INTERNATIONAL PICTURE LANGUAGE

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GENERAL SERIES

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PSYCHE MINIATURES

General Series No. 83

INTERNATIONAL PICTURE LANGUAGE

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BASIC ENGLISH

OPERATIONS

100 ETC.

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YESTERDAY
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WEST
PLEASE
YES

THINGS

400 General

ACCOUNT
ACT
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ADJUSTMENT
ADVERTISEMENT
AGREEMENT
AIR
AMOUNT
AMUSEMENT
ANIMAL
ANSWER
APPARATUS
APPROVAL
ARGUMENT
ART
ATTACK
ATTEMPT
ATTENTION
ATTRACTION
AUTHORITY
BACK
BALANCE
BASE
BEHAVIOUR
BELIEF
BIRTH
BIT
BITE
BLOOD
BLOW
BODY
BRASS
BREAD
BREATH
BROTHER
BUILDING
BURN
BURST
BUSINESS
BUTTER
CANVAS
CARE
CAUSE
CHALK
CHANCE
CHANGE
CLOTH
COAL
COLOUR
COMFORT
COMMITTEE
COMPANY
COMPARISON
COMPETITION
CONDITION
CONNECTION
CONTROL
COOK
COPPER
COPY
CORK
COTTON
COUGH
COUNTRY
COVER
CRACK
CREDIT
CRIME
CRUSH
CRY
CURRENT
CURVE
DAMAGE
DANGER
DAUGHTER
DAY
DEATH
DEBT
DECISION
DEGREE
DESIGN
DESIRE
DESTRUCTION
DETAIL
DEVELOPMENT
DIGESTION
DIRECTION
DISCOVERY
DISCUSSION
DISEASE
DISGUST
DISTANCE
DISTRIBUTION
DIVISION
DOUBT
DRINK
DRIVING
DUST
EARTH
EDGE
EDUCATION
EFFECT
END
ERROR
EVENT
EXAMPLE
EXCHANGE
EXISTENCE
EXPANSION
EXPERIENCE
EXPERT
FACT
FALL
FAMILY
FATHER
FEAR
FEELING
FICTION
FIELD
FIGHT
FIRE
FLAME
FLIGHT
FLOWER
FOLD
FOOD
FORCE
FORM
FRIEND
FRONT
FRUIT
GLASS
GOLD
GOVERNMENT
GRAIN
GRASS
GRIP
GROUP
GROWTH
GUIDE
HARBOUR
HARMONY
HATE
HEARING
HEAT
HELP
HISTORY
HOLE
HOPE
HOUR
HUMOUR
ICE
IDEA
IMPULSE
INCREASE
INDUSTRY
INK
INSECT
INSTRUMENT
INSURANCE
INTEREST
INVENTION
IRON
JELLY
JOIN
JOURNEY
JUDGE
JUMP
KICK
KISS
KNOWLEDGE
LAND
LANGUAGE
LAUGH
LAW
LEAD
LEARNING
LEATHER
LETTER
LEVEL
LIFT
LIGHT
LIMIT
LINEN
LIQUID
LIST
LOOK
LOSS
LOVE
MACHINE
MAN
MANAGER
MARK
MARKET
MASS
MEAL
MEASURE
MEAT
MEETING
MEMORY
METAL
MIDDLE
MILK
MIND
MINE
MINUTE
MIST
MONEY
MONTH
MORNING
MOTHER
MOTION
MOUNTAIN
MOVE
MUSIC
NAME
NATION
NEED
NEWS
NIGHT
NOISE
NOTE
NUMBER
OBSERVATION
OFFER
OIL
OPERATION
OPINION
ORDER
ORGANIZATION
ORNAMENT
OWNER
PAGE
PAIN
PAINT
PAPER
PART
PASTE
PAYMENT
PEACE
PERSON
PLACE
PLANT
PLAY
PLEASURE
POINT
POISON
POLISH
PORTER
POSITION
POWDER
POWER
PRICE
PRINT
PROCESS
PRODUCE
PROFIT
PROPERTY
PROSE
PROTEST
PULL
PUNISHMENT
PURPOSE
PUSH
QUALITY
QUESTION
RAIN
RANGE
RATE
RAY
REACTION
READING
REASON
RECORD
REGRET
RELATION
RELIGION
REPRESENTATIVE
REQUEST
RESPECT
REST
REWARD
RHYTHM
RICE
RIVER
ROAD
ROLL
ROOM
RUB
RULE
RUN
SALT
SAND
SCALE
SCIENCE
SEA
SEAT
SECRETARY
SELECTION
SELF
SENSE
SERVANT
SEX
SHADE
SHAKE
SHAME
SHOCK
SIDE
SIGN
SILK
SILVER
SISTER
SIZE
SKY
SLEEP
SLIP
SLOPE
SMASH
SMELL
SMILE
SMOKE
SNEEZE
SNOW
SOAP
SOCIETY
SON
SONG
SORT
SOUND
SOUP
SPACE
STAGE
START
STATEMENT
STEAM
STEEL
STEP
STITCH
STONE
STOP
STORY
STRETCH
STRUCTURE
SUBSTANCE
SUGAR
SUGGESTION
SUMMER
SUPPORT
SURPRISE
SWIM
SYSTEM
TALK
TASTE
TAX
TEACHING
TENDENCY
TEST
THEORY
THING
THOUGHT
THUNDER
TIME
TIN
TOP
TOUCH
TRADE
TRANSPORT
TRICK
TROUBLE
TURN
TWIST
UNIT
USE
VALUE
VERSE
VESSEL
VIEW
VOICE
WALK
WAR
WASH
WASTE
WATER
WAVE
WAX
WAY
WEATHER
WEEK
WEIGHT
WIND
WINE
WINTER
WOMAN
WOOD
WOOL
WORD
WORK
WOUND
WRITING
YEAR

200 Pictured

ANGLE
ANT
APPLE
ARCH
ARM
ARMY
BABY
BAG
BALL
BAND
BASIN
BASKET
BATH
BED
BEE
BELL
BERRY
BIRD
BLADE
BOARD
BOAT
BONE
BOOK
BOOT
BOTTLE
BOX
BOY
BRAIN
BRAKE
BRANCH
BRICK
BRIDGE
BRUSH
BUCKET
BULB
BUTTON
CAKE
CAMERA
CARD
CART
CARRIAGE
CAT
CHAIN
CHEESE
CHEST
CHIN
CHURCH
CIRCLE
CLOCK
CLOUD
COAT
COLLAR
COMB
CORD
COW
CUP
CURTAIN
CUSHION
DOG
DOOR
DRAIN
DRAWER
DRESS
DROP
EAR
EGG
ENGINE
EYE
FACE
FARM
FEATHER
FINGER
FISH
FLAG
FLOOR
FLY
FOOT
FORK
FOWL
FRAME
GARDEN
GIRL
GLOVE
GOAT
GUN
HAIR
HAMMER
HAND
HAT
HEAD
HEART
HOOK
HORN
HORSE
HOSPITAL
HOUSE
ISLAND
JEWEL
KETTLE
KEY
KNEE
KNIFE
KNOT
LEAF
LEG
LIBRARY
LINE
LIP
LOCK
MAP
MATCH
MONKEY
MOON
MOUTH
MUSCLE
NAIL
NECK
NEEDLE
NERVE
NET
NOSE
NUT
OFFICE
ORANGE
OVEN
PARCEL
PEN
PENCIL
PICTURE
PIG
PIN
PIPE
PLANE
PLATE
PLOUGH
POCKET
POT
POTATO
PRISON
PUMP
RAIL
RAT
RECEIPT
RING
ROD
ROOF
ROOT
SAIL
SCHOOL
SCISSORS
SCREW
SEED
SHEEP
SHELF
SHIP
SHIRT
SHOE
SKIN
SKIRT
SNAKE
SOCK
SPADE
SPONGE
SPOON
SPRING
SQUARE
STAMP
STAR
STATION
STEM
STICK
STOCKING
STOMACH
STORE
STREET
SUN
TABLE
TAIL
THREAD
THROAT
THUMB
TICKET
TOE
TONGUE
TOOTH
TOWN
TRAIN
TRAY
TREE
TROUSERS
UMBRELLA
WALL
WATCH
WHEEL
WHIP
WHISTLE
WINDOW
WING
WIRE
WORM

QUALITIES

100 General

ABLE
ACID
ANGRY
AUTOMATIC
BEAUTIFUL
BLACK
BOILING
BRIGHT
BROKEN
BROWN
CHEAP
CHEMICAL
CHIEF
CLEAN
CLEAR
COMMON
COMPLEX
CONSCIOUS
CUT
DEEP
DEPENDENT
EARLY
ELASTIC
ELECTRIC
EQUAL
FAT
FERTILE
FIRST
FIXED
FLAT
FREE
FREQUENT
FULL
GENERAL
GOOD
GREAT
GREY
HANGING
HAPPY
HARD
HEALTHY
HIGH
HOLLOW
IMPORTANT
KIND
LIKE
LIVING
LONG
MALE
MARRIED
MATERIAL
MEDICAL
MILITARY
NATURAL
NECESSARY
NEW
NORMAL
OPEN
PARALLEL
PAST
PHYSICAL
POLITICAL
POOR
POSSIBLE
PRESENT
PRIVATE
PROBABLE
QUICK
QUIET
READY
RED
REGULAR
RESPONSIBLE
RIGHT
ROUND
SAME
SECOND
SEPARATE
SERIOUS
SHARP
SMOOTH
STICKY
STIFF
STRAIGHT
STRONG
SWEET
TALL
THICK
TIGHT
TIRED
TRUE
VIOLENT
WAITING
WARM
WET
WIDE
WISE
YELLOW
YOUNG

50 Opposites

AWAKE
BAD
BENT
BITTER
BLUE
CERTAIN
COLD
COMPLETE
CRUEL
DARK
DEAD
DEAR
DELICATE
DIFFERENT
DIRTY
DRY
FALSE
FEEBLE
FEMALE
FOOLISH
FUTURE
GREEN
ILL
LAST
LATE
LEFT
LOOSE
LOUD
LOW
MIXED
NARROW
OLD
OPPOSITE
PUBLIC
ROUGH
SAD
SAFE
SECRET
SHORT
SHUT
SIMPLE
SLOW
SMALL
SOFT
SOLID
SPECIAL
STRANGE
THIN
WHITE
WRONG

NO 'VERBS'

IT
IS
POSSIBLE
TO
GET
ALL
THESE
WORDS
ON
THE
BACK
OF
A
BIT
OF
NOTEPAPER
BECAUSE
THERE
ARE
NO
'VERBS'
IN
BASIC
ENGLISH.

A
WEEK
OR
TWO
WITH
THE
RULES
AND
THE
SPECIAL
RECORDS
GIVES
COMPLETE
KNOWLEDGE
OF
THE
SYSTEM
FOR
READING
OR
WRITING

EXAMPLES OF WORD ORDER

THE
CAMERA
MAN
WHO
MADE
AN
ATTEMPT
TO
TAKE
A
MOVING
PICTURE
OF
THE
SOCIETY
WOMEN,
BEFORE
THEY
GOT
THEIR
HATS
OFF,
DID
NOT
GET
OFF
THE
SHIP
TILL
HE
WAS
QUESTIONED
BY
THE
POLICE.

WE
WILL
GIVE
SIMPLE
RULES
TO
YOU
NOW.

RULES

ADDITION OF 'S' TO THINGS WHEN THERE IS MORE THAN ONE.

ENDINGS IN 'ER', 'ING', 'ED' FROM 300 NAMES OF THINGS

'LY' FORMS FROM QUALITIES

DEGREE WITH 'MORE' AND 'MOST'

QUESTIONS BY CHANGE OF ORDER, AND 'DO'.

FORM-CHANGES IN NAMES OF ACTS, AND 'THAT,' 'THIS' 'I,' 'HE,' 'YOU,' 'WHO', AS IN NORMAL ENGLISH.

MEASURES NUMBERS DAYS, MONTHS AND THE INTERNATIONAL WORDS IN ENGLISH FORM.

THE ORTHOLOGICAL INSTITUTE
10
KING'S PARADE,
CAMBRIDGE,
ENGLAND.

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INTERNATIONAL PICTURE LANGUAGE

THE FIRST RULES OF ISOTYPE

BY

OTTO NEURATH

Director of the International Foundation or Visual Education, Writer of "Basic by Isotype"

WITH ISOTYPE PICTURES

LONDON:
KEGAN PAUL, TRENCH, TRUBNER & Co., Ltd.
BROADWAY HOUSE, CARTER LANE. E.C.
1936

British

American

Scientific

International

Commercial

"One unlooked-for development of the hundred years between 2000 *and* 2100 *was the way in which Basic English became in that short time the common language for use between nations. . . . By* 2200 *almost everyone was able to make use of Basic for talking and writing."—H. G. Wells.*

Put into Basic from *The Shape of Things to Come*

Printed in Great Britain by
R. I. SEVERS, CAMBRIDGE

408.9
N491

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NOTE

This book in Basic English is a first general outline of the questions in connection with the building up of the international picture Language 'ISOTYPE': International System Of TYpographic Picture Education. It will give some facts about the relation of ISOTYPE to languages generally, about some language rules of ISOTYPE, and about its international value.

We are here giving an idea of the possible development of this picture language and the field which may be covered. The system is now ready to be used generally in all fields of education—there is a special need for it at the present time. The position is this: there are a number of attempts being made today to make a fuller use of pictures for teaching and advertisement, but there is no connection between these attempts. Till now no clear-cut selection of good rules from among those in general use has

438085

been made. Our book gives such a selection from the point of view of teaching and advertisement—a selection which is in harmony with a complete system for an international picture language.

Further, till now there has been no system for working out such pictures. Even geography maps, though based on a fixed system of picture rules, do not get as much profit as they might from teaching experience. Maps are dependent for their form on the work of men of science and designers—but for putting the two together a special expert is needed. This is even more important in other fields of picture-making. Turning the statements of science into pictures is frequently a delicate business, and it is not the work of a man of science or of a designer. Special attention to this process has given birth to the ISOTYPE system. Its rules are the instruments for putting together the work of science and the work of design.

The first step from the statements of science to the pictures has a special name : ' transformation.' For transformation as for designing—the writing of the picture language—it is necessary to have

not only a knowledge of the rules but training in their use. That is why it was only possible to make a start with such a picture language when an organization had been formed in which a group of persons of different education had been working together for years. The Government of Vienna gave birth to such an organization in the form of the " Gesellschafts-und Wirtschaftsmuseum in Wien " in the year 1925 (which was in existence till 1934). More than ten years back pictures made by this group of persons were put before the public for the first time. From that time on it has been working on the development of the international picture language ISOTYPE. Every new picture is a step forward. A great number of pictures has been produced for a great number of countries. The organization for producing teaching pictures is now at The Hague. To give a further impulse to these tendencies and to make clear the new sort of education for which these pictures are a base, a special international organization has been formed: the INTERNATIONAL FOUNDATION FOR THE PROMOTION OF VISUAL EDUCATION BY THE ISOTYPE

METHOD (President : M. L. Fleddérus) with its head office at The Hague.

A number of persons have given their support to the building up of the system ; some of them are working together today as the chief group in the " MUNDANEUM INSTITUTE THE HAGUE ": Marie Reidemeister, putting material together and making the ' transformations ' ; Gert Arntz and Erwin Bernath designing the signs and making the pictures ; Josef Scheer printing, colouring, and helping generally. From the very start Josef Frank has been our regular expert on the building and organization of museums.

The pictures given here as examples are very small and in black and red only. The selection of these ISOTYPE pictures had to be made with these limiting conditions in mind. However, these examples will give an idea of the effect which is possible with pictures of greater size using a wider range of colours, and of the sort of help they give in making clear complex relations in society and economics, in biology, the engineering sciences, and a number of other fields.

Miss Reidemeister gave much help in putting together the material in this

book, and Miss L. W. Lockhart gave special attention to the language side. For the kind offer to get out a book on international picture language I am in debt to Mr. C. K. Ogden and The Orthological Institute.

Otto Neurath,

International Foundation
for the Promotion of
Visual Education,

267, *Obrechtstraat,*
The Hague, Holland.



ISOTYPE

International
System
Of
TYpographic
Picture
Education

THE QUESTION OF AN INTERNATIONAL LANGUAGE

The desire for an international language is an old one, and it is more than ever in men's minds at this time of international connections in business and science. But 'debabelization' is a very hard and complex work. The attempt to make one international language has given us a parcel of new languages. The best way out seems to be the use of instruments which are, or have become, international. For this reason this book is in Basic English, because this international language is part of an old language in general use.

The question of an international language has now become important. There are a number of signs pointing to a great development of international organization in the near future—though we are living in a time of warring interests and broken connections. Any work done on the question of international languages—with a view to making a word language, or

a helping picture language—will give support to international developments generally. An international language has to take into account international needs, and at the same time it has to be as simple as possible.

Every language is complex—even the simplest. Its store of words and its rules make it possible to put a statement into other words or one group of statements in the place of another. The words 'here' and 'now' may be used in talk, but in a book time and place are not common to the writer and the reader, so the book has to give the points of time and place in their relation to our general system of time and place. Statements are more or less clear-cut; the words used in business and talk are not as complete as they might be; when persons are face to face it is enough to give an idea of what is in one's mind if one's hearers are conscious what the question is. That is the same even with the language of science. The name of the book makes clear its range, and the range makes clear the sense of the words.

All this is true not only of our normal language, and the special instruments of

business and science, but, with special changes, of picture languages, as international instruments specially designed for education and advertisement. The ' words ' and ' statements ' of the picture language—signs and their order— are not the same in pictures in a book as they are in pictures on walls. A special organization is necessary to make clear certain relations between them with the smallest possible number of words. Such adjustments to special purposes have to be made in any language.

To be good at a language more is needed than a knowledge of the words and of the rules : the sense of a word and of a group of words is different under different conditions. It is an art to get the full effect from the words. In the same way it is an art to get the full effect from pictures. To make a picture is a more responsible work than to make a statement, because pictures make a greater effect and have a longer existence. Every ISOTYPE picture is like a part of a great picture book or encyclopaedia, because all of them have to go together. This is necessary even with the pictures for boys and girls. The word language of boys and girls is not a

special language but it is not complete. In the same sense the ISOTYPE language for a lower form of education is a part of the ISOTYPE language as a complete system in itself.

There are simple picture languages in which no other sorts of signs are used. What we have to do with here, however, is a picture language which is not able to give the story by itself, but only with the help of the words of a normal language.

Where to put your boxes



Where to get your boxes

PICTURE 1

ISOTYPE
AS A HELPING LANGUAGE

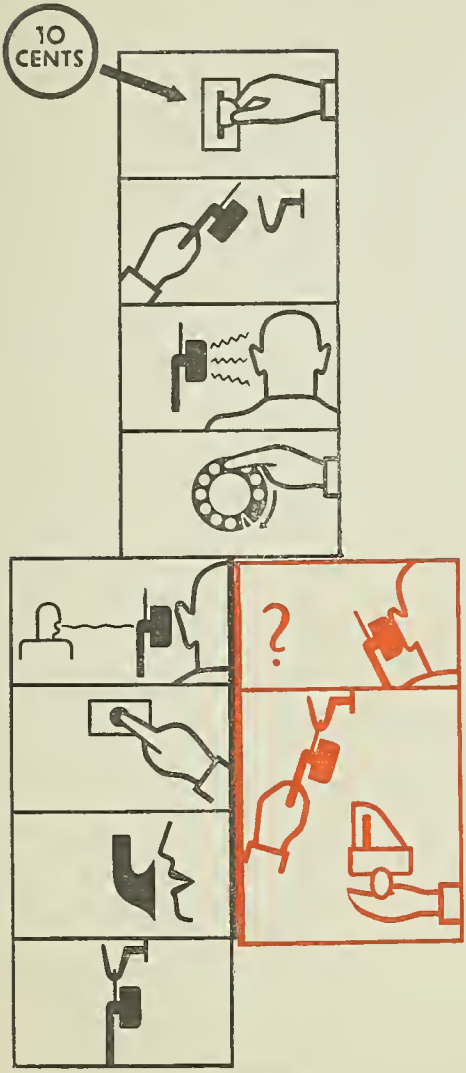
In the Far East we see *one* language for writing, but a great number of languages for talking. We have made *one* international picture language (as a helping language) into which statements may be put from all the normal languages of the earth. We have given it the name 'ISOTYPE.'

A picture language of this sort is frequently very important and of great use. A man coming into a strange country without a knowledge of the language is uncertain where to get his ticket at the station or the harbour, where to put his boxes (see Picture 1), how to make use of the telephone in the telephone box (see Picture 2) ,where to go in the post office (see Picture 3). But if he sees pictures by the side of the strange words, they will put him on the right way. Signs might give the same sort of help in ' statistics ' (making comparisons between amounts). The books of this science are full of numbers

—the international signs of the language of mathematics—and words are only used to give their sense. But we are not able to get anything from them if we have no knowledge of the language used. A sign at the top of a list of numbers (see Picture 4) makes us almost independent of the knowledge of the language, because pictures, whose details are clear to everybody, are free from the limits of language: they are international. WORDS MAKE DIVISION, PICTURES MAKE CONNECTION.

Education by pictures in harmony with the ISOTYPE system, advertisement by ISOTYPE signs, will do much to give the different nations a common outlook. If the schools give teaching through the eye in harmony with this international picture language, they will be servants of a common education all over the earth, and will give a new impulse to all other questions of international education.

The ISOTYPE picture language is not a sign-for-sign parallel of a word language. It is a language which may be put into words in very different ways. The units of the picture language have different senses when they are in different positions.



Picture 2

It is not possible to give a word for every part of such a picture or a statement for every group of parts. The parallel in a normal language of a complete ' language picture ' is a complex group of statements ; and an account in words of what is in a group of language pictures would make a book. The sense of every part of these pictures is dependent on the sense of the complete picture and on its relation to the other parts of the picture. Like words they are used again and again to make quite different statements.

Reading a picture language is like making observations with the eye in everyday experience : what we may say about a language picture is very like what we may say about other things seen by the eye. For example : the man has two legs ; the picture-sign has two legs; but the word-sign ' man ' has not two legs.

But the uses of a picture language are much more limited than those of normal languages. It has no qualities for the purpose of exchanging views, of giving signs of feeling, orders, etc. It is not in competition with the normal languages ; it is a help inside its narrow limits. But in the same way as Basic English is an

Post-signs

telegrams

stamps

telephone

air-post

money



Picture 3

education in clear thought—because the use of statements without sense is forced upon us less by Basic than by the normal languages, which are full of words without sense (for science)—so the picture language is an education in clear thought—by reason of its limits.

EDUCATION BY THE EYE

Teaching through the eye is today becoming more and more important. Its development is going forward in a number of ways, and it is only a question of time before a complete system will be part of our general education. The general public is conscious of the need for education by the eye—the great number of pictures like ISOTYPE pictures in different countries (used, though they are, without relation to the system) are a sign of that.

Our experience is that the effect of pictures is frequently greater than the effect of words, specially at the first stage of getting new knowledge. The number of pictures which come before everybody's eyes in newspapers, in motion pictures, in the street advertisements, is getting greater and greater, and today it is most

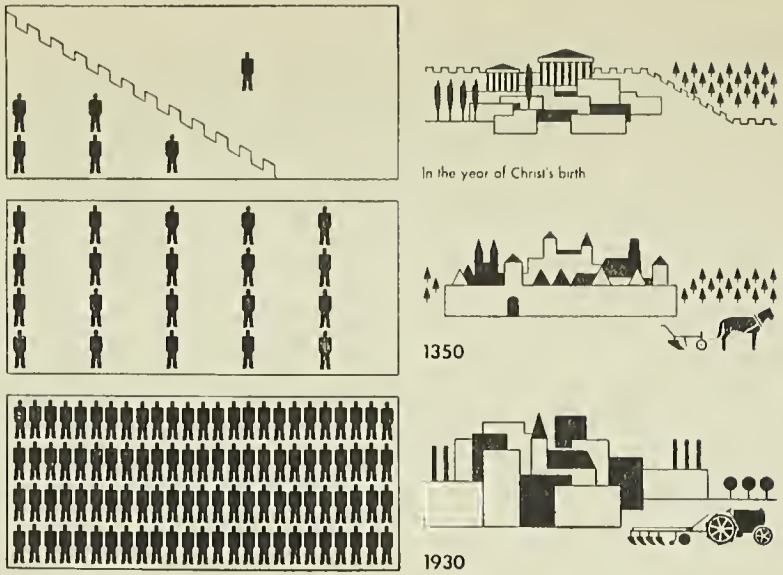
Gewerbebetriebe im Deutschen Reich 1933

	Betriebe	Beschäftigte: Männl.	Beschäftigte: Weibl.
Bergbau usw	1 305	437 807	4 776
Eisen- und Stahlgewinnung	1 458	473 570	7 657
Herstellung v. Eisen Stahl- u. Metallwaren	155 833	492 694	92 952
Elektratechnische Industrie	27 551	183 992	63 198
Chemische Industrie	7 699	182 443	63 986
Papierindustrie	10 886	118 936	62 171
Textilindustrie	67 579	385 840	460 991
Halz- und Schnitzstaffgewerbe	214 640	555 179	52 638
Kautschuk- und Asbestindustrie	1 948	27 775	20 519
Bekleidungsgewerbe	535 266	528 264	517 037

Picture 4

necessary for the schools to take note of this fact, if the effect of the streets is not to be greater than that of the school. The schools, like all old organizations, are rooted in the past, and the general teaching tendency is the outcome of the old opinion that pictures are only for men without knowledge of reading and writing, and not for men of good education. Even today there is still much of this feeling against pictures, which are said to make a book seem less serious, but in competition with it is the new feeling that today the eye is all-important.

The schools are starting to make use of pictures, but only in the less important connections. The full use of the rules of the ISOTYPE system will make a complete change in our ways of teaching. New fields of knowledge will be open for teaching in schools. The history of nations and groups (see Picture 5), the organization of goods, suddenly become clear when put before the eye in good teaching-pictures. The first suggestion gives the learner the guide to deeper knowledge and to science, without the danger which is so frequent in education by words: that of taking note only of details and seeing nothing of


Number of Men Living in Europe
In the year of Christ's birth
1350
1930
1 sign for 5,000,000 men

PICTURE 5

the general view. If the general view is given by teaching-pictures, it will be kept in mind.

The first need for teaching by pictures is to give the teacher good teaching material. Teaching by the eye is much more dependent on good teaching material, and much less dependent on the powers of the teacher than other forms of teaching. The better the teaching material is, the less teaching experience is necessary, which makes possible a higher general level of education. A small number of organizations, or even one common organization, will be able to give us all the teaching material needed and to see that it is of the best quality, but where are we to get thousands and thousands of good teachers? The teaching system which has the greatest value is not the one which in the hands of good teachers gets the learners furthest, but that which makes it possible for the least able teachers to do good work.

Frequently it is very hard to say in words what is clear straight away to the eye. It is unnecessary to say in words what we are able to make clear by pictures. And on the other hand, it is frequently

hard to make a picture of a simple statement. Education has to put the two together, and a system of education has to see which language is best for which purposes.

There will be need in the education system of the future for a system of teaching by pictures. Here it is—the first and so far the only system of making teaching-pictures.

THE CHIEF POINTS OF THE ISOTYPE SYSTEM

A picture making good use of the system gives all the important facts in the statement it is picturing. At the first look you see the most important points, at the second, the less important points, at the third, the details, at the fourth, nothing more—if you see more, the teaching-picture is bad.

A good teacher is able to keep out all unnecessary details. For the selection, a clear sense of the needs of education is important, and a good teaching-picture may only be produced with the help of a good teacher. The value of teaching by

pictures is that facts are put before the mind in a simple, straightforward way and are kept in memory. A good teacher is conscious that only a certain amount of knowledge will be kept in mind. So he puts into his picture only what is necessary. He is of the opinion that a simple picture kept in the memory is better than any number of complex ones which have gone out of it.

Sometimes a comparison is made between education by pictures and business advertisement by pictures. This comparison has its limits. Every business advertisement is in competition with every other and necessarily has the tendency to put all other such pictures out of the memory of the on-looker. Attempts to get general advertisement units are against the purposes of advertisement and will not ever come to anything. Every advertisement has to be different from all others. Not so the teaching-pictures. One has to be like another so far as it gives the same details, and to be different from another only so far as the story it gives is different. All pictures are part of a unit: they are using the same language. Signs of the same language are put together in

harmony with the same rules. This is the reason why long experience and special training is needed for the process of putting the material given by science into teaching-pictures.

The man of science has to make clear-cut statements on which other clear-cut statements in different branches of science may be based. The picture-maker has to be guided by the rules of education by the eye and to make a *selection of material which will give a certain teaching effect,* but it is not his purpose to give a full account of all the facts. The outcome of this is that a number of experts in science are not supporters of this system, and are even of the opinion that it is a danger to the rules of their science. But the needs of education are of a different sort from those of science, and they have to be worked out by men with a special outlook and training.

Sometimes fact-pictures have to put details clearly before the eye. Which details to put in, which to keep out, is a hard question and one which is not to be answered generally but only in relation to special examples. We will say more about this later.

A specially important part in the ISOTYPE system in its present development is taken by the pictures giving 'statistics' or the relation between amounts of different things—'amount pictures,' or 'number fact pictures.' To most men the reading of long lines of numbers is a great trouble—they put down a book when they see it has in it numbers or curves. But pictures are an attraction. This fact gives the ISOTYPE system a special value for all sorts of education.

It is not necessary for every reader of ISOTYPE pictures to have a complete knowledge of all the rules of the ISOTYPE system, because without being conscious of the reason he gets the effect of the pictures. It is the same with the reading of a good play or a well-balanced bit of writing—there is no need to have a knowledge of the art used in producing such effects to get pleasure from it. We may even say that almost no knowledge at all is necessary of the 'words' of the picture language—the signs—or of the rules for talking this language—the system.

On the other hand, for writing this language much more is necessary than the reading of a book about the system. The



man



group

PICTURE 6

work has to be done by a group of experienced persons acting together : men of science, the teacher (the ' transformator '), and men with a knowledge of designing, colouring, printing, pasting, etc.

THE SIGNS

In building up such a language great care has to be taken to see that as much as possible may be said with the help of the smallest number of words. That is to say, for our picture language one general list of a limited number of signs is needed for international use, and this has to be worked out by or under the control of one *chief organization*. (This organization is now the ISOTYPE work-rooms at the Hague). On this international list, giving all the necessary rules about forms and colours, international picture education and advertisement will be based.

The signs have to be clear in themselves, without the help of words as far as possible —that is, ' living signs.' They have to be different from one another, so that there will be no doubt of their right name, when they are seen again. They have to

be so simple that they may be put in lines like letters. The signs have to be of such a form that the on-looker will not get tired of seeing lines of the same sign. The sign ' man ' has not to give the idea of a special person with the name XY, but to be representative of the animal ' man ' (see Picture 6). A picture-sign for the word-sign ' men ' is different from a picture of some men. In the first we give a group-sign ' men,' (Picture 6) made by putting together a number of signs for ' man;' in the second it may be necessary to give a picture of a number of different men, small, tall and so on. Sometimes, for example in teaching history, it may be necessary to give the picture of a special person in a teaching-picture—that is not at all out of harmony with the rules of picture language.

Most of the signs may be used not only in lines but as separate designs. An example of this is the sign for ' servant' (see Pictures 7, 8, 9). It is used : 1, on the directions for making use of the bell, 2, in a picture of a lift, 3, as a unit in an amount-picture.

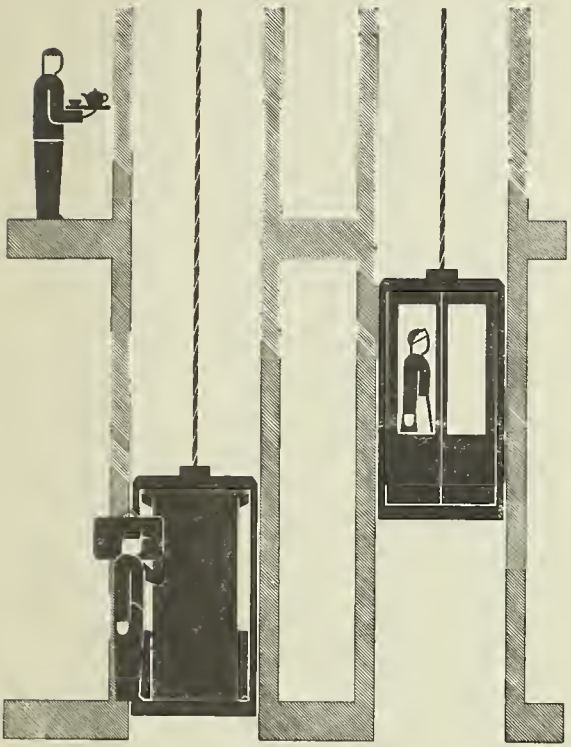
The sign for ' automobile ' is the same in a picture teaching care on the road as

Bells for the different sorts of servants



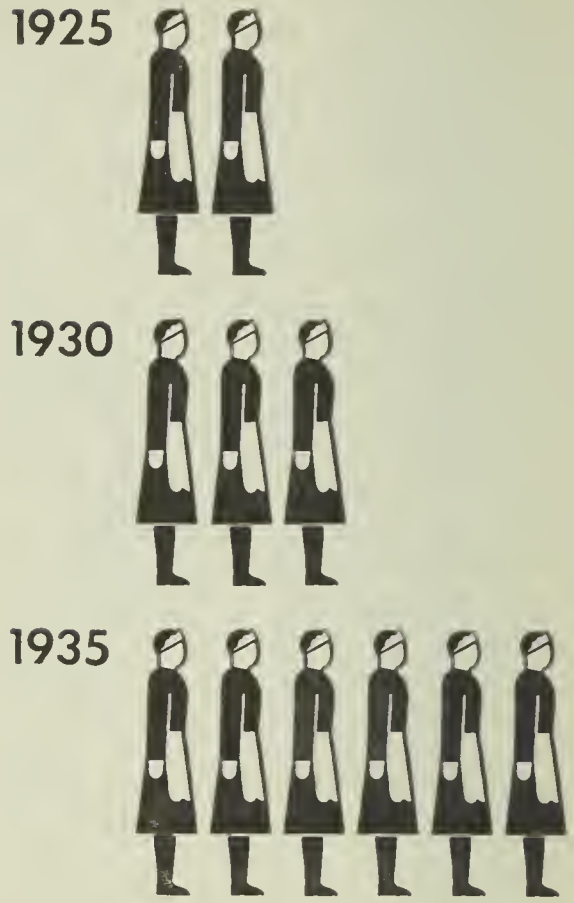
Picture 7

Isotype picture of a lift in a hotel (detail)



Picture 8

Growth in Number of Servants



PICTURE 9

in an amount-picture. You will see here a new suggestion of the Mundaneum Institute, to be used on roads at the points where the rule to keep to the right is changed into the rule to keep to the left, and the other way round (see Pictures 10 and 11). Frequently this change is not at the line of division between two countries, and if the directions are only given in words and the chauffeur has no knowledge of the language used, bad smashes may be caused. The idea is to put the directions: " Go slowly and get over on to the other side of the road " on three-angled boards at some distance from the point of the change. Then at that point put up a square board, which will be clear not only for automobiles but for persons on foot who have no training in road signs. It is important to have the signs for ' automobile front ' and ' automobile back ' very different from one another, because only in this way will the direction of the automobile be clearly seen at the first look. The automobile back has been made as dark as possible, the front much lighter. The sign for ' automobile front ' is the unit for the amount picture of the numbers of automobiles in existence (see Picture 12).



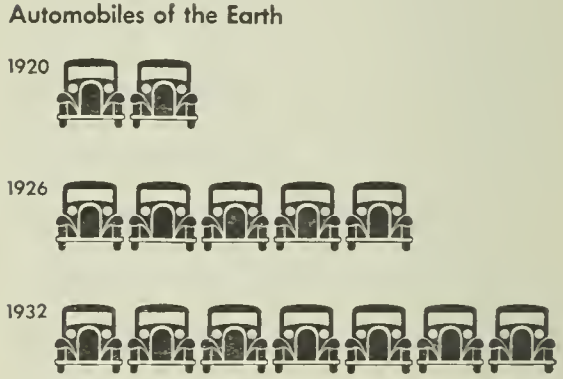


PICTURE 10



PICTURE 11

Science gives us accounts of old picture languages in general use, for example, in the first stages of the development of society. The signs used are frequently not very clear to us today, but they were clear when and where they were used. We are not able to take over the old signs as they are. Adjustments have to be made in relation to the forms of today and tomorrow before it is possible for them to come into general use. Giving a sign its fixed form for international use, possibly for a great number of years, is responsible work. The signs have to be like good letters. It will not do to take the taste of the present day as our only guide ; we have to



PICTURE 12

take into account the experience of history. The picture-writing of old Egypt and pictures of fights on old military maps (see Picture 37) are of much help in building up a system of signs. The ISOTYPE list of signs, put together in the last 10 years, is based equally on the experience of the past and on present forms. If we were not in a position to make use of past experience, it might be a very long time before our store of signs was complete.

The colours do not give as much trouble as the forms. The use of colours in pictures, not only to give natural effects, but as signs for special qualities or feelings, has been common from earliest times. In teaching-pictures the colours are a great help to the eye in keeping together different divisions in a common group. For example: metal industry: red; clothing industry: blue; wood industry: green; and so:

iron industry, machine industry: different signs in red.

cloth industry, dress making: different signs in blue.

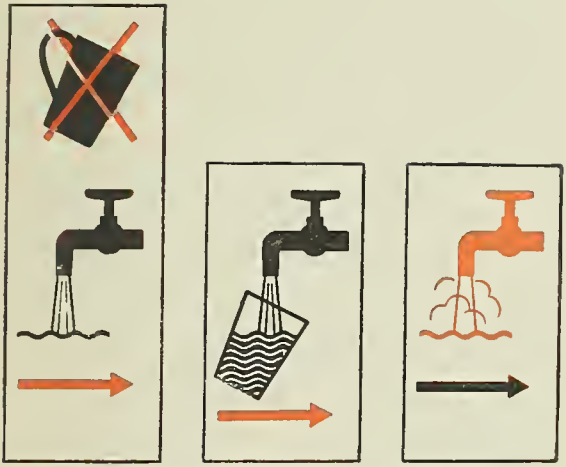
cutting up wood, wood work: different signs in green.

If a distribution of such signs is made on a map it is a great help to see groups in colours when looking at it for the first time.

Sometimes the colours are necessary to make clear that signs of the same form have a different sense. For example: the picture of "Development of the iron produced on the earth" will be made up of signs for iron which are completely like one another. If at the same time the development of the iron produced in different countries has to be seen, the signs have to be in different colours, as: blue for U.S.A., red for Great Britain, black for Germany, and so on.

The rules for colours are not so fixed as the rules for forms. There are only seven colours for use in ISOTYPE pictures: white, blue, green, yellow, red, brown, black; and only some of them may have a further division (as into: light blue, dark blue, light green, dark green, light red, dark red, light brown, dark brown), or be mixed with others, as white and black to make grey, yellow and red to make orange etc. Even this small number of colours may not all be used in the same way: on white paper all

To the water



not for drinking for drinking warm water

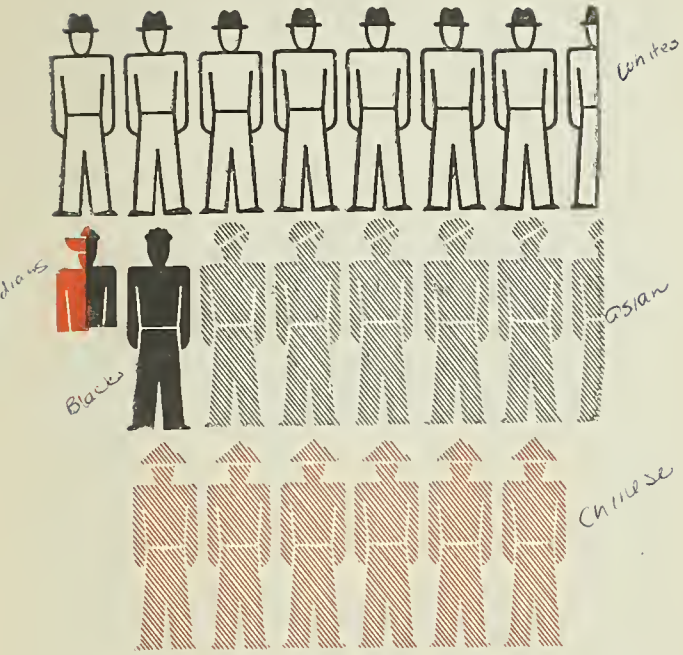
PICTURE 13

white signs have to have a black line round them, and so do most of the yellow signs. The colours blue, green, red are almost of the same weight and so are used most frequently with black, grey, and sometimes with brown.

There are certainly maps or pictures with a great number of different shades. But the teacher has to make use of as small a number as possible, because most persons have not a delicate colour-sense, and because the teaching effect of shades of colours is small. The colours have to be so different that there will be no doubt in the mind of the on-looker which colour he has before him when he sees it separately.

A decision about colours which is made for a group of pictures has to be supported by all the group. But in another group the order of colours may have to be changed—because of the small number of colours at hand. If the pictures are to be printed, the range of selection is frequently even smaller. For printing purposes one may be limited to only two colours, and the colour will then be nothing more than a guide to the more important thing—but even then the ISOTYPE picture-maker will keep as near as possible to his

Men Living on the Earth



1 sign for 100,000,000 men

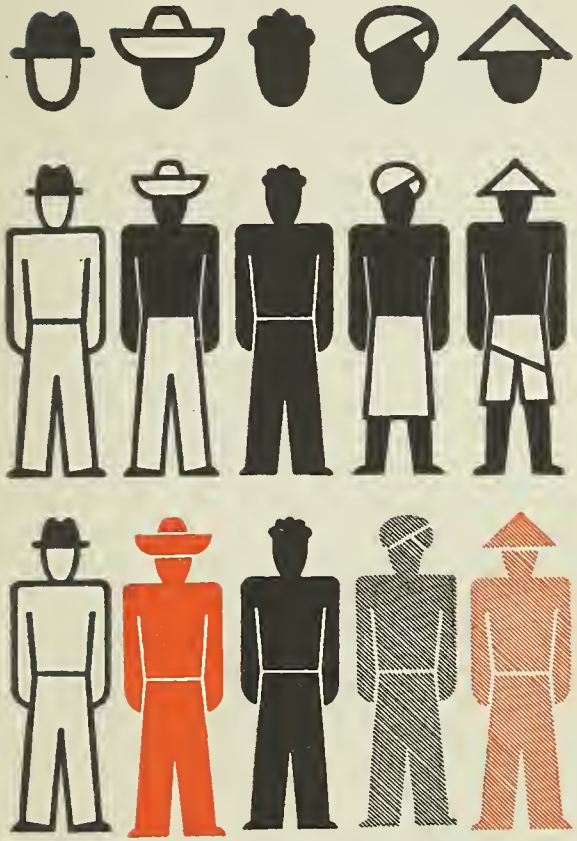
White—red—black—brown—yellow men

PICTURE 14

colour rules. If, for example, he has to give a picture of cold and warm water, he will make the warm water red (red is warm, power, industry. . .) and the cold water blue. If there is only black and red, he will make the warm water red and the cold black (see Picture 13). If there is only black, he has to make the two of them black, and this is the reason why the signs for warm and cold water have further to be different in design. One of the important rules for the designer is that it is necessary to be able to see the sense of an ISOTYPE picture from its camera copy in black and white. Where it is impossible to say something of the form only, and at the same time impossible to give colours, the effect has to be got by shades of black, small lines or points covering the plane like a colour. The selection of such lines, curves, and points has to be made in such a way that the eye will readily see that the designs are different from one another even when it sees them separately.

Pictures 14 and 15 give examples of changing from five colours to two or one. But Picture 14—though not making use of the special man-signs of Picture 15,

Signs for the 5 groups of men



PICTURE 15

second line—would be clear in black, because the hats of the man-signs are different in form. When this picture is in five colours, these do not give the effect of the true colours of the skin : they are much more different than the natural colours. They are the simple colours which have the same name as the group of men of which they are the representative. If there are only black and red for print—as here—the red man will be red and the black black, the white will have a black line in place of the grey line used in a picture with more colours, and the yellow and brown will be changed into light red and light black.

There is a certain general feeling about the sense of the colours. Not only is hope green, love red, etc.–these facts are not very important in teaching—but there will be a great measure of agreement about the colours representative of such groups as farming, industry, business, and transport, if these groups are to be marked off from the rest. Farming will be green, industry red, business and transport blue, other groups grey. In addition, the sign for farming will be a curved knife, for industry a toothed wheel, for business and transport scales (see Picture 16).



curved knife
(farming)



toothed wheel
(industry)



scales
(trade)

PICTURE 16

If colours have to be given to the three stages of development of society—the earliest stage, the stage of a high development of handwork, the stage of machine work, they will be green for the first, blue for the second, red for the last. Green is wood, grass, field, young, early. Red is industry, machine, metal, warm, present, higher stage of development, worker. Blue is in the middle. The sign for a country is frequently a flag, or one of the colours of the flag. Great Britain is red, U.S.A. blue, Germany black, France blue, and so on.

PUTTING SIGNS TOGETHER

There is a sign for ' shoe ' (a shoe), and there is a sign for a works (a building with a great smoke-outlet). By joining these two words to make the new word ' shoe-works ' we get the word for a works in which shoes are produced. The picture of such a works in the ISOTYPE picture language is the building with the great smoke-outlet, with a shoe on it. If it is desired to say " shoes produced in a works (by machine) " and " shoes produced by handwork," the Basic language gives



shoe



works



shoe-works



shoes produced
by machine



shoes produced
by handwork

PICTURE 17

' machine-made shoe ' and ' hand-made-shoe ' (see Picture 17). On the ISOTYPE picture the signs will be in two groups and at the top of one group will be the sign for ' produced by machine', and at the top of the other group a sign for hand-work. Or the division might be made by colours, and the sense of the colours would be given in a clear way by making the signs for machine and handwork in their special colour, and placing them well.

There is a sign for ' worker ' and a sign for ' coal.' If it is necessary for a worker in the coal industry to be marked off from other workers, the sign for coal will be put on his chest. The man is the thing and the coal is his quality. The man is the root idea and the coal the addition. On the other hand, the coal may be the root idea and the man the addition, for example if we are talking about coal produced by handwork and coal produced by machines (see Picture 18). Then we will make the decision to put the man and the machine outside the coal. Such signs outside the root picture to which they are an addition are named ' guide-pictures.' ' Guide-pictures ' are used for example in



worker



coal



coal-worker



coal produced
by machine

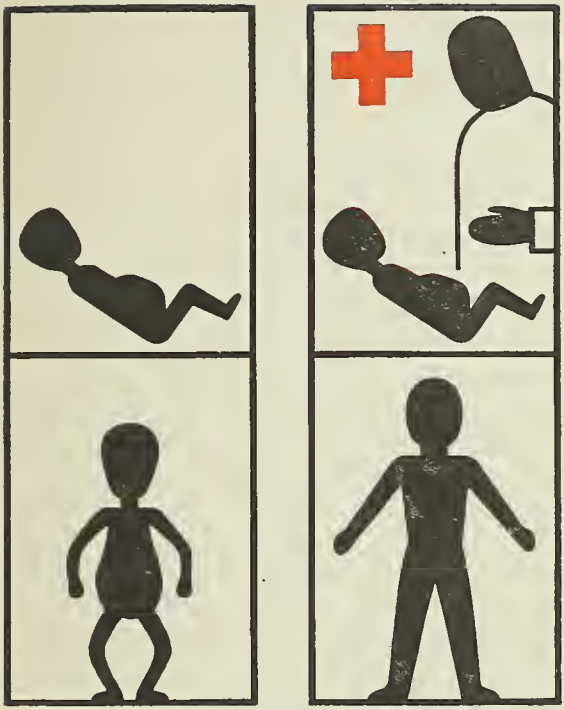


coal produced
by hand

PICTURE 18

Picture 5, giving an idea of the different times and of the facts in connection with the different living conditions, making it clear that in our day it is possible to have more men living on the same space. The iron-making apparatus at the top of Picture 30 makes clear only that we have to do here with the amount of iron *produced*. On Picture 33 a comparison is made between the automobiles produced in America and in Europe. There are guide-pictures of America and Europe, making us more independent of the words.

The system of connection between signs in word languages and picture languages is not at all parallel. In a picture language there is no sign for the word 'foot;' and for word groups like "foot of a man," "foot of a mountain," "foot of a table" there are simple signs of a very different sort. Generally, the foot of a man will not be important in a language picture and the statements giving an account of the picture will not make use of the word 'foot.' But sometimes special attention will be given to the foot, for example if the statement: Take care not to have a smash, your foot may get broken, and so on . . . has to be



Go to the medical man, if your baby has Rachitis

PICTURE 19

put into a picture. Another example is when the form of the leg is the key point of the picture. The baby with the straight legs is the healthy baby, the baby with the bent legs is the one who is ill (see Picture 19). 'Go to the medical man if your baby has Rachitis ; he will give you help in making it healthy.'

The picture language has frequently to make different signs for things at rest and things in motion, for example : grain produced here for use here, grain going to other countries, grain coming from other countries. The three signs of the ISO-TYPE language are : grain by itself, grain on a small ship, grain on a small ship done in outline, not in full colours (see Picture 20).

If the sign ' coffee ' is by itself, its sense is coffee and nothing more, but if the sign ' coffee ' by itself is at the side of coffee on a ship, coffee in outline on a ship in outline, coffee with a flame, coffee with a line round it, these five signs are representative of : coffee produced here for use here, coffee produced here to be sent to other countries, coffee coming from other countries and used here, coffee for destruction, coffee in store (Picture 20). These are the divisions



Signs put together

PICTURE 20

of the coffee business today. Picture 21 gives this story :

Most of the coffee is produced in South America, but a third part of it is for destruction. A very small part is for use in South America itself. The rest goes to other countries. Canada and the U.S.A. together are using as much as Europe and the Soviet Union together. The amount of coffee in store is almost as great as the produce of one year, but this year the store is getting a little smaller : certain amounts are being sent away (signs of stored coffee on a ship).

Flames are not at all times the sign for destruction. Coal with a flame is coal used, or heat produced by coal, in comparison with heat produced by oil and working power produced from water power (Picture 20). Such changes are the same as with certain words in the word language : the spring of a watch is not the same as the spring which comes after the winter.

Ships used with other signs make the statement only that things are moved, and do not say anything about the direction in which they go. If the direction itself is important, or if the starting-point and the end-point have to be noted, this direction



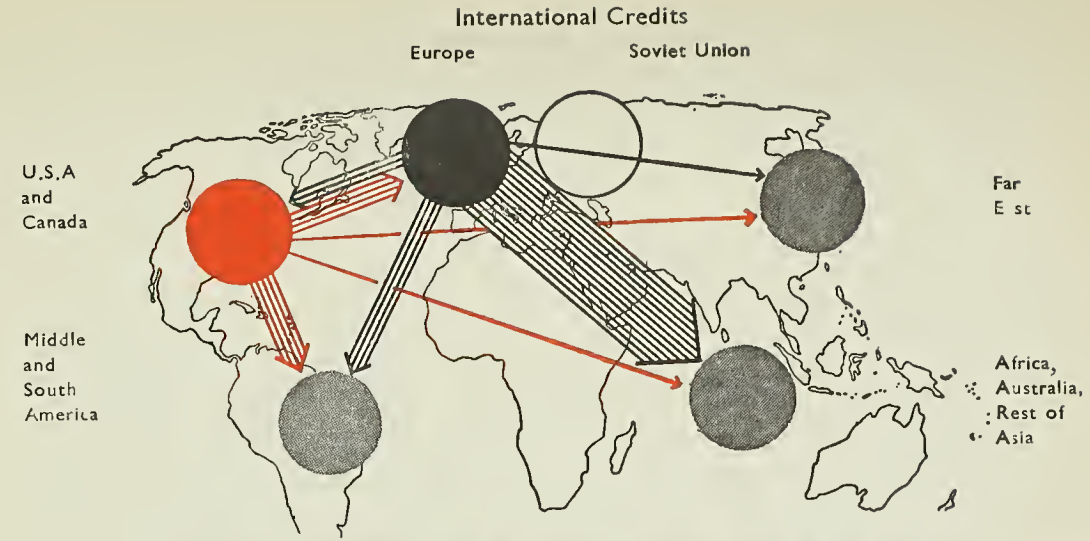
1 sign for 100,000 tons of coffee.

black without ship :	produced and used
black on ship :	produced and sent to other countries
black with flame :	produced for destruction
black with lines round :	in store
in outline :	sent from other countries and used

PICTURE 21

or these places have to be designed in addition, for example by lines on a map joining the two parts of the earth (see Picture 22). If it is important to see which of the ways across the earth are used more frequently and which less, the number of lines of connection may be in relation to that. Ships forming an addition to the chief sign, representative of 'move,' will be seen only at the second look. If ships themselves are the chief signs, they have to be designed in a different way, so that they will be seen at the first look (see Picture 23).

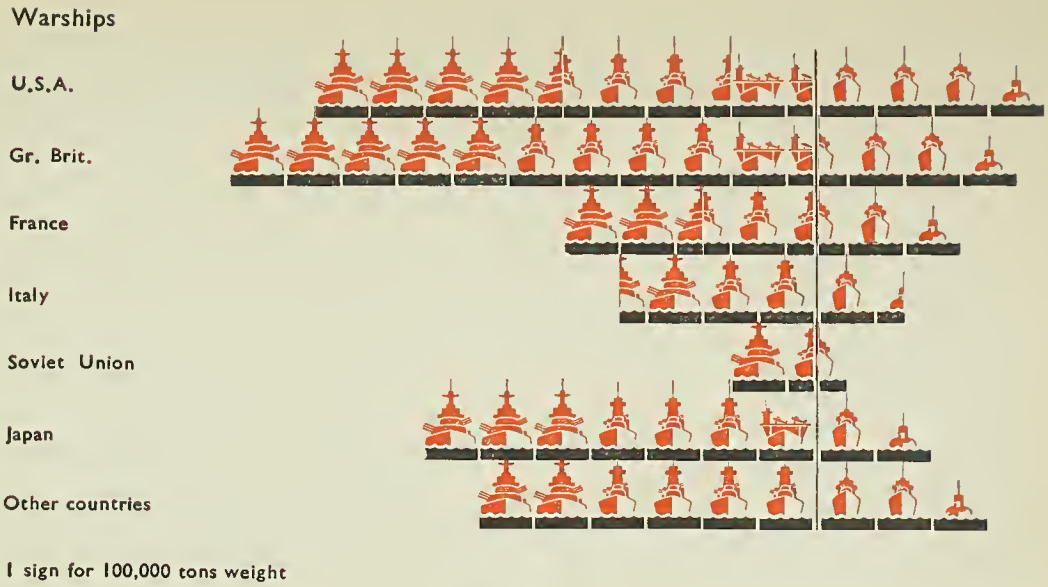
Signs are generally put together on a plane, and sometimes, in addition, as bodies in the room. The writing or talking language is only of 'one expansion'—the sounds come one after the other in time, the word-signs generally come one after the other on paper, as for example the telegram signs on a long, narrow band of paper. The same is true in books—one word over another in the line under it has no effect on the sense. But there are languages of "two expansions," for example, part of the language of chemistry, giving the structure of connections in the smallest unit of substance. But languages


International Credits
Europe
Soviet Union
U.S.A
and
Canada
Far
E st
Middle
and
South
America
Africa,
Australia,
Rest of
Asia
1 line for 5 milliard marks in long time credits or put into business in other countries

PICTURE 22

of one and two ' expansions ' are not very different from one another ; they may be made parallel in the same way as the points of any number of ' expansions ' may be put into relation to the points of a limited line. Some of the picture languages in existence are of one expansion, they are made up of long lines of small signs, put together in rolls. Another sort of picture language, such as the ISOTYPE system, makes use of the connection of parts not in one direction only, but in two, and the effect is a *language picture.*

The purpose of teaching-pictures is to have an effect on the mind. The distribution of signs and colours over the plane of the picture has to be made in such a way that the attention is guided to certain points which have to be looked at first. That is like the selection of words in a discussion or in a book, like the weight put on words in talking or in reading. If a word is printed **w i d e r** you will give it more attention, as when one word is said louder than another. Special notes would be necessary to give an account of other shades of feeling, other shades of rhythm, a better idea of the distribution of weight in statements or words. Such


Warships
U.S.A.
Gr. Brit.
France
Italy
Soviet Union
Japan
Other countries
1 sign for 100,000 tons weight

PICTURE 23

rules of rhythm are not generally a part of education, which is normally limited to words and the right connections between them. But some languages (like Dutch) give rhythm to the writing language by putting the sign ´ over a word. Possibly the Dutch give more attention to questions of rhythm in schools. The ISOTYPE language, as a helping language for teaching purposes, has to give attention to questions of rhythm before everything at the very start.

The order of signs seen by the eye has to be in relation to the best order for keeping in memory marks in the mind. That is what every decision in the invention of a teaching-picture is based on. At the same time every other picture which has been put before the public has to be kept in mind. All pictures together make one unit, and it is important for the reader not to be troubled in any way if he is conscious of all the marks which teaching-pictures have made on his memory.

Our fact pictures have to give as small an amount of detail as possible. In this they are the opposite of a natural picture and specially of a camera picture. Every ISOTYPE picture has to make use only

of such details as are necessary for an account in the language of science. It is certainly not necessary for a fact picture to be poor in details, but all details have to have teaching-value. Every part of the language-picture has its limited sense. In other words : with a limited number of statements in the language of science it is possible to give the clear story of the fact picture. Only the opinions formed in the learner, the connections he makes with his present knowledge, are outside the teaching tendency and may be a surprise to the teacher.

GROUPING PICTURES WITH OTHER THINGS

It is not the same thing to make a teaching book on a special branch of knowledge as to make an encyclopaedia from which the reader makes a selection himself. The ISOTYPE picture language would be of use as a helping language in an international encyclopaedia of common knowledge. Such an encyclopaedia will be the work of our time. A number of

pictures which have been worked out may be part of such an encyclopaedia in pictures.

In putting together a special selection of pictures for certain teaching purposes, one has to be guided by the same rules of wise selection as in putting together signs for a teaching picture. It would be an error to put a number of pictures before the eye which were as uninteresting as the statements they take the place of. Pictures, being parts of one group, have to be as different from one another as possible so that they will not get mixed up in the memory.

It is a special work to give to every picture a new note. It is against the rules to make changes without any reason. Every change has, in addition, to say something. It is important for teaching-pictures to be the cause of a strong reaction. Every picture has to give a new impulse to attention, to conscious thought, to a desire for deeper knowledge. Interest has to be the guide between one picture and another. But it is possible to overdo things. "Less is more." The teaching effect will be greater, the memory will be clearer, when only a small number of

good pictures has been given, every one different from the other, and at the same time every one supporting the other.

From this account it will be clearly seen what are the ISOTYPE rules for putting things on view, in special buildings, museums, etc. It is necessary for the public to be guided through a museum in the same way as the eyes are guided through the signs and words of one picture. Everything which is put on view has to be given order like the different parts of a book. It is not necessary for an ISOTYPE museum to have nothing but ISOTYPE pictures: no, ISOTYPE rules may be made use of in natural history museums and in museums giving the history of society, in museums of science and industry, in museums of art and in museums of hygiene, etc. In the society of the future all these different sorts of museum will be parts of one great teaching organization. Everything which is put on view in a museum has to be given a teaching purpose. At present, experts in special sciences put things together for a museum—everybody has been into a natural history museum and seen the thousands and thousands of

birds and other animals which are there grouped under one roof. Every expert is pleased to have a great number of examples and details. But museums are not for experts, they are for the public. At present there are no representatives of the general public to take care of the interests of the men who come to see and to get some knowledge. ISOTYPE rules are the rules for respecting the interests of the public (in a picture, in a museum, or in all museums together).

What will an ISOTYPE museum of natural history be like? Certainly it will have in it a number of birds, fishes, etc. But some account will be given of their living conditions, and other facts about them, such as their distribution over the earth, and their relations to man and society will be made clear. An ISOTYPE museum of natural history will have not only animals and plants on view, but maps, number fact pictures, examples of things made from different animals and plants, their part in our existence, etc. So such a museum would be like a great ISOTYPE picture made up of natural things. The things have to be not separate, but in some relation to one another and

in some relation to the experience and the knowledge of every on-looker. So the new knowledge will come into its right place.

An ISOTYPE museum has to give the chance to every comer to make hisselection himself. A great museum, specially, has to give a number of different chances. It is important to make this clear to everybody by the order of things, by the system of the building. For example, if someone has an interest in ' whales ' (the greatest sea-animals), it will be important for him to see quickly what their special place in the museum is, and to have a key to everything in connection with whales: substances for lighting, for leather-making, for medical purposes, and soap-making, supports made of whalebone, where their living-place is, what number of them are put to death every year, where and how whale-fishing is done, which countries take part in this trade, etc.

Such ISOTYPE museums are quite different from the museums of yesterday. The idea has come down to us from the past, when rulers or churches got together works of art and strange things which were the property of one person only, that museums have to put on view

separate things of special value or attraction, things of which there is only one in existence. But ISOTYPE museums might be copied everywhere without any loss of value. Their value is their teaching value.

Even from the outside the ISOTYPE museums will be different from the museums of yesterday. They will be nothing but a simple cover for simple teaching-material. Not only has the order of rooms to be in harmony with the order of the things on view, but it has to be readily changed on the addition of new groups of things; for this reason it is important to make adjustments of the building possible, having floors and walls which may be moved, space for new rooms, etc. The designing of an ISOTYPE museum will be special work needing a house designer and an ISOTYPE expert. What will it be like? The first ISOTYPE museum in existence will give the answer to this question. So far it has existence only in the minds of a small number of persons.

The GESELLSCHAFTS-UND WIRTSCHAFTSMUSEUM IN WIEN (1925–1934) was not in a special building, but



Pictures grouped together

PICTURE 24

as far as possible it was in harmony with the ISOTYPE rules. In great rooms there were a number of thin walls of wood put together by a sort of hooks. In this way it was possible to make smaller rooms of different size which might be changed whenever necessary. On the walls there were two rails of wood at such a distance from one another that pictures a certain number of centimetres high might be put on and taken off without any other apparatus. The normal size of a picture is 126 cm × 126 cm (4 feet × 4 feet), and the middle-point of a picture is about 150 cm (5 feet) higher than the floor, that is the position of the eye of a normal upright person. Smaller pictures are put together in groups so that every group is 126 cm high (see Picture 24). 90 cm (about 3 feet) of wall-space under every picture is kept clear, so that a table with apparatus, some books or other things on view may be placed there. Being conscious of the fact that the working man has time to see a museum only at night, the GESELLSCHAFTS- UND WIRTSCHAFTSMUSEUM was open at night. The lights were so placed that the brightest rays came on the pictures. There were branches

of the museum in different parts of the town. One room in the business part of the town with pictures and special apparatus for testing the public was open all through the day. It was seen by 2000 persons every day, some using it as a sort of waiting-room, and others going there for some minutes every day for knowledge and amusement. Sometimes groups of pictures were sent round to other towns, together with such moving walls. Taking everything into account, the GESELLSCHAFTS- UND WIRTSCHAFTSMUSEUM IN WIEN was a museum measuring itself by man's measure and basing its work on the needs of the man in the street.

SOME SPECIAL RULES FOR NUMBER FACT PICTURES

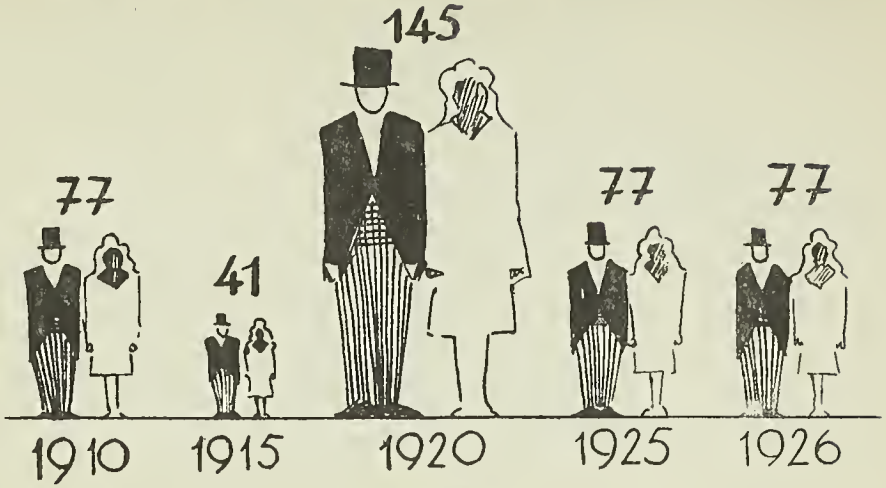
A group of fact pictures to which special attention has been given are the number fact pictures. The first rule for number fact pictures is: A sign is representative of a certain amount of things; a greater number of signs is representative

of a greater amount of things. Everyone is conscious of the value of this system in comparison with the old system of making the signs themselves greater or smaller (see Picture 25). All of us have seen in old and new books those pictures in which a tall man is placed by the side of a small one. The signs are sometimes representative of the number of men living in different countries. But it is not clear what sort of comparison is to be made by the eye. Have we to see only how high they are, or have we to see in addition how wide the signs are? Or have we to be conscious that the signs are representative of bodies, and is the comparison to be made between the weight of the two men? These questions get no answer from the picture. The designer of the example was conscious of this fact: he put in the numbers in addition!

These old pictures are not able to make it clear that all greater amounts are made by the addition of smaller amounts, and they give no idea what will come out if we take a smaller amount from a greater one. These old pictures are not able to give a clear idea of the effect of a change in the number of births and

Example of bad system : signs of different sizes

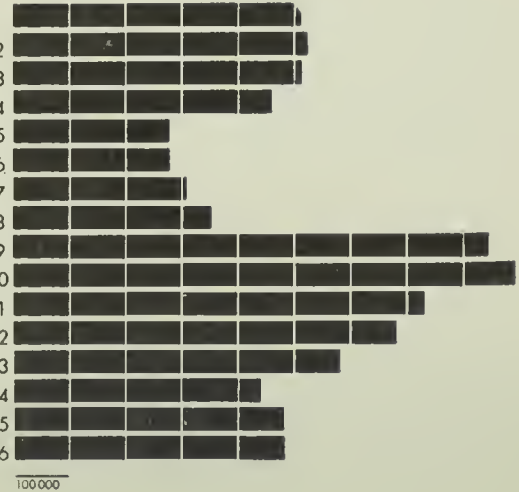
Number of men getting married in Germany out of every 10,000 persons



PICTURE 25

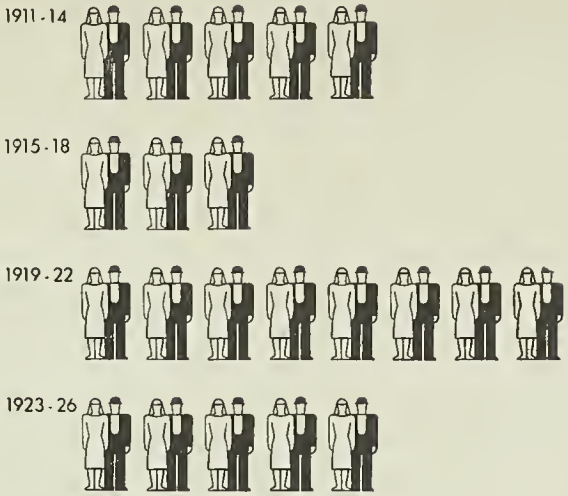
Men getting married in Germany

1911	512 819
1912	523 491
1913	513 283
1914	460 608
1915	278 208
1916	279 076
1917	308 446
1918	352 543
1919	844 339
1920	894 978
1921	731 157
1922	681 891
1923	581 277
1924	440 039
1925	482 792
1926	483 198



PICTURE 26

Men Getting Married in Germany in a Year



1 sign for 100,000 a year

PICTURE 27

deaths. The Isotype system of picture-making is able to do that (see Picture 31).

The unit of which one sign is representative has to be a round number. Care has to be taken to get the right number of signs on a picture. In the picture "Men living on the Earth" the unit is 100 million men. There are about 20 signs. The order of signs has to be made in such a way that some simple statement which is a help to the memory will be clear. The statement on which the structure of the picture "Men living on the Earth" (see Picture 14) has been based is: a third part of the men are white, a third part yellow, all other groups are smaller. This will be the statement made clear at the first look, because there are three lines of signs. A second look will make the statement somewhat sharper. An important condition for the effect of this picture is the small number of second-level divisions. The ISOTYPE system generally makes not more than 5 or 6 such divisions.

If the change in the numbers in a society for example, or the automobiles produced in certain years, are under discussion for an amount picture, the

process will be this : 1, the selection of the years which will make clear the curve of development ; 2, the selection of the unit, which will be as great as possible but small enough to give the rough general curve of development clearly, and will, at the same time, be right for teaching purposes ; 3, the selection of divisions.

Example : list of numbers, clear design, ISOTYPE picture of the number of men getting married in Germany (Pictures 26 and 27).

Some general rules for the structure of a language picture are : Generally, the direction of the eye has to be from the top left side to the foot of the right side, as with books. This rule may be broken only where there are special teaching needs.

An amount picture in harmony with the ISOTYPE system, giving the development of some amount in a fixed time, will have this structure :

1. • • • •
2. • • •
3. • • • • •
4. • • • • • •

It is not in harmony with the ISOTYPE rules to make a change in this structure

without very good cause, for example in this way :



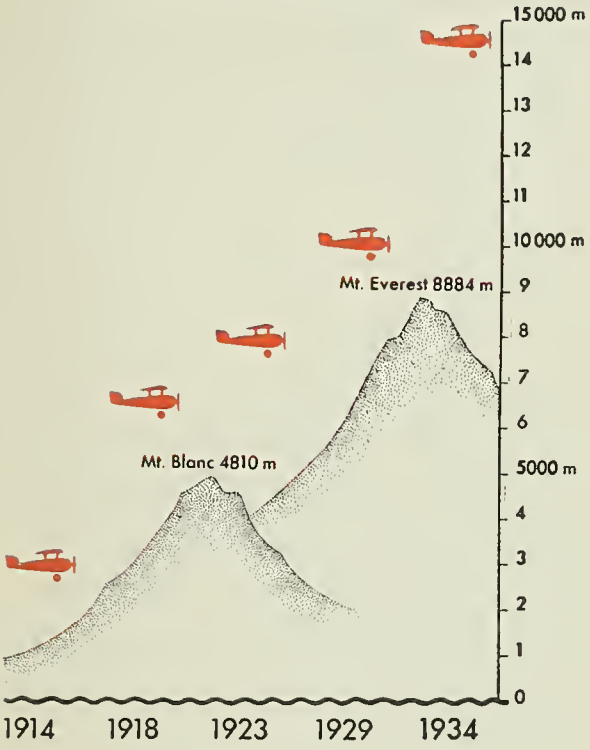
or in this way :



and so on. This last form will only be necessary sometimes : for those amounts the units of which have to be over one another and not side by side : the record of how high airplanes are able to go (see Picture 28), how high the level of water has been, and so on. In most examples it is better if one unit is put at the side of the other : men, animals, trees, grain, automobiles and so on. For some examples the order is not important : iron, rubber, books and so on. For these examples the general rule of the ISOTYPE system has its value.

If the comparison is not between the amounts at different times, but between the amounts in different countries, there

How High Airplanes have been Able to Go



Picture 28

will sometimes be a distribution of signs on a geography map. Even if it is better to have no map, the memory of the map has to be respected. The positions of the countries has to be the same as on the map in general use. The map of the earth which is in use in Europe has America at the left side and Asia at the right, so the order of the 6 great divisions of the earth on the ISOTYPE pictures is this :

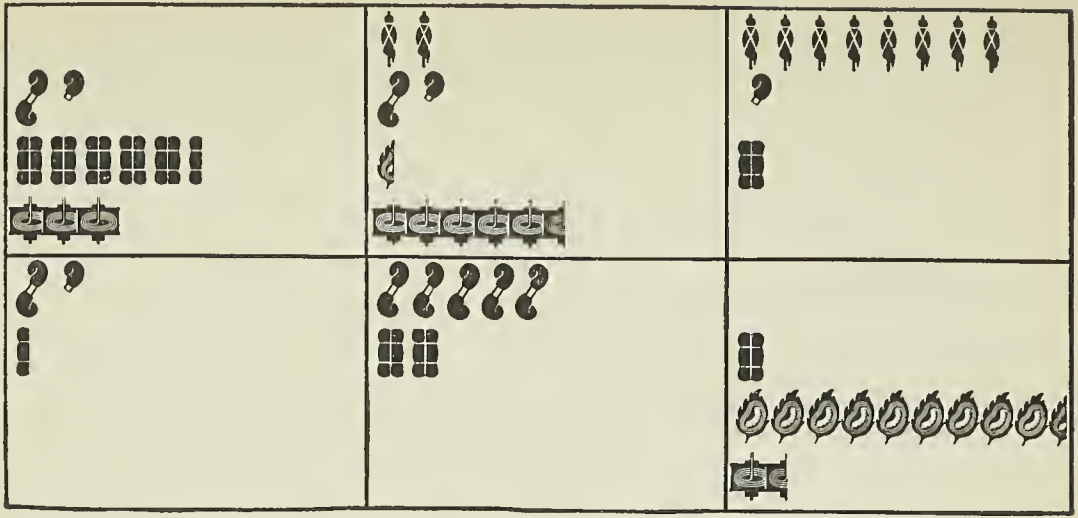
CANADA, U.S.A.	EUROPE	SOVIET UNION
MIDDLE AND SOUTH AMERICA	AFRICA, SOUTH ASIA, AUSTRALIA	FAR EAST

(See Pictures 21, 22)
or, if they have to be in one line :
CANADA and U.S.A., MIDDLE and SOUTH AMERICA, EUROPE, AFRICA and SOUTH ASIA and AUSTRALIA, SOVIET UNION, FAR EAST.
In the same way, a position for all the countries has been fixed by the ISOTYPE system.

Very frequently, but quite against the rules of the ISOTYPE system, amount

Material for Cloth

U.S.A. and Canada | Europe | Soviet Union



Middle and South America | Africa, South Asia, Australia | Far East

linen—wool—cotton—natural silk—chemically produced silk

1 sign for 10% of the amount produced on the earth

PICTURE 29



PICTURE 30

pictures put the amounts in order of size. All these pictures seem to be a statement of the same thing: a falling amount. The order of the names is almost the most important part of the picture. What has the greatest effect on the eye in the bad example is of no value for learning.

If the order of countries is fixed, the curve is dependent on the thing under discussion. It is not hard to keep in memory the fixed order of countries. What has the greatest effect on the eye, the curve, is most important for learning. Every sort of thing which has a distribution over the earth, has such a curve, which is its special mark, its ' face.' Here is an example in the form of a test-question: the places 1., 2., 3. . . . are the 6 great divisions of the earth, Canada and U.S.A., Middle and South America, and so on. A, B, C, D are materials produced for making cloth. The distribution is :

1.	AAAAAA		CCC	
2.	A			
3.		BB	CCCCCC	
4.	AA			
5.	A	BBBBBBBB		
6.	A		C	DDDDDDDDDD

What are A, B, C, D ?
It is not hard to see : A is cotton, B linen, C chemically produced silk, D natural silk (see Picture 29).

A number of rules are necessary if there is not only one sort of thing, but two or more different sorts of things in some

relation to one another. Some examples : Iron produced in U.S.A. and other countries

1900 UUUOOOOO
1913 UUUUUUOOOOOOOOO
1920 UUUUUUUOOOOO

The changes will be made much clearer in this way :

1900 UUU OOOOO
1913 UUUUUU OOOOOOOOO
1920 UUUUUUU OOOOO

(See Picture 30).

Births and deaths. Here it is important to see by how much one amount is greater than the other.

1. BBBBBBB
DDDDD

2. BBBBBB
DD DDDDDD

3. BBBBB
DDDDD

1, more births than deaths : greater number of men ;

2, more deaths than births : smaller number of men ;

3, the same number of births and deaths : no change in the number of men. There are less births in 3, than in 1, and the same number of deaths, and so on (see Picture 31, and, for comparison, Picture 36).

Births and Deaths in Germany in a Year



1 red sign for 250,000 births a year
1 black sign for 250,000 deaths a year

PICTURE 31

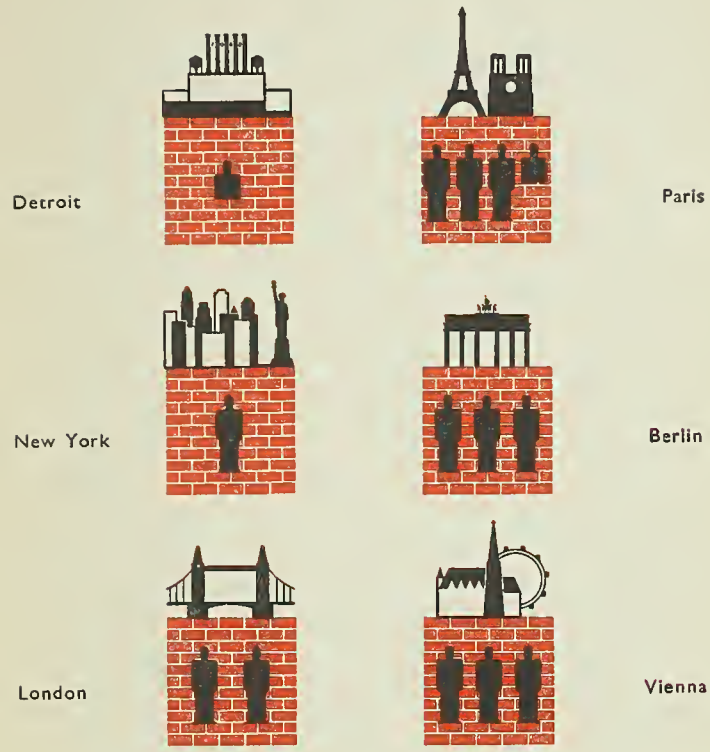
Men living on a unit of space. This is clear from the distribution of signs, without doing a division :



The more persons are massed together, the more signs there are on the unit of space. That is for the eye almost as simple as the comparison of the men by themselves (see Pictures 32 and 5).

Picture 32 makes a division between towns of the U.S.A. and England on the one side, and towns of other countries in Europe on the other side, because these two groups have different forms of housing.

Men Living on a Unit of Space in Towns



Every brick square for 100 square metres
1 sign for 1 man

PICTURE 32

The picture examples of this book give an idea of some other rules of distribution. In Picture 33 not only is one able to see the relation between the number of automobiles produced in a year and the number of men working in the automobile industry, but it is clear from the very first look that one American worker makes much more than the European worker in the same time. One of the most important reasons is the new adjustment of the automobile-producing plants in America ; that is why a band moving over rollers has been designed in connection with the American workers. This is a good example of the use of the two directions of measuring in a fact picture.

AMOUNT PICTURES IN THE LANGUAGE OF GEOMETRY

As an instrument of discussion, frequent use is made of simple signs—points, lines and so on, which are not part of the store of signs. Such pictures are not teaching-pictures, but only self-teaching pictures : they give no memory-material, but only an idea of relations. But this

way of putting facts before the eye may equally be of good or of bad quality, and may be in harmony with the ISOTYPE rules or against them. We have to be guided here, in addition, by the general rules for putting signs together. This sort of design is of great value in the exchange of thought and discussions of theories, because even men who are experts in a special science frequently see much more clearly what the question is if the material under discussion is put before them in this way.

All designs which make use of separate, equal signs may be in complete harmony with the ISOTYPE rules. All designs making use of forms which are put together in equal units may be in complete harmony with the ISOTYPE rules. Four-sided forms which are equal in one expansion and different only in the second expansion (see Picture 26) are almost parallel to a certain sort of ISOTYPE picture.

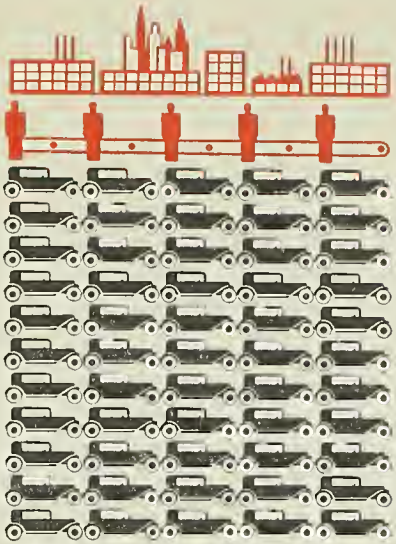
The eye is able to make a comparison between amounts of signs, and it is able to see how much longer one line is than another, as for example : three times as long . . . and so on.

But the eye is completely unable to make a comparison between planes in such a sharp way. The only decision it is able to make is : this plane is greater than that. But how much greater? This question will get no answer from the eye by itself.

That is the reason why the square and the circle will have no place in the ISOTYPE system. The square is frequently used in books of geography, specially if the question is the size of planes, for example the size of countries. It is true that we see at one look that one country is greater than another. But it is impossible to see what number of times one country is greater than another, the addition of which countries makes a country the same size as which other country, and so on. If the rules of the ISOTYPE system are taken as the guide, all this will be clear. Every plane will be made up of units of the same size and form (four-sided forms, possibly squares, but that is not necessary), and by reason of these units any comparison of sizes will be possible. "But," the man of science will say in support of his system, "our squares give the relation between sizes

Automobiles produced in 1929

in America



in Europe



1 red sign for 100,000 workmen

1 black sign for 100,000 automobiles produced

PICTURE 33

more clearly, the numbers have not to be made into round numbers as in the ISOTYPE system." Yes, that is true, but nobody is able to see that. It will be necessary to take a measure and to see how long the side of the square is, if it is *a*, this has to be taken *a* times, that is the right size of the plane. But what is this hard work for—the work of the designer and of the on-looker? Why not give the number itself? Such squares have no teaching-quality at all—certainly no teacher has made this poor invention. Without a doubt it comes from a person who is not able to get the 'square' of the square miles or square metres out of his head.

The comparison of circles is as hard for the eye as the comparison of squares (see Picture 34). Unlike the square, however, the circle has one attraction: the division by lines with the middle point of the circle as a meeting-point (see Picture 35). By a comparison of the angles formed in this way the relations of the parts may be seen. But what if the question is to make a comparison of two such angles and the planes between them in two different circles of different size? Take a smaller

Example of bad system : circles of different size



PICTURE 34

Squares

One is only able to say :
2 is greater than 1
B is greater than A

Circles

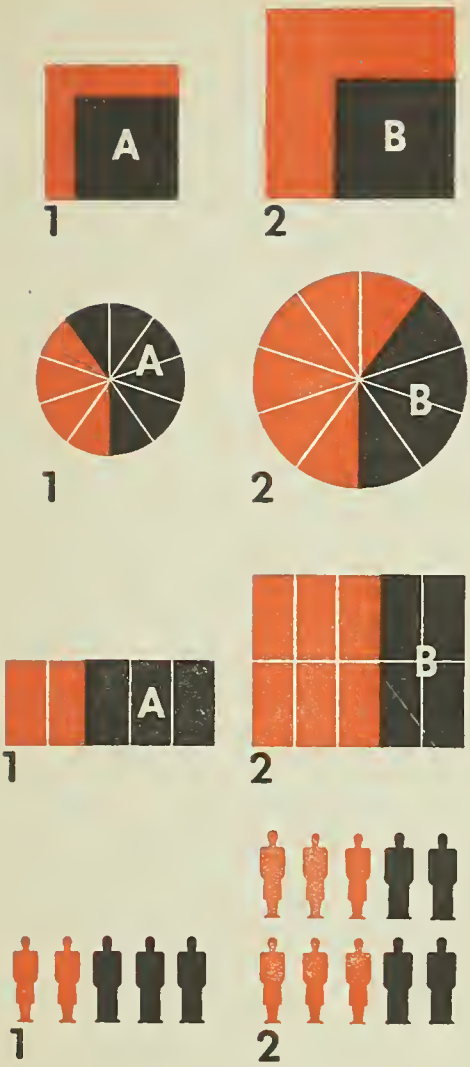
One is only able to say :
2 is greater than 1
A is $^{6}/_{10}$ of 1
B is $^{4}/_{10}$ of 2

Four-sided forms put together from units

One is now able to say :
2 is twice as great as 1
A is $^{3}/_{5}$ of 1
B is $^{2}/_{5}$ of 2
A is $^{3}/_{4}$ of B

Groups of signs

One is able to say :
Group 2 is twice as great as group 1
Number of men is $^{3}/_{5}$ of 1
(number of women $^{2}/_{5}$ of 1)
Number of men is $^{2}/_{5}$ of 2
(number of women $^{3}/_{5}$ of 2)
Number of men in 1 is $^{3}/_{4}$ of number of men in 2
Number of women in 1 is $^{1}/_{2}$ of number of women in 2



Picture 35

circle with a greater angle and a greater circle with a smaller angle—frequently you are not able to see which of the two planes covered by the angles is the greater. But that is sometimes important. For example: a comparison is made between two countries and their division into woods, grassland, fields, and unfertile land. The countries are of different sizes—the circles are of different sizes. The relation of parts is different—the angles are different. But if the question is: where are there more fields, the answer will not necessarily be given by the design without some mathematics. This design is not a good picture of the number material.

In addition, circles, like squares, are necessarily separate. They may not be used for covering a plane. They will never give the effect of parts of a unit. There are pictures of the nations of the earth, in which every nation is a circle. A great number of unequal circles—a trouble for the eye, which does not see clearly why there are such a number. Isn't one of them unnecessary? Are they all there?

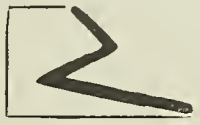
The complete comparison of these forms is made clear in Picture 35.

Another sort of geometry design which is specially valued is the curve. It is used for the statement of changes in amounts or degrees in time: curves of heat, changes in the number of men living in a town, changes in the amounts produced in some industry. The curves put the changes clearly before the eye. They may make rough statements and they may make clear-cut statements—they may be looked at as giving a general view or as making an addition of delicate details—they are never a trouble to the eye.

In the ISOTYPE system changes in amounts are pictures of this sort:



If we take away all signs—the only thing which makes clear the material in question—and make a mark where the end of the line of signs has been, and then make a connection between these points, we get the curve:



If we take into account not only the curve-line but the part of the plane which is between the curve and the straight line of 0, it will be more like our ISOTYPE system. And if divisions are made on the plane at equal distances, it will be even more like, because now it will be possible to see the number of divisions. If we have a look at the curve in this rough way, there seems to be nothing wrong.

Let us have a look with greater care. What the curve gives in addition to the ISOTYPE picture, is the points of the curve between these four marks which the curve has in common with the ISOTYPE picture. Sometimes these between-points have a possible sense—but sometimes they have no sense at all. The curve of the numbers of some society has a sense. The numbers are given for certain days of the year, which are certain points on the time line. But there is a number for every day of the year, even for every minute, and it has sense to say: we may get narrower and narrower, till we get the true position—every curve designed is in some degree representative of this true curve. It is like the curve of heat which



Example of bad system : curve of births, deaths, and men getting married

PICTURE 36

may be given in detail by a certain apparatus.

But what is to be said in approval of a curve of the iron produced every year? Or of a curve of births and deaths and the number of men getting married every year (see Picture 36)? Is there an amount of iron produced in a year for every minute of the year? Certainly not. What possible sense have these between-points? If one gave much thought to this question one might get some sort of sense: the year's produce for every possible sort of year, not only our calendar year—but this is without reason and was certainly not in the mind of the designer of the curve. There is some way out for the designer of curves: separate points of the time line have to be representative not of the years, but only of their start or end, so that limited equal parts of the line are representative of the years. In place of points the designer has to make small parallel lines to the time line and he will get a stepped curve in place of the other curve of bent lines (like Picture 26). This stepped curve has a certain sense from the point of view of mathematics. It has sense to say: we may get nearer and

nearer to the true development. If, for example, the amounts produced are given for half years, there will be two steps in place of one, and if the amounts are given for the months, there will be 12 steps in place of one. Not the distance between time line and curve, but the plane between time line and curve is representative of the amounts produced. The distance is representative of the amounts produced in a unit of time, the mathematics expert will say. But this expert will see no sense in the first curve of bent lines between fixed points—it is nothing but a connection between separate points. Only these separate points have sense: the curve has no sense at all. Further, the curve of births and deaths—even if designed as a stepped curve—is not able to give such a clear and living picture of births and deaths as the ISOTYPE picture (Picture 31).

Every process, however simple, has to be in harmony with the rules of logic and mathematics. No process, however clear-cut, and however full it is of science and delicate thought, will have any value for science or for education if it is not in harmony with the rules of this poor

logic and mathematics. Not only a person judging the value of the material for education will say: put the iron curve away. Anyone judging its value for science will say the same.

It has never come to our knowledge that experts in mathematics or logic have come across such errors in the ISOTYPE system. This system does not take for its field the more complex part of science; its field is only the teaching of the very first stage—but this work it does seriously and as well as those responsible for building it up have been able to make it.

FROM DESIGNS IN STONE AND THE ORBIS PICTUS TO THE ISOTYPE ENCYCLOPAEDIA

The first designs of man are old designs on stone, in secret and dark places in hollows, or on great stone walls. It seems that these designs were a part of the process by which special powers were used to put animals to death ('magic'). We have the knowledge of old sign-languages in different countries, for example in America, and specially in

Egypt, where the pictures were named 'hieroglyphs.' The hieroglyphs came from pictures, but they became representative of the unit sounds of words.

The present writing in China and Japan is a writing in signs, and every sign is representative of a thing or an idea, etc. and not of a word or of sounds. The position of signs in a group, their form of connection, gives them a sense. When the same sign is put down more than once, the sense does not necessarily have to be given in more words. For example, signs for *tree* put together give the sign for *wood*. This comes very near to the ISOTYPE system. But the Chinese writing has to be able to put down all the words and statements of the language—this writing itself has to be a complete language, while the ISOTYPE language is only a helping language for those groups of statements which will be made clearer by pictures. This fact makes these two languages very different. (It is impossible for all Chinese signs to be clear straight away. They have been formed by reasoning, and by hundreds of years of use).

All these sign-languages have more in common than word languages. That

seems natural. They are based on our knowledge of the things themselves, putting weight on whatever seems important. Ideas of what is important are not the same at all times or in all countries, and this fact makes the designs different. Sometimes the head of a man seems important, sometimes not; sometimes even the hands and the fingers seem important. Certainly the ISOTYPE signs are dependent on their time like all these old sign-languages. Later times will see what their special qualities are and what the conditions were which made them.

In present Europe the idea of picture education is not more than 300 years old. Before that there was not very much connection between words and pictures. The books and the thoughts of those times had little to do with experience, but were in the field of religion and had to do with questions of reasoning. The pictures were not based on science and gave their story of religion to a wide public. In later times the relation between words and pictures became clearer, in connection with the development of science.

The Orbis Pictus of Comenius gives pictures for a great number of words and

Old military picture



Picture 37

names in different languages. A start was made with those names which take a great part in religion— but after two or three pages there are only things of everyday experience, men living on the earth, working at machines, etc. The pictures of this Orbis Pictus are not at the same level as the new idea of their use— their designer is not an authority for our designing like Comenius for our teaching. There were a number of 'orbis pictus,' but in not one of them is there any idea of a common system for writer and designer. Frequently the delicate thought which has been given to the writing has not been given equally to the designing.

The discovery of printing in black and white gave a new impulse to every sort of writing and designing for a wide public. All the developments were independent of one another and went forward quite separately. One special branch of work was the making of pictures of military stations and of fights, in which the order of military units is designed in a way which is very like the ISOTYPE system (see Picture 37). These pictures were made for experts who had no training in the art of design, so they gave true and

clear-cut accounts which were at the same time simple for normal readers. Of the same sort were pictures of machines, of ships and carriages, of the first railways, etc. Some of them were very good teaching-pictures, giving a true and complex account. But there were no conscious rules of design.

In the writings of Leibniz we come across the idea that picture-making is to be done with the help of science. His desire was to make an 'atlas universalis' in connection with an encyclopaedia. The French encyclopaedia gave a great amount of material and a great number of pictures, but there was only a loose connection between them. In our day Paul Otlet (Palais Mondial, Bruxelles) is taking a step further. His idea is the building of a 'cité mondial' for the organization of museums and the distribution of printed material and pictures. He made a start to get together picture material from all countries. He has the desire to get museums of a new sort started in all countries: MUNDANEUMS, that is, museums of man's development. The GESELLSCHAFTS- UND WIRTSCHAFTSMUSEUM IN WIEN with its

great picture book GESELLSCHAFT UND WIRTSCHAFT was ready to give help in this undertaking. The chief work of the Gesellschafts- und Wirtschafts-museum was the building up of a system of rules and signs. The MUNDANEUM INSTITUTE THE HAGUE and the INTERNATIONAL FOUNDATION FOR VISUAL EDUCATION took this work to a further stage, and are now in a position to make international picture books and get international museums and an international teaching organization started. When all this will be possible, however, is dependent on the education of public opinion ; the first conditions necessary for such developments are given by the outcome of the ISOTYPE work.

At this time the idea of an international encyclopaedia is coming once more to the front. The ISOTYPE system and the encyclopaedia are equally part of the work of the Mundaneum Institute, and there seems to be a very important parallel between them. The encyclopaedia will make use of one language for all sciences, it puts out all feeling—all words for right and wrong—from the account of science, it will have as little as possible to

do with any words or any signs which are not clear, it will make use of one picture language. The purpose of this new encyclopaedia, which is only an addition to other encyclopaedias, is to give all men a common starting-point of knowledge, to make one united science, forming a connection between the special sciences and putting together the work of different nations, to give simple and clear accounts of everything as a solid base for our thoughts and our acts, and to make us fully conscious of conditions in which we are living. This encyclopaedia will be all the time in the process of growth, like society, science, and language themselves. What the science of reasoning has done to make possible such a uniting of the sciences and to give one word language to all the special sciences, the ISOTYPE system has done to make possible one language of pictures which will give the same sort of help to the eye for all the special sciences and for persons of all nations.

Dr. H. von Bracken, when he was teacher of psychology in a German high-school, made tests with the ISOTYPE book "GESELLSCHAFT UND WIRTSCHAFT," with the help of a young university man. He made the discovery that: Two and a half times as much is kept in the memory with the help of ISOTYPE pictures as when other pictures are used.

Dr. Göransson, chief of the Statistics Office in Göteborg, Sweden, after having made a journey to get new inventions and wider experience for his work: "The most interesting developments in the art of making picture statistics are to be seen at the GESELLSCHAFTS- UND WIRTSCHAFTSMUSEUM IN WIEN. Its system is giving us a completely new way of putting before the general public statistics, and specially the science of relations."

Willy Haas, a judge of books ("Literarische Welt," 12. 12. 1930): The greatest surprise for me this year was possibly the "bildstatistische Elementarwerk des GESELLSCHAFTS- UND

WIRTSCHAFTSMUSEUMS IN WIEN" with the name "GESELLSCHAFT UND WIRTSCHAFT." There is a secret in it. These Viennese had a feeling for the connections between play and learning. How does a man get knowledge? Nobody is able to say. A baby gets twenty times more knowledge in his first five years than a normal person from 30 to 80. Probably the only way of learning is through play. That is to say, at the base of every learning process there is some sort of playing with a thing, a regular but at all times elastic, free operation with a thing—this carefree behaviour does not come naturally in later years, and that is what makes learning so slow and hard then.

I got an idea of how strange the mind's operation in learning is, for the first time, when I took the old Basedow in my hands. It made me say to myself straight away: Yes, that certainly is a good way to put before young persons the facts as they are, so that they will get them into their heads. There is enough free invention in it and enough fixed system; it is so pleasing and so serious, giving desire for knowledge and knowledge itself, that one does not take one's eyes off it before

getting it by heart. I had the same feeling with this book of statistics, and whenever I take a look at it, I am conscious of the strange attraction of these coloured signs. The book is not cheap—but if you have the desire to make a 20–30 years old man who is interested in present-day questions happy for a number of long winter nights—give him this.

A Teacher: Every picture may be the interesting point of long and fertile discussions in a school group.

Another Teacher: Even slow groups of learners came awake and had a surprising amount to say when the pictures were put before them with some words to make them clear. The boys themselves made statements which would never have come into their heads if only numbers or only words had been put before them.

A Learner (having seen the museum): I never would have gone into this museum or had a look at these pictures if the pictures themselves had not made me do so. The thoughts of the on-looker come into motion automatically. When you see before you a sign or a picture without any account of what it is about, you have the desire to see the point; and you see it, as

you never will with dead numbers and letters.

A School-Group (a teacher's account): "Oh, good, we get something again from the coloured book." Men, coloured signs on them. "We saw them before. It is the same unit, every one 100 million men." To see again these men they had in memory seems to be pleasing to them. "But what are the signs on them?" One of the boys says: "It is clear to everybody, those with a red wheel have machines." "But the blue hammer?" They are reading: old form of art and learning, handwork, farming. "What is that?" "They may not be so far in development." There is something more, green archer's instrument. Long discussions on these three forms of living, in connection with stories they have a memory of. What these forms are, where they are in existence . . . "Are not parts of such old forms still here with us? Even the first stage? Getting in berries and other fruits and plants from the wood. . . "

WRITINGS ON ISOTYPE

By Otto Neurath
and his Institutes

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