Damned Lies. And Statistics.
Otto Neurath and
Soviet Propaganda in the 1930s

Clive Chizlett

For more than three years, I have been inquiring into the use
of ideographs for inter-cultural communication from the Late Stone
and Early Bronze Ages to the present day. Studies of ideographic writing
systems based largely on pictographs such as Sino-Japanese and Bliss
Semantography have been particularly interesting and valuable to
this study. Closed systems of pictographic symbols used for cartography,
signposting and such inter-cultural events as the Olympic Games
are also fields for study. Turning to diagrams, as though they were com-
pound, annotated ideographs, I have been comparing the types and
principles of diagrams which exist to convey descriptive and comparative
statistics. Among the most prominent cases in this connection is the
work of Otto Neurath and his associates.

When I examined for the first time Neurath's Isotype Picture
Language in the context of statistics, I got the feeling of something
odd, bogus, tinny; of things that did not really make sense. It was, at first,
a disturbing sensation because Neurath is a major figure in the evolu-
tion of twentieth-century visual communication. My investigation
of Neurath confirmed that initial instinct. It is timely and necessary to
demonstrate that Neurath is, at best, over-rated by many historians
of design.

Life and Times

A superficial outline of Neurath's career reveals he was a
professional philosopher, political revolutionary, museum-director and
descriptive statistician. A brief and selective review of important
aspects of Neurath's disputes with some of the philosophers of his time
indicates that these disputes were significant of Neurath's approach to
education, propaganda and statistics and to his notions about the
underlying unity of the exact and social sciences. In the early 1930s, he
was heavily engaged in promoting his personal variations of analytical
philosophy and theory of truth. It is particularly important to look at
Neurath and his formulation and actual uses of the Isotype Picture
Language against the background of his purported philosophy – his
theory of truth. This paper examines in some detail what is the single

1
Neurath, Otto. 1936.
*International
Picture Language.*
London: Kegan Paul,
Trench and Trubner,
Psyche Miniature
Series No. 83 (1980
facsimile reprint,
University of Reading,
United Kingdom),
7-11.

2
Edwards, J.
and M. Twyman. 1975.
*Graphic Communica-
tion through Isotype.*
Reading,
United Kingdom:
University of Reading,
18.

3
Bartley III,
William Warren. 1974.
Wittgenstein.
London: Quartet, 33.

4
Edwards and Twyman,
*Graphic Communica-
tion through Isotype,* 18.

5
Arntz, Gerd
and Kees Broos. 1979.
*Symbols for Education
and Statistics.*
The Hague: Mart Sprujit,
introductory essay.

most revealing episode in Neurath's remarkable career: the period
in the early 1930s when he was a consultative descriptive statistician to
the Soviet authorities during the implementation of Stalin's first
Five Year Plan.

The Austro-German Connection

Dr. Otto Neurath (1882-1945), the principal formulator of
the Isotype Picture Language,[1] received his higher education in Vienna
and Berlin (1901-1905). His first degree related to mathematics and
physics. His postgraduate work in Berlin was directed towards history,
sociology and economics. From 1907 to 1914, Neurath taught at a
trades college in Vienna. Between the years 1911 to 1913, he was also
commissioned by the Carnegie Foundation to examine the prospects for
peace in the Balkans.[2]

During the latter half of World War I, Neurath was employed by
the German government as the director of the Leipzig War Economy
Museum. Thematic museums with an ideological mission and a
propagandistic function are phenomena which are unique to Austro-
German cultural life and history. Neurath's first experience as a museum-
director in war-time Germany greatly helped him when he subse-
quently set out to establish a museum dedicated to the social sciences
in Vienna in the mid-1920s. Following his military and government
service in World War I, Neurath was, for a short time, an active member
of the revolutionary Spartacist Party which governed Munich for
a few months during the year 1919.[3] Post-war politics in the Bavarian
capital were fast moving and strong flavored. When the execution squads
of the counter-revolutionary Freikorps swept into action, the practice
of far-left politics in Munich and elsewhere in Germany became a
distinctly lethal occupation. Neurath went home to Vienna to work for
three years on municipal planning and housing in that city. From 1924 to
1934, between the ages of forty-one and fifty-two, Neurath was the
founder-director of the Vienna Social & Economic Museum.[4]

A Museum of Social Science

Neurath's idea of an educational resource – a museum – dedi-
cated to social and economic matters easily attracted civic and govern-
ment funding. The museum was developed by Neurath as a medium
of political propaganda rather than public education. (Bear in mind that
public education and political propaganda are the same thing to totalitar-
ian ideologists. The semantic distinction between a political museum
and a museum of politics is subtle but very important to distinguish.)
During his time at the museum, Neurath and his associates began to work
on what was to become the Isotype Picture Language. In the processs,
Neurath established one of the first graphic design group-practices.
He worked with Alois Fischer, a consultant statistician, on the compilation
and interpretation of data. He commissioned Gerd Arntz and Augustin
Tschinkel and several other artists, to design picture-symbols for the
museum's collaged statistical displays, printed wallcharts and pamphlets.[5]

Figures 1-2 Examples of Isotype comparative presentations.
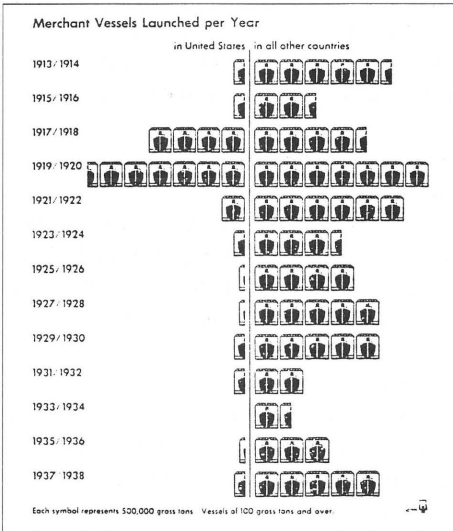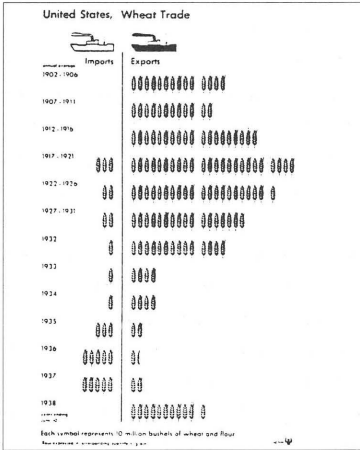
6
Arntz and Broos,
*Symbols for Education
and Statistics*,
illustrations of Isotype
pictographs organized
into sections.
The introductory
essay describes
the systematic
approach to design
of the figurative
symbols. The essay
also describes the
processes of
tranformation from
raw statistics into
Isotype charts. The
principal transformer
was Marie
Reidemeister.

7
Neurath, *International
Picture Language*.
Seven colors are
stipulated, see page 42.
For worldmaps,
Molleweide's equal-
area projection was
normally used.

8
Passmore, John. 1968.
*A Hundred
Years of Philosophy*.
London: Pelican, 579.

The Isotype System

The Isotype Picture Language is a method of preparing and graphically displaying descriptive and comparative statistics. Strictly speaking, Isotype is not a language but a system of signification. Isotype relies on the use of unit-pictographs, each of which stands for two variables. The first variable is a nominal category such as persons or things. The second variable is numerical so that each of the individual pictographs may have a value such as a percentage, or some multiple of tens or units per thousand households. When displayed as exhibits in a museum or as illustrations in a book, Isotype charts are the frozen display of an abacus-setting or abacus-reading. Each of the unit-pictographs within an array of pictographs functions in exactly the same way as an abacus-bead. Each chart, therefore, claims to be an objective statement – a verifiable proposition – a sum (*see figures 1 and 2*).

Each Isotype pictograph is normally a metonymic symbol exploiting a stylized and figurative representation of a human being, animal or thing.[6] The Isotype system provides for overall layout of charts and for the typography of chart titles and annotations; it provides for keys to the nominal categories and numerical values of individual pictographs; it provides for systematic use of up to seven colors; and it provides for the use of equal-area maps.[7] The principle of Isotype abacus charts is widely applied today and has become commonplace in all kinds of publication and exhibition. However, in the mid-1920s, the charts were novel and their social or economic significance was clearly and simply intelligible. Their impact on the Viennese public would have been considerable.

Validity and Reliability

The statistical charts published by Neurath do not normally give the identities of the first-hand or second-hand sources of the data represented in pictographic arrays. The omission of sources from so many of those early abacus charts signalled the possible invalidity and unreliability of the content of those charts for purposes of inference. Descriptive and comparative statistics, which refer to social and economic phenomena, cannot be validly and reliably used for purposes of inference unless the sources of the statistics are properly and clearly identified. A further weakness of many of the early charts was their general failure to make clear whether or not the statistics were originally derived from systematic observations of whole populations, from genuinely random samples or from representative batches of the appropriate size and proportion. In short, the charts are unscientific. It is no use generating descriptive statistics as *objets d'art*. The only purpose of descriptive statistics is to provide a useful and useable basis for inferential statistics. It follows that many of the charts published by Neurath and his associates in the 1920s and 1930s are either inept or their purpose is merely to function as *objets d'art* or propaganda.

Neurath and The Vienna Circle

During the middle to late 1920s, Neurath was a member of the informal association of intellectuals known as The Vienna Circle (*Der Wiener Kreis*). He was directly and indirectly associated through the Circle with such outstanding thinkers as Ludwig Wittgenstein, Moritz Schlick, Rudolf Carnap and Karl Popper.[8] Among the many activities and concerns of the Circle, up to the time of its dis-

Greg Stone

The Journey of the Kamikaze Photon

Instructions

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the director of publi-
cations and media
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mouth. A former
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writer, and ama-
teur astronomer, his
articles on astro-
nomical topics have
appeared in publi-
cations ranging from
The New York Times
to *Popular Science*,
Boy's Life, and
Yankee magazines.
While his interests
are wide-ranging,
communication
is his central concern.

**Watch carefully.
There will
be two things hap-
pening at once.
Read what is here.
That's one thing;
the message,
the content.
But just as
important, watch
how it is said.
Watch the process.
That's the second
thing and
perhaps the most
important.**

9
Passmore,
*A Hundred Years of
Philosophy*, chapter 16.

10
Bartley, III,
Wittgenstein, 33.

11
Passmore,
*A Hundred Years of
Philosophy*, 375-379.

12
Bartley, III,
Wittgenstein, 36.

13
Passmore,
*A Hundred Years of
Philosophy*, 581.

bandment in 1938, was the critical study and development of a branch
of logic-based analytical philosophy – logical positivism.[9] Neurath,
who functioned as "the unofficial commissar and self-appointed political
secretary" of the Circle, visited Moscow in 1930-31 to try to persuade
Stalin to adopt physicalism (Neurath's personal variant of logical positiv-
ism) as the official form of scientific, materialist, analytical philosophy to
be followed by all straight-thinking Marxists-Leninists.[10]

Physicalism and The Unity of Science Movement

As an offshoot of analytical philosophy in general, and of logical
positivism in particular, Neurath's physicalism is realist in principle
and is opposed to idealist, empiricist, metaphysical and existential ap-
proaches to philosophy. Physicalism is an attempt to join logical positiv-
ism to behaviorist psychology. As shown above, Neurath believed
his theory of physicalism to be in perfect harmony with Marxist-Leninist
doctrine. In the context of physicalism, Neurath claimed that all state-
ments about so-called experiences are invalid unless they are expressed
in the language of physics and are invalid unless they refer to proces-
ses which only occur in a particular space (such as this room) and
a particular time (such as June 10, 1992).[11] Science supplies the criteria
(the protocols) by which the validity and meaningfulness of a state-
ment can be tested. If a statement, in the form of a sentence or a proposi-
tion, or an equation or a set of statistics can not be expressed in the
language of science, in the reductionist language of physics, then
that statement is effectively useless for objective purposes. It is either
tautologous or nonsensical. In all this, we have no reference to such
bourgeois notions as falsity or truth (or banality).

At some point during the mid-1920s, Wittgenstein expressed a
view that Neurath's philosophical notions were naive, simplistic and
materialist without being objective and vulgar.[12] A historian of modern
philosophy writes that Neurath's "philosophical position was never
worked out in detail: agitation was his forte."[13]

Physicalism eventually led Neurath to promote and en-
courage, in all sorts of ways, what he claimed to be the underlying unity
between the exact and social sciences. During the 1930s, he worked
with others to promote the Unity of Science Movement, chiefly through his
organization of five international congresses, whose theme was the
unification of the exact and social sciences.

The Soviet Connection

Throughout the late 1920s, Soviet diplomats, publicists and
other agents operating in Vienna would have been monitoring Neurath's
work as party-member, museum-director and exhibition-planner.
Neurath's novel uses of illustrated statistics for purposes of ideological
propaganda, or as he would have it, public information, would have
interested the officers of Soviet agencies in Vienna, and through
those agencies, the authorities in Moscow. Between 1931 and 1934
inclusively, and concurrently with his direction of the Social & Economic

To begin with

Open
a single packet of sugar,
such as you find
in restaurants,
and pour the contents
on a plate.
What you have
before you are 6×10^{23}
carbon atoms –
whatever the hell that is.
John Gribbing, writing
In Search of Schrodinger's Cat -
Quantum Physics and Reality,
gives us a way to get this
into perspective.
He suggests
that if we create a super being
with a super small pair
of tweezers, we could give
that person this plate of sugar
and tell her to start
removing atoms one at a time –
one every second.
If she began this task
at the time of the Big Bang
some 15 billion years ago –
the beginning of our Universe
as we think we know it –
she will have removed 5×10^{17}
atoms by today.

Now that might sound
like quite a few atoms. If you
removed one atom every second,
just for a single day,
you would discard 86,400 atoms.
Look at your plate of
sugar.
Try to imagine
for a moment
sitting there with your
super tweezers
and every second for
the next 24 hours,
picking out an atom
and discarding it.
Look at it.
Try – in the next two minutes
you could remove 120.
Now keep going, all day,
all week, all year.
Keep removing them all your life.
Live for thousands of years,
millions of years,
thousands of millions –
15 billion years,
doing nothing but this and
you will remove 5×10^{17} atoms.

14
Arntz and Broos,
Symbols for Education
and Statistics,
introductory essay.
Neurath's team
at the Institute from
1931 to 1934 operated
under the name
of Isostat. The Isostat
team included

Gerd Arntz as symbol-
designer and Marie
Reidemeister as
the person responsible
for selecting and
tranforming Soviet
statistics into the
material for Isostat
charts

15
Arntz and Broos,
Symbols for Education
and Statistics,
Chart 6.

16
Conquest, Robert. 1986.
The Harvest of Sorrow.
London: Hutchinson,
265.

Museum in Vienna, Neurath, and some of his principal associates, were invited to serve, under the team name Isostat, as designers, consultants and visiting instructors within the Moscow Institute for the Visual Representation of Statistics. Among the media used for official publication of the Institute's statistics were *Pravda* and *Izvestia*.[14] The statistical institute and the Isostat team would have been directly responsible to the Soviet directorate for agitation and propaganda, Cominform. One might speculate as to the degree to which Neurath, and some of his colleagues within the Isostat team, found credible the raw data supplied to them by Soviet officials.

Descriptive Statistics and Governmental Propaganda

"When I use a word,"
Humpty Dumpty said in rather a scornful tone,
"it means just what I choose it to mean–
neither more nor less."
"The question is,"
said Alice,
"whether you can make words mean
so many different things."
"The question is,"
said Humpty Dumpty,
"which is to be master – that's all."
Lewis Carroll's *Alice Through the Looking Glass,* 1872

The period 1929-33 is noted for Stalin's first Five Year Plan, including the imposition of collectivized agriculture upon the whole of the Soviet Union. Among many statisticals charts published in support of the first Soviet Five Year Plan, in late 1933 or early 1934, is a particular Isostat chart which claims to deal with statistics of insecticidal crop-spraying.[15] Based on the same principles as the proto-Isotype charts, it shows a fivefold increase in crop-spraying by aircraft across the Soviet Union over a span of four years from 1931 to 1934 inclusively, but with the exception of the year 1932. There are no intelligible criteria given on the chart for quantifying the amounts of insecticidal chemicals used for the areas crop-sprayed. No clear distinction is made between areas sprayed in past years (1931 and 1933) and areas planned to be sprayed in the coming year (1934). Each unit-area represented on the chart might be as small as a tennis court or as large as a whole region. The chart is superficially impressive and pretty, but it is statistically meaningless and mendacious. With regard to its mendacity, why is the year 1932 missing from the record? Is that year missing because it was the year of the first and worst in a continual series of man-made famines?

It was the explicit duty of Cominform and its agencies, including Isostat, to prove, in contradiction of the plain and brutal reality, that Stalin's policy of collectivized agriculture worked well. The policy was actually a vast and lethal catastrophe for millions of Soviet citizens,

A little hard to get a grip on?
What's harder still
is to understand
how many atoms *are still left.*
      Let's see
      if we can approach
      that point
      systematically.
Approximations are fine
for this next step.
Do your best
to discard half the sugar
onto the second plate.
      Done It?   Good.
      Now discard half
      of what remains.
      We're down to just one-fourth
      of what we started with,
      but we still have a way to go.
Do it again.
We're down to an 8th.
      Not bad.
      But we have to go to one millionth.
      If we kept dividing this in half
      17 more times,
      we would eventually get down to
      just one-millionth
      the amount of sugar we started with.
      (1/2; 1/4; 1/8; 1/16; 1/32;
      1/64; 1/128; 1/256;
      1/512; 1/1,024;
      1/2,048; 1/4,096; 1/8,192;
      1/16,384; 1/32,768,
      1/65,536; 1/131,072; 1/ 262,144;
      1/524,288, 1/1,048,576.)
      If you actually did this,
      you might begin to get an
            intuitive picture
            of how small an atom is.

For the sugar you've been discarding –
the sugar that's on the plate
that looks nearly full –
that sugar represents the atoms
that our mythical being
has not removed even though
he has been working
tirelessly at this task since
the beginning of time.
      All of this is preliminary.
      I'm trying to get you
      somewhere close
      to our starting point,
      which is not the atom,
      but something far smaller,
      the atomic nucleus
      of an atom of hydrogen –
      the simplest,
      and most plentiful atom
      in the universe.

17
Conquest,
The Harvest of Sorrow,
169.

18
Edwards and
Twyman,
*Graphic Communica-
tion through Isotype,*
list of quotations
from the writings of
Otto Neurath.

19
Holmes, Nigel with
Rose de Neve. 1985.
*Designing
Pictorial Symbols.*
New York:
Watson-Guptill, 7.

20
Arntz and Broos,
*Symbols for Education
and Statistics,*
introductory essay.
Gerd Arntz reports that
the reason for
Neurath's and his
associates' departure
from Moscow in
1934 was the Soviet
government's declared
preference for

socialist-realist
aesthetics in the fields
of art and design.
Such first-hand
testimony is important
because it discounts
any claim which
might be made that
Neurath and his
associates gave up
their work in Moscow
for reasons of disgust
or scruple.

21
Neurath.
*International Picture
Language.*
The facsimile reprint
of Neurath's illustrated
text is augmented
by a translation from
the original English
edition into German
and an editorial
introduction by Robin
Kinross. The English-
German translation is
by Marie Neurath.

a catastrophe designed to enable the consequent surplus of grain to be sold abroad in 1933.[16] The money obtained from these grain exports was used to buy the machine tools and other capital goods that Stalin needed for his policy of large scale and rapid industrialization.[17] As was the case with his malevolent and disastrous agricultural program, Stalin's chaotic industrialization schemes needed to generate fictional statistics for purposes of propaganda.

In September 1933, Neurath wrote, in terms that are truly worthy of Humpty Dumpty, "to remember simplified pictures is better than to forget accurate figures."[18] It all depends upon what you mean by the word simplified. In the case of the crop-spraying chart, and all the other Isostat charts published by the Soviet authorities in the early 1930s, did Neurath mean simplified pictures or did he mean simplified fictions?

The Chicago Connection

At some period in the mid-1920s, probably by way of the Vienna Circle, Neurath established a long-term friendship, exchange of correspondence and professional association with the American philosopher and semiotician, Charles W. Morris, of the University of Chicago. In 1938, and again for a period during World War II, Neurath worked with Morris as a principal editor of the University Press' serial publication, *The Encyclopedia of Unified Science*. As a pragmatist philosopher with an interest in building bridges between the analytical and pragmatic schools of philosophy, Morris may have introduced Neurath to the thought of the American logician, Charles Sanders Peirce (1839-1914), the earliest formulator of pragmatist philosophy and of a scientific approach to semiotics.

It is also possible that at some period during the mid-1920s, Morris may have drawn Neurath's attention to the work of the American statistician, Willard Brinton. In 1914, Brinton had published his illustrated manual, *Graphic Methods for Presenting Facts* (New York: McGraw-Hill). Brinton's book describes charts which exploit arrays of unit-ideographs, with each ideograph having a dual significance: membership in a class and representation of a prescribed quantity.[19] Brinton's work preceded the Viennese proto-Isotype by about ten years and may well have provided Neurath and his associates with inspiration and example.

The Dutch and British Connections

In 1934 Neurath and some of his associates, including his principal symbol-designer, Gerd Arntz, moved their work from Vienna and Moscow to The Hague for six years until the invasion of Holland by the Germany Army in 1940.[20] While based in Holland, Neurath established the International Foundation for the Promotion of Visual Education, and in 1936 he formulated the Isotype system in his book, *International Picture Language*, published in London.[21] Neurath came to Britain in 1940 and was among the hundreds of Austrian, German and Italian citizens

Most stars
consist mostly of hydrogen,
and that's
where we want to go now,
is into the center of a star
much like our sun.
There's a lot of company here.
Hydrogen atoms
are compressed close together
by the force of gravity.
But don't worry,
there's still plenty of
breathing room
because the atom itself
is mostly empty space.
One way to visualize
a hydrogen atom
is as a huge balloon.
The surface –
the part you see –
really isn't solid.
It consists of an incredibly
small particle called an electron
which is whirling around so quickly,
it's appearing to be everywhere
at once.
We can never identify exactly
where it is,
but we're sure it's there.
In the center of this balloon
is the nucleus.
It contains about 2,000 times
the mass of the electron
in the form of another particle,
a proton.
As large as this is,
this mass occupies just
10^{-15} of the total volume
of the atom.

At any rate,
these protons
in the center
of hydrogen atoms
collide and fuse
together,
and in so doing,
some of their mass
is converted to
high energy photons.
The process gets quite complex,
but the net result is
that photons created near
the stars' surface
escape.
It is one of these photons
that is the subject of this paper.
I call it the Kamikaze Photon,
for it fascinates me
that this object
that is only a very small part
of a very small part of an atom
can span incredible time
and distance
only to "die" in my eye.
Let me take you back
to the spring of 1991 and
to my backyard
in Westport, Massachusetts.
It is a clear Saturday night and
I have hunkered down
in the comfort of my star chair
with a small telescope
pointed towards a distant galaxy.
I am star dreaming.
I am relaxed, comfortable,
and totally transfixed
by a hazy patch of light
that appears in my telescope
as an oval blur. There are also some bright
pinpoints of light nearby,
but they don't interest me
on this evening.
Tonight I'm focusing on this blur
known as M-104,
or more poetically,
the Sombrero Galaxy.

22
Edwards and
Twyman,
*Graphic Communica-
tion through Isotype*,
Principles of Isotype,
23, and
Working Methods, 25.

23
Passmore,
*A Hundred Years of
Philosophy*, 375.

24
Hamlyn, D.W. 1988.
*A History of Western
Philosophy*. London:
Pelican, 281-83.

25
Hamlyn, *A History of
Western Philosophy*,
375.

311

Examining the Past
Clive Chizlett
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interned in prison camps as 'enemy aliens.' In 1941 he was released and he settled in Oxford. With his wife, Marie Reidemeister (born 1898, married 1941), he founded the Isotype Institute at Oxford in 1942. Between 1941 and 1944, Neurath worked with director, Paul Rotha, on eight documentary films for British government agencies. These films incorporate the earliest uses of *animated* Isotype picture-symbols. The themes of the films range from public health to aspects of prospective post-war reconstruction.

Marie Neurath and the Isotype Institute

Marie Neurath and her associates constructively developed the work of the Isotype Institute in Britain and Holland for some thirty years after Otto Neurath's death in 1945. The Institute turned away from ideological propaganda and statistics to specialize in preparing and publishing books, wallcharts, maps, filmstrips, animated film sequences, animated models and kits for educational purposes. The material was planned and designed for use in Britain and overseas. Starting in the mid-1950s, Marie Neurath produced a wide range of material in support of public welfare projects for the governments of Ghana, Nigeria and Sierra Leone. Her work had to take into account the various languages and tribal cultures of the West African states. Picture-symbols were extensively employed on the charts and posters so that information could be visually conveyed or orally presented to villagers whose culture was still in transition from pre-literacy to literacy. Marie Neurath's illustrated books, pamphlets, articles and charts on a vast range of topics, have been produced for use in schools in many languages: Anglo-American English, French, Dutch, German, Swedish, Italian, Portuguese, Japanese and the West African language, Yoruba (which uses the Latin alphabet for associated typography). All such material was developed on the basis of the first principles established by Otto Neurath in Vienna, Moscow and The Hague during the late 1920s and early 1930s.[22]

Science and Truth

During the period 1931-34, Neurath was regularly associated with the Moscow Institute and directing his Vienna Museum. He was also developing and publishing important philosophical ideas. For example, in 1932 (the year of the great famine in the Soviet Union), he published a paper on the topics of the coherence-theory of truth and protocol-sentences.[23] Coherence-theory had been earlier developed by the Oxford absolute-idealist and empiricist philosopher, F.H. Bradley (1846-1924) in his book, *Essays on Truth and Reality* (Oxford University Press, 1914).[24] Bradley, and later Neurath, argued that any coherent, comprehensive, well-knit, clear and consistent set of beliefs may be used contingently to supply the criteria for measuring the truth of a given statement. It would naturally follow that a statement which is found true by one set of criteria or set of protocols may be found true or false or non-proven

I have seen this before
in my much larger 16-inch telescope
and know that it deserves
the name Sombrero
because cutting across the center of the blur
is a thin, black dust line
that makes the galaxy look like
a Mexican hat.
That kind of detail is beyond the means
of the little 3-inch telescope I'm using now.
But I don't have to be able to see the dust line
to know it's there,
for there is so much
that I know about this little blur
that doesn't meet the eye,
but resides in the brain.
And it is this connection
between eye and brain –
between light and knowledge,
between photons and imagination,
between the physical and the abstract,
between the temporal and the eternal,
that I am trying to make
on this particular night
in the spring of 1991.
For the unknowing eye,
there is not much to see.
For the mind,
working in conjunction with the eye,
there is far more to see in this one blur of light
than a lifetime of observing will reveal.

What I see now
(in my eye and in my mind)
is that Kamikaze Photon –
that little dust mote of energy –
weaving its way across the boundless universe
to my backyard.
I lean back in my chair a little more; I
work the crick out of my neck;
I let my eye and mind relax –
and there is the photon,
emerging from a star within M-104.
Like our star, the sun,
it is a relatively ordinary star
and an ordinary photon.
Like other photons
it is moving at a constant speed,
about
186,200 miles per second.

Sure it is.

26
Haack, Susan. 1976.
Philosophy of Logics.
United Kingdom:
Cambridge University
Press. See the chapter
discussing and
comparing coherence-
theories and corres-
pondence-theories
of truth.

27
"Schlick thought that
one had in the end
to compare proposit-
ions directly with
experience, but that
what was being
ascertained in that
comparison could not
be put into words.
Neurath rejected that
idea, asserting that
one could only com-
pare statements
with statements.
Hence the acceptability
of any empirical
proposition, basic or
not, is a mat-ter of
whether or not it
fits into the system of
propositions. Neurath
thus accepted a coher-
ence theory of truth
and a notion of system
which is more like
that of the idealists.
This did not please all
members of the group
[The Vienna Circle],
although Carnap too
was eventually driven
in that direction."
Hamlyn, *A History of
Western Philosophy,*
308.

28
Passmore,
*A Hundred Years of
Philosophy,* 375.

29
Passmore,
*A Hundred Years of
Philosophy,* 407.

30
Passmore,
*A Hundred Years of
Philosophy,* 587.

by a different set.[25] The matter is not trivial: the effect upon ethics and aesthetics, for example, is vital.

Correspondence-Theories of Truth

Coherence-theories of truth are fundamentally different from the correspondence-theories of truth put forward by Bertrand Russell in 1918 and Ludwig Wittgenstein in 1921-22.[26] Correspondence-theory is universal in its scope and looks for direct mappings between the fact and the related statement of the fact. Such an approach to truth puts a major premium on the meaning of statements. We can largely replace Is it true? by What does it mean? To test the meaningful mapping of a fact by its related statement requires an examination of the methods that are used to test the mapping. Thus, we can agree with the conclusion of logical positivists, generally, that the truth of a statement is governed by the method of its verification. If, and only if, there is correspondence between fact and statement, is there meaning.[27] Neurath claimed that such an idea was metaphysical and therefore invalid in the context of analytical philosophy.[28]

Philosophy of Science

Karl Popper, who was particularly concerned with developing a philosophy of science, suggested to his colleagues in the Vienna Circle that the truth and reliability of scientific propositions, including hypotheses, are tested by refutation as much as by verification. According to Popper, refutation exists to distinguish science from its simulacra. He suggested that the social sciences and economics are merely simulacra of the exact sciences because, unlike the exact sciences, they do not and can not generate irrefutable laws. The social sciences and economics do not reliably explain "why things work out in one way rather than another."[29] Neurath recognized with bitterness and hostility that Popper's suggestions not only discounted the social sciences and economics as fields of objective inquiry, but also discredited Marxist-Leninist analyses of history, economics and societies.[30]

Language-Games and System-Codes

Correspondence-theory of the truth and the meaningfulness of terms relate naturally to scientific and logical discourse and to mathematics, particularly statistics. However, correspondence-theory can be generally and universally extended beyond scientific discourse to account for any proposition. Only within a coherent set of well-formed protocols, such as the rigorous language of science and physics, would Neurath accept a proposition as truly pertinent. Coherence-theory can not be generally and universally extended beyond formal protocols to account for any proposition (except to describe such a proposition as one to be excluded from consideration).

It was during the early 1930s, strangely enough, that Wittgenstein began to move away from the severe correspondence-theory of the *Tractatus* towards an almost open-ended theory of language-

Just wrap your mind around that
for a moment.
You want weirdness?
Think of something that moves
at 186,200 miles a second.
      How fast have you gone?
      Sixty miles an hour?
      That's a mile a minute.
      Eighty-eight feet in a second.
Or maybe you have flown in a jet
faster than the speed of sound –
about 700 miles an hour.
Eight hundred and eighty feet per second.
      Or if you happen to be an astronaut,
      you've orbited the Earth
      at 18,000 miles an hour.
      That's fast.
      But at that speed,
it would take you an hour and a half
to go around the Earth.
      Light –
      our little photon –
      travels around the Earth
      seven and a half times
      each second.

So our Kamikaze Photon is no laggard.
It's not dragging its heels.
But it has an awful long way to go.
Just to get out of its galaxy –
to break out of this little Island Universe
of another 1.3 trillion suns –
and begin to cross intergalactic space,
our photon will travel about 40,000 years.
How do I know this?
The truth is,
the star I'm talking about
is too distant
to see as a single star,
so I've taken a little poetic license
and I'm imagining
that this particular photon
is leaving from a star
      that's in one of the spiral arms
      of the galaxy
      at about the same distance
      from the edge of M-104
      as we are from the edge of the
            Milky Way Galaxy
            that we inhabit.

31
Eco, Umberto. 1976.
A Theory of Semiotics.
Bloomington: Indiana
University Press, 36.

32
Bartley, III,
Wittgenstein, 36.

33
Eco, *A Theory of
Semiotics*, 7.

34
Conquest,
The Harvest of Sorrow,
111.

games (as eventually published in his *Blue and Brown Books* and *Philosophical Investigations*). Neurath's work on coherence-theory and protocol-sentences reminds one, in some ways of Wittgenstein's ideas about language-games and also of Eco's and other semioticians' more recent descriptions of system-codes.[31] Incidentally, Neurath purported to believe that the picture-theory of thought proposed in Wittgenstein's book, *Tractatus*, endorsed the picture-based internationality of the Isotype system. Wittgenstein discounted such a belief, observing that representational thought alone is the common language of humanity. In other words, pictures are not intrinsically means of inter-cultural communication.[32]

The Conflict between Truth and Ideology

It is curious that Neurath was developing Bradley's coherence-theory of truth at a time when he was also advising Soviet authorities on the abuses of Isotype principles or how to deliver lies for the purpose of political propaganda. It is one thing to have made a contribution to the theory of language-games, but quite a different thing to play games with language itself. Clearly, Marxism-Leninism is a language-game or system-code which incorporates a "coherent, well-knit, clear and consistent set of beliefs" by which to test a truth. If the Party says that black is white, then black is white. Similarly, if it says that crop-spraying took place on that scale, it did.

However, even though Neurath allowed or engaged in dishonest use of Isotype principles, there is no need to invalidate his claims for Isotype as a means of conveying information. After all, one can tell truth as well as lie with a natural language. According to Eco, "semiotics (the science of the life of signs in the life of society) is in principle the discipline studying everything which can be used in order to lie."[33] Exactly.

The Statistics of Genocide

A closer examination of Neurath's contributions to the work of Isostat and the Moscow Institute for the Visual Representation of Statistics during the implementation of Stalin's first Five Year Plan is in order. The materials published by the Institute between 1929 and 1934 particularly, including its quasi-Isotype charts, describe remarkably successful developments in agriculture, industry, power-generation, mining, forestry, civil engineering and communications. The publishing program for the charts relating to the first Five Year Plan broadly coincide with the period of Neurath's consultative and instructional activities at the Moscow Institute. The data upon which the Institute's charts were based is a matter of critical importance when we examine Neurath's positive and perhaps negative contributions to the discipline and practice of descriptive and comparative statistics.

The Journey   **The first 40,000 Years**

The Kamikaze Photon
leaves its star, and
possibly a family of planets,
behind in a day or two.
It passes other stars and nebulae
and clusters of stars.
Some of these it comes quite near –
perhaps as close as half a light year.
  But most
  it misses by several light years,
  and as it moves toward the edges,
"close" encounters with other stars become rare.
    It also misses the tremendous cloud
    of cosmic dust
    that gives this galaxy its nickname.
    Then it is in intergalactic space.
    Ahead lies apparent nothingness –
        roughly 40 million years
        of nothingness.

As the Kamikaze Photon
departs its home galaxy,
there is no observatory at 1346 Drift Road,
Westport, Massachusetts, U.S. of A.
There is no 1346 Drift Road,
no United States,
and no creature on this planet
who even knows
how to build a telescope.
  The land itself
  is periodically part of the ocean,
  then land again.
  On it remain the bones of dinosaurs,
  wiped out some 25 million years before this.
  Some version of the early horse
  might have been roaming it
  as the photon began its journey.
  Cats and dogs
  have yet to make their appearance
  even in primitive form.
    Preprimates have appeared,
    but the separate evolutionary path
    for apes and monkeys
    had not begun yet.

35
Conquest,
The Harvest of Sorrow,
88.

36
Conquest,
The Harvest of Sorrow,
see chapter 18.

37
Conquest,
The Harvest of Sorrow,
311.

38
Conquest,
The Harvest of Sorrow,
311.

Soviet Statistics

A brief review of the history of a typical set of data from which the Moscow charts were derived is revealing. The Institute's immediate source of statistical data would have been Gosplan (the Soviet State Planning Commission) and its central statistical office.[34] Gosplan was the principal agency of the Soviet authorities for implementing the economic policy within the Five Year Plan: prescribing goals and establishing the interim objectives but also measuring actual economic performance. Gosplan collected its own raw data from statistical bureaus based on economic sectors, geographic regions and republics of the Soviet Union. Such bureaus gathered their data from local officials and line managers. We may assume that some of these officials and managers understood some of the forms and questionnaires which they were required to complete and return. We may also assume that some senior officials and managers knew how to draft a questionnaire (not an easy thing to do well without training). Finally, we may assume that some officials and managers ignored their prescribed quotas or deadlines within the Five Year Plan and told the truth.[35]

But What Shall We Tell the Children?

When Gosplan at last acquired data to be compiled into nationwide statistics, what did they do with the material? The facts as relayed to Stalin and his closest associates were rarely suitable for the consumption of the Soviet people and the world-at-large. The facts had to be hidden. Something had to be published, and if the real facts were politically unacceptable, fictions had to be devised by Cominform and its agencies for news, propaganda and agitation. The fictions were published and broadcast to occupy the place of the real facts.[36] In the contexts of governmental, ideological, political and corporate propaganda, the compilation, interpretation, selection and transmission of data are not, and can not be, scientifically objective. However, when groups or individuals exploit an apparently scientific medium such as descriptive statistics to convey data which are merely fictional or corrupt or banal, then we are in serious difficulty. No cause justifies the uttering of forged statistics.
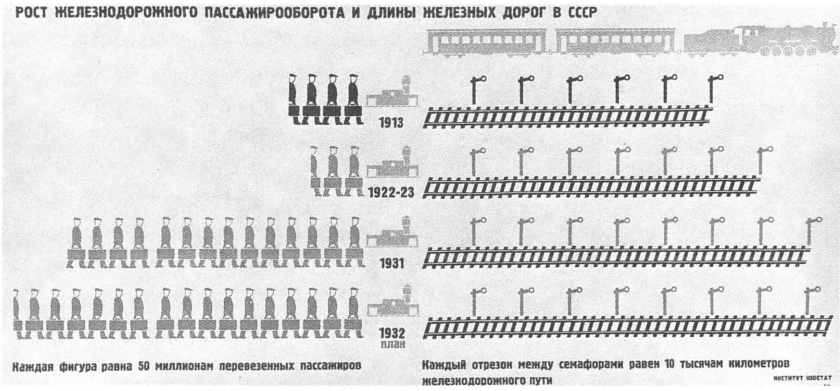
News of the Great Famines

Reports of the several genocidal famines imposed upon the Ukraine and elsewhere in the Soviet Union by Stalin during the early 1930s were widely published and broadcast in the West. The facts were also well known within all the major Russian centers of population such as Moscow. Reports of the famines circulated among foreign nationals living and working in Russia at that time. In December 1932, Stalin's second wife, Nadezhda Alliluyeva, was intensely distressed by reports of the Ukrainian famines, reports which she had been given by fellow students in Moscow.[37]

In Vienna, Neurath's home city and work base in between his operations in Moscow, the newspaper *Reichpost* continually reported

Figure 3 **Isotype comparison of passenger traffic and railroad construction in the Soviet Union.**
Each figure represents fifty million passengers transported. Each segment between semaphores represents ten million kilometers of train track.
(*Translated by Tim Jucovy*)

Reproduced courtesy of the Otto & Marie Neurath Collection in the Department of Typography & Graphic Communication, University of Reading, England.

РОСТ ЖЕЛЕЗНОДОРОЖНОГО ПАССАЖИРООБОРОТА И ДЛИНЫ ЖЕЛЕЗНЫХ ДОРОГ В СССР

1913

1922-23

1931

1932 план

Каждая фигура равна 50 миллионам перевезенных пассажиров

Каждый отрезок между семафорами равен 10 тысячам километров железнодорожного пути

ИНСТИТУТ ЮОСТАТ

39
Conquest,
The Harvest of Sorrow,
317.

40
Edwards and Twyman,
*Graphic Communi-
cation through Isotype,*
33.

41
Conquest,
The Harvest of Sorrow,
306.

the famines in the Ukraine from late 1932 onwards until the middle of 1934. In 1933, an International Relief Commission, with its headquarters in Vienna, was established under the chairmanship of the Cardinal Archbishop of Vienna. That commission was explicitly concerned with attempting to alleviate the effects of the famines in the Soviet Union.[38]

Know-Nothing or Stand-Patter?

It is remotely possible that Neurath was unaware of the widespread famines which were in full spate throughout the latter half of his work at the Moscow Institute. Rail journeys between Moscow and Vienna may have skirted the worst affected regions of the Ukraine and Byelorussia. While he was in Moscow and in Vienna between 1932 and 1934, it is even possible that he heard and read but honestly and honorably discounted all reports of the famines. What chills the blood, particularly in the light of history, reason and common sense, is the possibility that Neurath knew the purposes, locations and extent of the famines. Perhaps, in common with the British economists, Sidney and Beatrice Webb, he recognized and accepted the underlying political goals of the man-made famines.[39]

The Missing Chart?

The classical period of the Isostat work does not include any chart which conveys the brutal facts of the first Five Year Plan. We do have some very pretty charts such as the ones produced in Moscow in 1932 under Neurath's direction and dedicated to celebrating the first fifteen years of Soviet power following the revolution (*see figure 3*). There are other attractive charts which describe the phenomenal progress in various sectors of the Soviet economy (particularly in heavy industry and agriculture).[40] We can, however, imagine a chart for the famine years 1932-37 in the Ukraine, Byelorussia, the Caucasus, the Crimea and Kazahkstan. We might choose the human skull as the appropriate metonymic symbol, printed in off-white on a black background. Given the impact on the census-figures of more than twelve millions *extra* deaths in the Soviet Union between 1932 and 1937,[41] we might allocate 100,000 deaths to each skull. With photo-prints of 120 skulls, we should have enough images to patch together the artwork for printing an accurate array based on the principles of the classical Viennese abacus-charts. It would not be appropriate to use the Cross instead of the skull. The famines were inflicted upon the Ukrainian Jews and Kazahk Muslims in addition to whole populations of Orthodox, Catholic and Protestant Christians.

The first 30 million years

The space it is traveling
through is unbelievably empty –
more so than the best laboratory vacuum
we can produce on earth,
and yet there are occasional atoms even here,
but our photon doesn't encounter any of them.
It does come relatively near other galaxies,
for its home galaxy is part of a cluster of star systems
known as the Virgo cluster.
There are about 2,500 galaxies in this cluster,
each containing on average 100,000 million stars.
But the distances between galaxies
is truly beyond the ability of our imagination to grasp.
Sometimes, on a dark morning
when I have been alone under the stars for hours
and I have given my mind free reign –
sometimes, I believe I understand those distances
just a little better.
Sometimes I think I understand them too well,
and I abandon my telescope and the stars
for the safety of my bed and sleep.
Sometimes they scare the hell out of me.

And onward
our Kamikaze Photon
rushes.

Conclusion and Summation

"A natural consequence of the upheaval was the death of millions of peasants in the rural famine of 1932-33 . . .To discourage the starving peasants from stealing their own grain, intended for the towns or for export, the death penalty was extended to "pilfering". . . For three decades after 1929 the Russian diet remained deficient in protein."

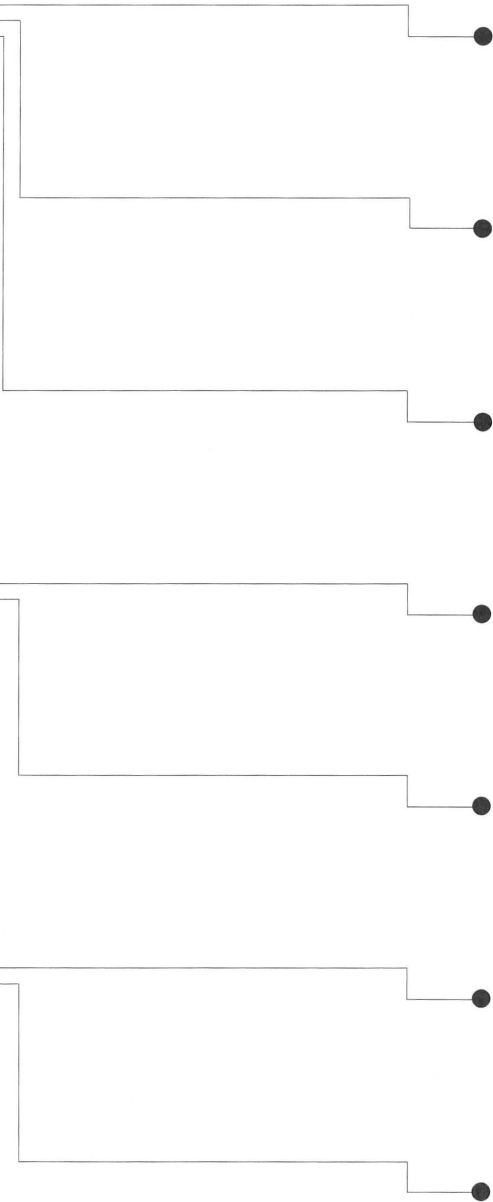*Endurance and Endeavor.*
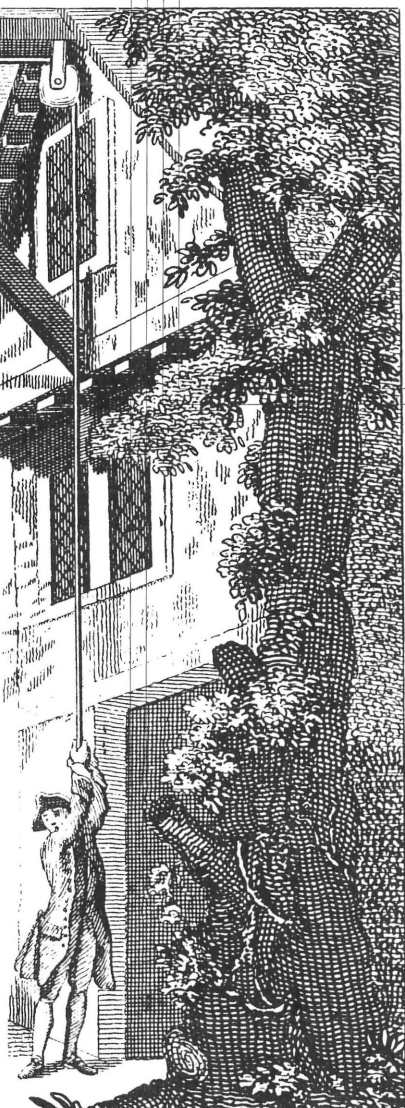J.N. Westwood, Oxford University Press, 1987.

Each Isostat chart is the graphic expression of statistical content, content which we normally think of as real in its origin. The authority of an Isostat chart is endorsed by the disciplined regularity of its arrays of repetitive pictographs. The attractiveness of an Isostat chart is reminiscent of the attractiveness and simplicity of toys and tabletop games from childhood. The authority and attractiveness of Isostat and Isotype charts were exploited positively, but also negatively, by Neurath in the years from 1925 to 1934. But what is the objective value of a chart which is attractive but also banal or mendacious? Does the prettiness absolve the banality and the lying?

It can be shown that Otto Neurath helped the Soviet authorities in the early 1930s to compile and publish false statistics for the purposes of propaganda. To be fair to Neurath, we must consider the context of those times – the baleful and terrifying menace from Nazi Germany, particularly after December 1933 when Hitler became Chancellor. Neurath certainly deserves to be read against the background to his life and times during and between the two World Wars. He was, morally and ethically, neither better nor worse than the hundreds of other artists, writers, broadcasters, editors, journalists, film-makers, photographers, teachers and designers who worked to further the interests of Hitler, Mussolini, Franco and Stalin. Neurath is a major figure in the development of persuasive uses and abuses of media and statistical diagrams. He is also a political propagandist and campaigner of formidable ability and tenacious commitment. He has original things to say about the nature of truth. I rest my case.
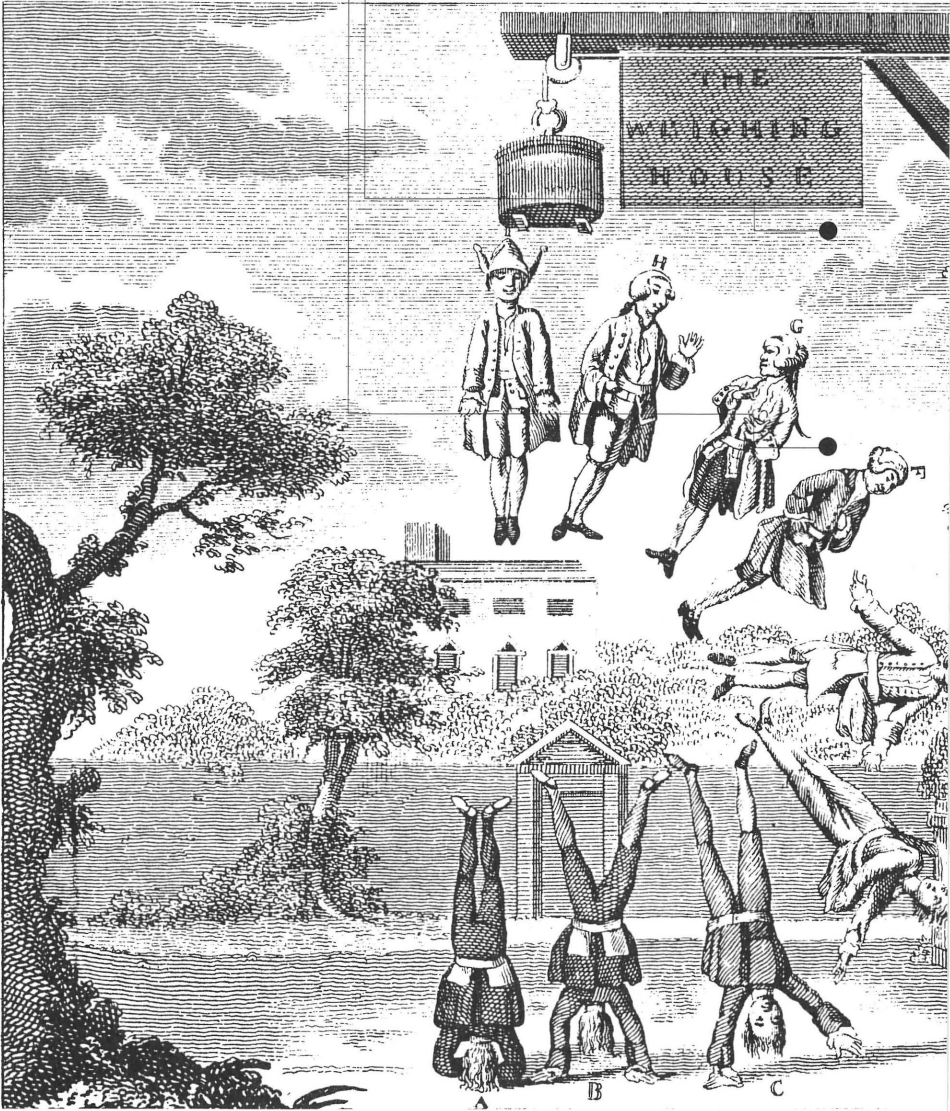
Questioning the Present
or
questioning conventions

Judith E. Sims-Knight,
professor of psychology at
University of Massachusetts
Dartmouth, has been
studying the development
of reasoning for twenty years.
Her interest is the develop-
ment of mature reasoning and
problem solving skills in
adolescents and adults.
She is interested not only
in the nature of reasoning and
how it develops, but also,
and especially, the environ-
mental conditions under
which such development can
occur. This interest has led
her to investigate the role
of visual representations in
promoting understanding
of complex concepts and the
role of user-based design
in overcoming the difficulties
of creating visuals that
communicate. She has con-
ducted research on develop-
ment of logical reasoning
and of algebraic reasoning
and is currently engaged in a
National Science Foundation
project that employs user-
based design to develop
procedures using visual repre-
sentations to teach
nonprogramming students
how to design computer
software.

This paper proposes that to create visual designs that effectively communicate their information it is necessary to supplement the intuitions of the designer with empirical research. The first part of the paper gives the reasons why intuitions – of designers or anyone else – are inadequate. It describes the habits of human reasoning that distort designers' ability to intuit how users will understand and respond to graphics. The second part of the paper gives two alternative solutions to these problems, both of which are based on observing how people actually behave in response to visuals. One solution is to investigate scientifically whether and how visuals communicate to viewers. From such investigations general principles can be developed and examples of research-based principles for educational visual representations are given. When such general principles are not available or appear to be inappropriate for the given situation, designers can use a second solution, that of user-based iterative design. This strategy provides procedures by which designers can explore users' reactions at the same time they are developing prototypes of their designs. In this way user-based errors can be corrected while designs are still being developed.

1
Bertin, J. 1983.
*Semiology of Graphics:
Diagrams, Networks,
Maps.*
(W.J. Berg, trans).
Madison, Wisconsin:
University of
Wisconsin Press.

2
Cox, D.J. 1988.
Using the super-
computer to visualize
higher dimensions:
An artist's contribution
to scientific visuali-
zation. *Leonardo*, 21,
233-242.
Also
Cox, D.J. 1990
The Art of Scientific
Visualization.
Academic Computing
4, 20-22, 32-40, 58.

3
Tufte, E.R.1990.
*Envisioning Infor-
mation.* Cheshire,
Connecticut: Graphics
Press.

4
Personal
communication,
Dietmar Winkler,
1988.