us summarise a few relevant points already well-known to students of Wittgenstein's work. (i) Having studied engineering, Wittgenstein was conversant with technical drawing, and thus with the projection of the three-dimensional onto the two-dimensional.[19] Wittgenstein's training in drafting can be traced back to his schooldays.[20] (ii) There is a vast number of sketches, schemata, drawings, diagrams, and figures in his 'Nachlass'.[21] (iii) Concepts of the visual constitute his basic conceptual repertoire. He is widely considered to have been a 'visual thinker' who assigned the role of providing evidence to the pictorial; he always treated philosophical problems graphically.[22] (iv) His reflections have for many scholars formed the basis of a 'logic of the visual'.[23]

In brief: the extraordinary (indeed, eminent) role played by iconicity in Wittgenstein's thought has been explored in multiple ways. So what contribution can the identification of a cartographic impulse in his thinking add to all of this?

We assume that this impulse, understood in an epistemic sense, consists in transforming a graphic configurative space into a space for the actions of thinking. In fact, the relation between arrangements and intelligible activity

in Wittgenstein's philosophical work plays a role that we can roughly express like this: thinking takes place in operating with and looking at configurations. We shall explain the connection between 'seeing a configuration' and 'thinking' by means of two examples. The first refers to the relationship between seeing and thinking in the so-called change of aspect.[24] The second refers to the relationship between different periods of Wittgenstein's thinking.

(1) **Change of Aspect**: By famously invoking the duck-rabbit optical illusion, Wittgenstein is not attempting anything as ambitious as explicating a theory of perception. Instead, he wishes to show how complex our use of the word 'see' is: for that which occurs during aspect seeing is "half visual experience, half thought."[25] There are many versions of this duck-rabbit figure; Wittgenstein uses a simple line drawing derived from Jastrow. The drawing is not altered during the changing of aspect. But what is crucial here is that as the observer turns the figure over, he or she is connected to a *reconfiguration of its spatial orientation*. As a duck-schema—following the direction of the beak—the picture is oriented to the left: the point that marks the duck's eye looks out to the left margin. As a rabbit-schema, the beak becomes the ears and the alignment is precisely the opposite: the point of the rabbit's eye points to the image's right margin. The change in aspect draws upon the fact that the inscribed surface contains in each case the alignment's opposite orientation. For Wittgenstein, the role of thinking is embodied during the change of aspect by the moment of its *transfiguration*. This turning over is that which we cannot quite *see*; rather, we slip into the invisible domain of thought. Thinking is analogous to the act of spatially re-orienting the two-dimensional space of optical illusion. Could we perhaps say that philosophical thinking is analogous to the act of re-orienting oneself?

We thus see that Wittgenstein's schema—functioning as a visual alignment inserted into the flow of his text—opens up a space of intellectual operation in which the reader can perform a distinct cognitive act: we see the aspect, but we perform the change of aspect without actually *seeing* the change. For this reason, the flip-flop-picture is more than an explanation of 'seeing-as'. In addition, it evokes an epistemic 'seeing-in'.[26] The reader should experience in the drawing the insight that seeing and thinking are connected and thus understand the complexity of the grammar of 'seeing'. We see *in*

the optical illusion an ambiguous drawing, which should make evident the impossibility of being able to see the change of aspect itself. As paradoxical as this appears to be, Wittgenstein demonstrates with his duck-rabbit figure what cannot be rendered visible—and this is precisely what is characteristic of the epistemic handling of diagrammatic inscriptions that we have specified as a 'seeing of the conceptual in graphical configurations.' Incidentally, in his Simile of the Divided Line, Plato has already named this 'making visible of the invisible': it is the epistemic device '*dianoia*', which is put into place when, for example, the mathematician sees an inextensible point represented within an empirical one.

(2) **The Relationship of the Early and Later Wittgenstein**. The Wittgenstein of the *Tractatus* behaves like a logical cartographer of the world. With the aid of the picture theory of the proposition[27] and nourished by an internal inclination toward a structure in which thought, proposition, and world intersect, he gives us the world as an intuited—albeit limited—whole.[28] The spatial positioning is in this case the *vertical*; it embodies that *one* correct perspective in which the world and our model of the world become congruent.

In contrast, the Wittgenstein of the *Philosophical Investigations* behaves like an ethnographer of our forms of life; he only reaches insights when he exchanges his standpoint as an observer for a participatory perspective. The spatial positioning is in this case the horizontal, in which the world is encountered as a multitude of heterogeneous language games and life forms, which amongst themselves cannot be hierarchically ordered.[29] They can only be represented as a synoptic plurality—'sketches of a landscape' that come into the world on 'these long and meandering journeys'.[30] In the *Tractatus*, model and world coincide; in the *Philosophical Investigations*, the 'sketches of landscapes' cannot be made congruent amongst themselves. Thus it only remains to order them in the form of an 'album'.[31] The world becomes a continual change of aspect between various two-dimensionally ordered world images.

This distinction between Wittgenstein's early vertical perspective and his later participatory, horizontal perspective is illuminating. Nevertheless, it is apparent that Wittgenstein, in describing representations that depend upon the participatory perspective within an action space, always returns to the idea of 'sketches of landscapes' that must be arranged as an 'album'. It is

thus our assumption that Wittgenstein never broke away from the diagrammatical[32] synopticity[33] that was the nucleus of his interest in the pictorial. His debt to the spatiality of the planar, which we can understand as the phenomenology of everything pictorial, manifests itself as a diagrammatical trace in Wittgenstein's pronounced philosophical renunciation of 'depth'.

We wish to clarify Wittgenstein's renunciation of the dimension of depth using two examples: first, his concept of the 'perspicuous representation' ('*übersichtliche Darstellung*') and secondly, his approach to formalism.

(i) Wittgenstein favours the idea of 'perspicuous representation'[34] as well as that of morphological procedure.[35] Descriptions take the place of explanations[36] because phenomena are synoptically aligned and therefore their relationship can only be visualised by the gradual appearance among them of a figure, form or pattern. In other words, to describe is to make visible by way of alignment. Hence Wittgenstein's injunction: 'don't think, but look!'[37] Certainly, there are different kinds of groupings and—returning to Goethe—Wittgenstein assumes that one possibility for alignment consists in finding a standard of comparison or paradigm in relation to which all remaining phenomena can be ordered according to their similarity or dissimilarity. The scale of the ideal against which all other phenomena are measured is thus not independently inferred, but rather stems directly from the circle of appearances. *Which* morphological relationship is produced depends upon which phenomenon is chosen as a standard of comparison. Clearly, on the horizon of this morphological process, there is no longer any gradation between essence and appearance, between ideals and realisations, between surfaces and deep structures. Wittgenstein cites Goethe approvingly: 'Don't look for anything behind the phenomena; they themselves are the theory'.[38]

(ii) A recurring impulse in Wittgenstein is the renunciation of hierarchisation.[39] It is present in his rejection of Bertrand Russell's theory of types, insofar as this theory falls back upon the linguistic hierarchy of languages. It also appears in his critical discussion of Gottlob Frege's concept of 'meaning': for Wittgenstein, the meaning of a sign does not exist as an entity beyond or behind the sign, but rather lies exclusively in its use.[40] Above all, the paradigmatic orientation toward planarity manifests itself in its relation to mathematics, which he interprets in terms of sign-games[41] which are nonetheless embedded, applicable, and useful in everyday life; they mani-

fest themselves in his dismissal of the descriptive character of mathematical language, which he notably interprets as normative.[42] All computation and proof is based on procedures of sign-transformation, which are made visible as planar configurations of figurative character.[43] Proofs are reproducible pictures whose notable feature is in turn their 'perspicuity'.[44]

The rejection of the dimension of depth and hierarchisation represents Wittgenstein's proximity to formalism;[45] and this proximity does not only relate to mathematics, but also reveals a main feature of his *entire* philosophy. Wittgenstein is a thinker of *flat ontology* and *planar epistemology*; this is perhaps the most radical form of realizing the 'cartographic impulse' within philosophy.

Summary

(**i**) Diagrammatic inscriptions in the form of notations, tables, graphs, diagrams, and maps belong to the domain of visual language. They are as significant for the working of the 'extended mind' as auditory language. Epistemic connections are 'translated' into spatial relations and constituted at the same time. 'Mind' comes into being in the interaction of eye, hand and brain.

(**ii**) Point, line and plane constitute the elementary repertoire of graphematics. They produce a two-dimensional configurative space that can be implemented as a space for the movements of thought. Cognition is oriented by thinking on paper. Diagrammatic inscriptions serve not only to represent and communicate epistemic states of affairs, but also to produce and explain them.

(**iii**) The epistemology of the line is based upon the double life of the line: the empirical stroke is perceptible, the one-dimensional line is merely conceivable. Based on this dual character of the sensual/intelligible, the lines of two-dimensional planes become the 'place' in which the difference between intuition and thought are both produced and bridged.

(**iv**) The metamorphosis of configurative spaces into movement spaces is called a 'cartographic impulse'. The conversion of graphematic structural

spaces into spaces for the activity of thought is a central aspect of our reasoning acts. While the role of notational and graphical inscriptions in the sciences has been repeatedly explored both historically and systematically, a diagrammatological reconstruction of philosophy—with the exception of Peirce—is still needed. Plato, Aristotle, Nicholas of Cusa, Descartes, Leibniz, Lambert, Kant, Peirce, Wittgenstein and Deleuze, among others, will be crucial for this reconstruction.

(**v**) With his Simile of the Divided Line (*Politeia*, 509d–511e), Plato demonstrates the epistemic signature of his ontology by means of a proportioned line. Cognition is specified in terms of spatial ascent. Although Plato's philosophy locates the essential *beyond* appearance, his Simile of the Divided Line imagines the perceptible and the intelligible by means of the homogeneous line *on one* plane, allowing the gap between them to be bridged by '*dianoia*'—scientific understanding that uses the visible as an image of the intelligible. The cartographic impulse takes Plato 'beyond Plato'.

(**vi**) Wittgenstein is an anti-Platonist: for him there is no difference between essence and appearance. Wittgenstein's ontology is 'flat'; his representation is pervaded by characteristics of visual-projective thought, which he had first encountered in his engineering studies. For him, 'cognition' is the way in which phenomena are ordered and depicted via projection and arranged in perspicuous representations. Nevertheless, he concedes in his remarks on the optical illusion of the duck-rabbit that cognition is associated with that which remains invisible—in this particular case, the moment of the change in aspect itself. To articulate it paradoxically: within the diagrammatic scene, Wittgenstein makes visible not what is invisible, but rather an *invisibility*.

Notes

1 Boehm 2001; Mitchell 2008.
2 Earnshaw 1992; Heintz/Huber 2001; Lynch 1998; Tufte 1997.
3 Châtelet 2000, 38 ff.; Summers 2003, 43 ff.
4 Clark/Chalmers 1998: Clark 2008.
5 Krämer 2009, 114–115.
6 Krämer 2010.
7 Gehring/Keutner et al. (eds.) 1992.
8 On Peirce: Stjernfelt 2000; Stjernfelt 2007.
9 Krämer 2008, chapter 18: Karten, Kartieren, Kartographie 298–337.
10 'Real space is the space we find ourselves sharing with other people and things; virtual space is space represented on a surface, space we "seem to see".' Summers 2003, 43.
11 Kant 1977.
12 See Krämer 2010.
13 Krämer (forthcoming) 'The eye of the mind'.
14 Information by Dieter Harlfinger, Director of the Aristotle Archive, Freie Universität Berlin. Reference to the manuscript: Cod. Gr. 1807, f22r.
15 'Theoros' originally means: The envoy of the polis to take part in religious celebrations and oracles: König 1998, 1128.
16 Platon, *Republica* VII, 514–519.
17 See also: *Menon* 82b–84c und 86e–87a, *Theaitet* 147c–148d, *Politikos* 266b.
18 Ptolemaios 2006.
19 König 2000.
20 Hamilton 2001.
21 Wittgenstein 2000; Nyíri 2004.
22 Blich 1987, 284 f.; Gessmann 2009, 157 ff.; Mersch 2006, 925; Nyíri 2004, 110 ff.; Kunzmann 1998, 126 ff.
23 Mersch 2006; Mersch in *Image and Imaging in Philosophy, Science and the Arts*, volume 1, Proceedings of the 33rd International Ludwig Wittgenstein Symposium, edited by Richard Heinrich, Elisabeth Nemeth, Wolfram Pichler and David Wagner (Frankfurt: ontos Verlag, 2011), 257–287.
24 Krämer 2009, 114–115.
25 Wittgenstein 1984, I, 524. But also: 'Kann ich beim Aufleuchten des Aspekts ein Seherlebnis von einem Denkerlebnis trennen? – Wenn Du es trennst, dann scheint das Aufleuchten des Aspekts verloren zu gehen.' Wittgenstein, 1984, VII, § 564, 423.

26 To the 'seeing in': Wollheim 1982, 205–226; Seel 2000, 284.
27 Stenius 1969; Stenius 1975.
28 Wittgenstein 1984, I, *Tractatus* 6.45.
29 Krämer 2001, 111–121.
30 Wittgenstein 1984, I, *Philosophische Untersuchungen*, Vorwort, 231 f.
31 Wittgenstein 1984, I, *Philosophische Untersuchungen*, Vorwort, 232.
32 To this 'diagramatical character' of Wittgenstein's picture theory: Mersch 2006; Schneider 2005.
33 For the 'synopticity': Plaud 2010a, 256–257.
34 Wittgenstein 1967; Wittgenstein I, *Philosophische Untersuchungen* § 122, 302. See: Hacker 2004; Puhl 2001; Puhl 2006; Schulte 1989, 108–112.
35 To the morphological method and Wittgenstein's relation to Goethe: Krämer 2001, 111–114; Plaud 2010b; Rowe 1991; Schulte 1984.
36 'Und wir dürfen keinerlei Theorie aufstellen. Es darf nichts Hypothetisches in unsern Betrachtungen sein. Alle Erklärung muß fort, und nur Beschreibung an ihre Stelle treten.' Wittgenstein 1984, I, *Philosophische Untersuchungen* § 109, 298f.
37 Wittgenstein 1984, I, *Philosophische Untersuchungen* § 66, 277.
38 Wittgenstein 1984, VII, *Bemerkungen über die Philosophie der Psychologie* § 889, 163.
39 Wittgenstein 1984, I, *Philosophische Untersuchungen* § 89, 291.
40 Wittgenstein 1984, VI, *Bemerkungen über die Grundlagen der Mathematik*, Teil I, §§ 19 ff.; Teil V §§ 2, 257 ff.
41 'Wenn wir jedoch irgendetwas, das das Leben des Zeichens ausmacht, benennen sollten, so würden wir sagen müssen, daß es sein Gebrauch ist.' Wittgenstein 1984, V, *Das Blaue Buch*, 20.
42 'In der Mathematik ist alles Algorismus, nichts Bedeutung.' Wittgenstein 1984, IV, *Philosophische Grammatik*, 468. To the normativity of mathematical language: Kroß ed. 2008; Ramharter/Weiberg 2006; Weiberg 2008.
43 'Der Beweis [...] ist *eine* Figur, an deren einem Ende gewisse Sätze stehen und an deren anderen Ende ein Satz steht (den wir den ›bewiesenen‹ nennen).' Wittgenstein 1984, VI, *Bemerkungen zu den Grundlagen der Malthematik*, I, § 28, 48.
44 '›Ein mathematischer Beweis muß übersichtlich sein.‹ »Beweis« nennen wir nur eine Struktur, deren Reproduktion eine leicht lösbare Aufgabe ist. [...] Der Beweis muß ein Bild sein, welches sich mit Sicherheit genau reproduzieren läßt.' Wittgenstein 1984, VI, *Bemerkungen zu den Grundlagen der Mathematik*, III, § 1, 143.—To the surveyability and formalism of proof: Mühlhölzer 2005.
45 Mühlhölzer 2008.

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