

Generalized Between Icon, Symbol and Index: The Physical Dimension in Isotype and Unicode

Sandra Neugaertner¹

¹ *Leuphana University Lüneburg, Universitätsallee 1, 21335 Lüneburg, Germany*

Abstract

Pictograms are components of the visual language systems of ancient cultures in Egypt and Mesoamerica as well as in modern pictorial statistics and applications of the Unicode system in our computerized present. The term “pictogram” or “pictograph” (from Latin *pictum* “painted”, “picture” and ancient Greek *γράφειν* *gráphein*, English “to write”) indicates that the icon and the symbol are conjoined and function together. The paper looks at different applications of pictograms and explores their relationship to and understanding as image schemas. Starting with the Isotype, a pictorial-static method developed by Otto Neurath, and taking into account its artistic origin and specific production process, it is shown that pictograms such as the Isotype integrate not only icon and symbol, but also the indexical sign. This is not only of fundamental importance with regard to the question of the power associated with the increasing organizational abstraction of pictograms through textual logics, but also the strongest connection can be made here to image schema that are based on the sensorimotor experiences of the body with the environment. The value of the indexical sign is important precisely because it is diametrically opposed to coding. Thus, the analysis of the states of the sign, drawing on the semiotics of de Saussure and Peirce, aims to examine the phenomenon of formal to technical reduction in greater detail. To this end, the reference to hieroglyphic writing (which Neurath himself did), to the Huexotzinco Codex, and finally to the application of Unicode pictograms will be discussed. The work of artist Marcel Schwittlick will be discussed as an example of how coded Unicode pictograms are used as a reference for exploring new means of machine-based artistic practice.

Keywords

Image schema, pictogram, pictograph, pictorial statistics, Vienna method, Isotype, Cologne Progressives, Huexotzinco Codex, Unicode, sign theory, coded, index, physical

1. Semiological Categorization

The paleoanthropologist André Leroi-Gourhan has shown that visual art is inextricably linked to language and has its origins in the constitution of an intellectual pair, namely the formation of sounds and signs. However, the development of linear type led to the separation of art and writing or – in the semiological dimension – to the splitting of human-cultural expression into the iconic and the symbolic category. In order to return to a visualization that was and is common to all peoples, Leroi-Gourhan proposes to mobilize all the forces of abstraction [1]. This proposal is similar to the strategies that Otto Neurath (1882-1945) formulated and pursued from the mid-1920s with the Vienna method of pictorial statistics.

Neurath, who is also known for his political involvement in the Munich Soviet Republic, the Vienna Settlement Movement and the Austrian Social Democracy, developed the Vienna method as the first pictorial statistic of its kind to illustrate sociological, statistical facts [2]. Its establishment is linked to the founding of the “Gesellschafts- und Wirtschaftsmuseum” (GeWiMu) in Vienna, whose director Neurath became at the beginning of 1925. The integration of displays with pictorial statistics

The Eight Image Schema Day (ISD8), 25–28 November 2024, Bozen-Bolzano, Italy

✉ sandra.neugaertner@leuphana.de (S. Neugaertner)

ORCID [0000-0001-8629-8466](https://orcid.org/0000-0001-8629-8466) (S. Neugaertner)



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according to Neurath's method was the essential and characteristic feature of this new type of museum (Fig. 1).²

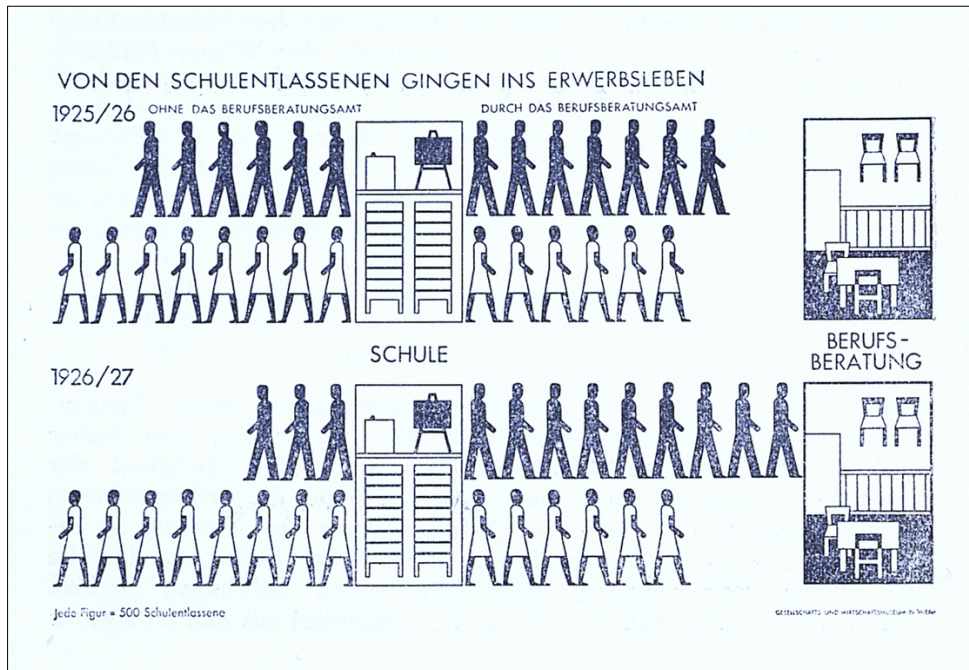


Figure 1: Activity Report of the City of Vienna's Career Advice Office, 1929. GeWiMu.

Neurath's recourse to pictorial signs, which had been developed at the GeWiMu in a laborious search for reduced, abstract, adequate forms (Fig. 2), was a step backward in palaeographic terms, but all the same an advance in the unique inclusion of semiological categories. To describe the Viennese method of pictorial statistics, Neurath introduced the term *Isotype* in 1934, an acronym for "International System of Typographic Picture Education". This name suggests not only the educational purpose, but also hints at the connection between the two sign states: "Typographic" points to the category of symbol, "Picture" to that of icon. Likewise, terms such as "pictorial language", "pictogram" and "pictograph" (from Latin *pictum* "painted", "picture" and ancient Greek *γράφειν* *gráphein*, English "to write") indicate that icon and symbol enter into a connection and operate together. And indeed, while the meanings of the pictorial-statistical pictograms as symbolic signs were determined by convention, as iconic signs they were at the same time similar to the original object to which they referred and thus not entirely arbitrary or capricious. In fact, they function neither as completely iconic nor as completely symbolic signs, but rather on the borderline between the two categories of signs.

Neurath developed his pictorial statistical method in parallel to the semiological and structural linguistic movements, within which the question was posed: What is the source of meaning; what generates meaning in language? As a general interest in science and society at the time, such questions were posed both in the United States in the work of Charles Sanders Peirce

² The "Gesellschafts- und Wirtschaftsmuseum" in Vienna and its "Vienna Method of Pictorial Statistics" soon became known and recognized first in Vienna and then worldwide. It took part in numerous exhibitions at home and abroad with its pictorial statistics panels, e.g. in 1926 for the municipality of Vienna and the Austrian social insurance institutes at the major exhibition for "Gesundheit, Soziale Fürsorge und Leibesübung" [Health, Social Welfare and Physical Exercise], GESOLEI in Düsseldorf and in the same year at the first major urban planning exhibition in Vienna; in 1928, for example, at the Housing and Urban Planning Congress in Paris and at the Pressa in Cologne, and in 1931 at the International Hygiene Exhibition in Dresden. It also produced illustrated panels for other museums, including the Museum of Science and Industry in Chicago. In addition, articles by Neurath and his colleagues with illustrated statistics appeared in magazines ranging from the "Wiener Gemeindezeitung" to Survey Graphic in New York, the most important magazine in the field of social work in America at the time. A separate institute, the "Mundaneum Institute", was founded in 1932 for international work, with branches in Vienna and The Hague.

(1839-1914), who generated the first theory of signs, and by the Swiss semiologist Ferdinand de Saussure (1857-1913) and the Russian semiologists in St. Petersburg and Moscow, such as Viktor Šklovskij (1893 greg.-1984), and Czechoslovakia, such as Roman Jakobson (1896 greg.-1982), who had an outstanding influence on the development of linguistic structuralism.³ Semiotics and linguistics, with their interest in the genesis of meaning and linguistic standardization, are scientific movements that took place parallel to Neurath's development of pictorial statistics and must be considered in conjunction with it. The overarching question was how meanings and relationships between objects or events are conveyed, and in the specific case of pictorial statistics, how a high degree of abstraction makes sign systems applicable to a wide range of contexts. This gives rise to questions about the universality versus conventionality of visual languages.

I propose that by abstracting signs to elementary forms and symbols that are organized and represent complex information in simple and comprehensible images, pictorial statistics based on the Vienna Method reveal connections to visual representations of image schemas. Image schemas make visible how the patterns of recurring structures in our cognitive processes are anchored in our experience and perception and determine our patterns of understanding and reasoning [3] [4]. While it must be emphasized that they do neither abstract reality nor generate meaning (as pictorial statistics do), but rather abstract our experience of reality, the representations of image schemas bear surprising analogies to the Isotype. Because of their *organization*, the visualized image schemas in Figure 3 may refer to path, center-periphery, and, I would argue, as a conceptual metaphor for hierarchy. The organizational charts of a family tree (Fig. 4) and a company (Fig. 5) implement similar conceptions in a more detailed way. Figures standing together naturally suggest a couple, and the top-down organization makes the temporal process or hierarchy clear. While they refer to social relations, they are compressed generalizations of particular spatio-temporal relations that could be derived from repeated embodied experience, and thus, following Maria Hedblom's characterization of image schemas, bear crucial links to it [3].

The charts from the 'Fighting Tuberculosis' exhibition produced by Neurath's enterprise for the National Tuberculosis Association in the USA in 1938 (Fig. 6 and 7) may suggest the implementation of some schematic value. But above all, they are narrative and function in exactly opposite direction to image schemas. The charts are intentionally created for a purpose, while image schemas do not have to be developed first but are already anchored in people's minds.

The crucial distinguishing point is therefore, whether we are dealing with a form of communication that aims to convey an argument (socio-economic or other), or with an illustration of what is present anyway, without the manifestation being linked to a specific intention [3, 4, 5]. In contrast to image schemas, pictorial statistics are based to a large extent on conventions. This means that they are accepted by a definable group of people. Image schemas, on the other hand, are readable and valid for everyone because they are based on sensory-motor experiences that we have with our environment [3]. These are, so to speak, physical rather than cultural foundations. It is about the distinction between physics and culture, between natural determination and intentional, cultural determination.

A resulting question is whether this sensorimotor basis still applies exclusively to the visual representations of image schemas? Or do the effects of culture creep in through the search for the best possible representation? Just recall the family tree and company charts, which show that there is room for maneuver on both sides in terms of representation. And so it is with the Isotype: The more detailed the shapes are, the less abstract they are, the more culture has flowed into them, which means that they are more determined by convention (see Fig. 8).

³ While Charles Sanders Peirce, whose "What is a Sign?", published in 1894, was a representative of behaviorist sign theory and, like his successor Charles William Morris, distinguished between syntactics, semantics and pragmatics, Ferdinand de Saussure, who published "cours de linguistique générale" in 1916, was the main representative of the second branch — structuralist sign theory, which developed from the approaches of Viktor Šklovskij, Roman Jakobson and colleagues and was continued by Roland Barthes, among others.

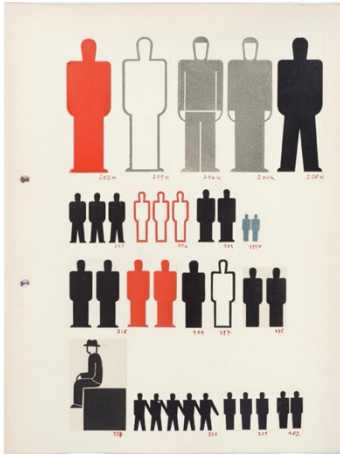


Figure 2: Gerd Arntz's variations on male pictograms for Neurath's "Bildlexikon", GeWiMu/Arthur Wolf Verlag.

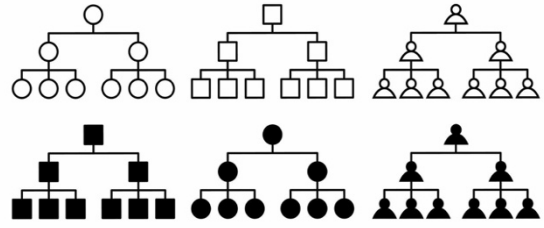


Figure 3: Outline silhouette organization structure (family tree).

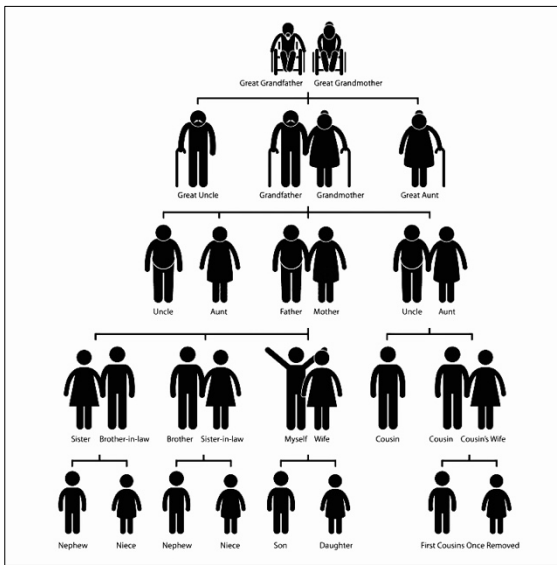


Figure 4: Pictogram organization structure (family tree).

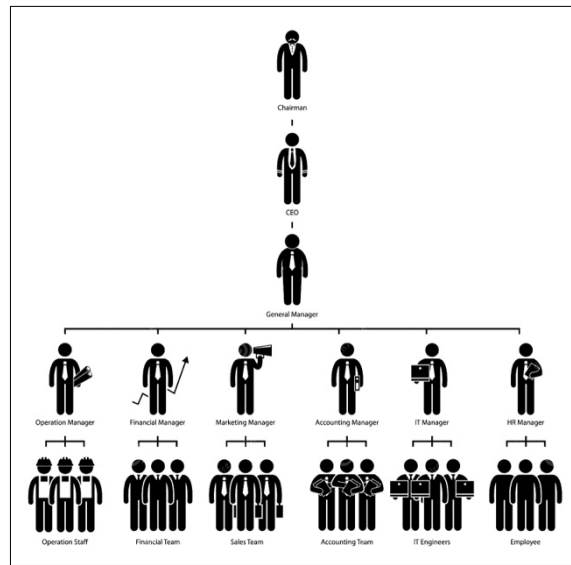
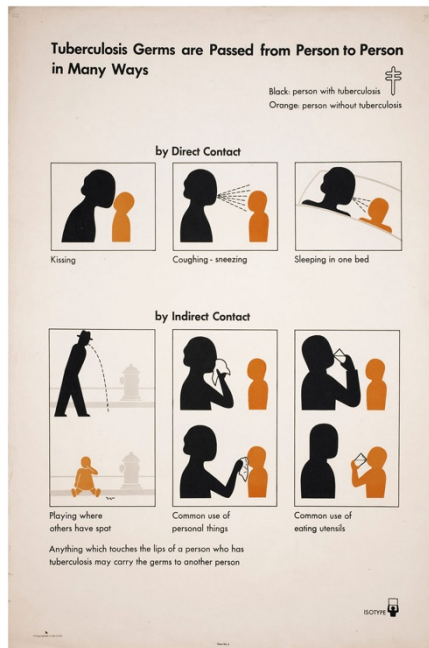
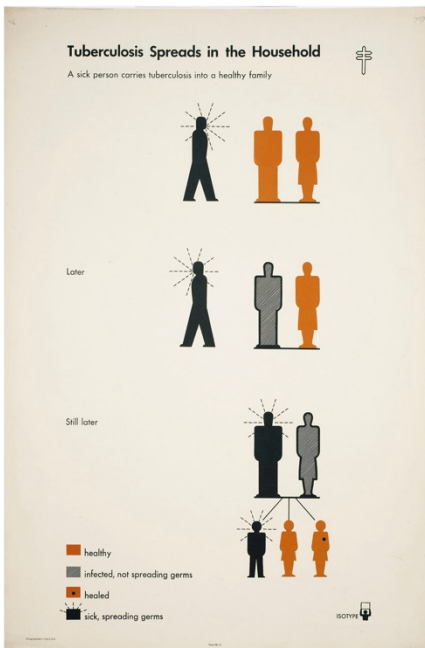


Figure 5: Pictogram organization structure (company).



Figures 6–7: Charts from the “Fighting Tuberculosis” exhibition produced for The National Tuberculosis Association in the USA, 1938: Tuberculosis spreads in the household; and Tuberculosis germs are passed from person to person in many ways. University of reading, Otto and Maria Neurath Isotype Collection.



Figure 8: “Millions of working women were educated. The USSR is a country of female equality”. Pictorial statistics by the Isostat Institute, 1938; GPIB Collection.

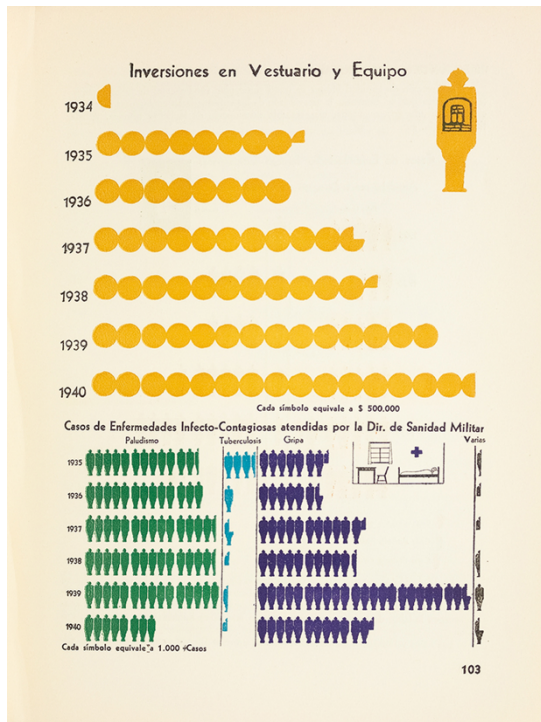


Figure 9: Isotype in Mexico, early 1940s.

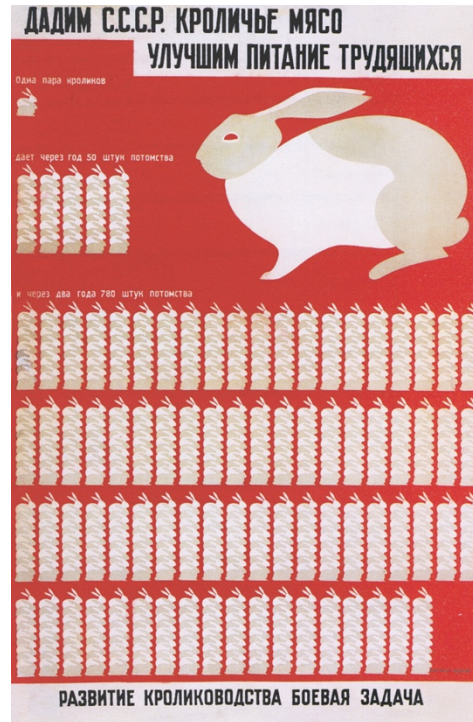


Figure 10: Isotype in USSR (Isostat Institut), 1930s.

At the same time, just as the visualizations of the image schemas must be circumscribed in terms of their alleged non-culturality, a concession must be made to the pictorial statistics: they too convey certain contents and concepts on the basis of shared experiences and perceptions of a so to speak non-specific culture. It must be emphasized that Neurath attempted with the pictorial statistics to reduce culturally anchored components to a minimum by striving for general applicability, in other words for universality (see Fig. 9 and Fig. 10 compared to Fig. 8). These displays strive practically for what is inherently present in the image schemas. Through abstraction, cultural limitations were at least minimized.

Neurath intended to introduce a globally valid alphabet of pictorial symbols that could be understood across social and national borders without much explanatory text and thus largely independent of the respective national language. Neurath's encyclopaedic goals according to which he was concerned with the construction of a scientific corpus that would enable the cooperation of as many disciplines as possible in terms of scientific logic and terminology [6], culminated in the mid-1920s in an extensive collection of symbols already in use, the *Thesaurus*, which was to serve as the basis for his international visual language [7]. At the same time, Neurath was aware of the constraints of such an undertaking, as he aptly put it: "Of course, a 'worldwide universal visual language' always had to remain an unfulfillable dream, because in most countries in Africa or Asia the typical unemployed person is dressed differently than in this symbol, but the symbolic visual language could make many things directly understandable to many viewers over wide areas and in many countries" [7]. Neurath's *Thesaurus* correspond in its interest in unification to the nature of image schemas. Both are not detailed, but rather template-like concepts that are linked to linguistic expressions. With the reality-abstracting structures of his new sign system, Neurath was in fact striving for a new cognitive pattern formation that would function analogously or as a substitute for the linguistic alphabet and would be learned in the same way as linguistic patterns are formed in children during language acquisition.

With the claim to create a new language system with universal readability through abstraction and systematization, the *Thesaurus* also shows a proximity to the goals of Gestalt psychology of Kurt Grelling and Paul Oppenheim, the representatives of the Berlin Circle, which they expressed in connection with the concept of *Gestalt*: "Ultimately, our work serves the standardization of scientific language and thus the logical ideal of the unity of science" [8]. However, Neurath tended to push for a standardized physical language (which explains the relationship with image schemas, as will be shown). Steffen Kluck states that Neurath will have seen Gestalt psychology as a way of overcoming linguistic diversification in the individual sciences, especially as "the physical correlates of phenomenal forms can of course be easily integrated into a unified physical science" [9].⁴

As a representative of empiricism and logic, Neurath developed his own theory of science, which he called "physicalism", claiming that "in a sense unified science is physics in its largest aspect, a tissue of laws expressing space-time linkages" [10]. Assuming that "physicalism" influenced the genesis of the Isotype, Peirce's sign theory, which, in contrast to de Saussure's linguistic sign theory, also deals with the extra-linguistic sign category – the indexical sign – is highly applicable to the analysis of the Isotype. The indexical sign is defined by a physical connection to those objects of which it shows something. In other words, Neurath's "physicalism" and conviction that all science is based on the experience and observation of concrete phenomena are the very links to the image schemas, which are described by George Lakoff as "relatively simple structures that constantly recur in our everyday bodily experience: containers, paths, links, forces, balance, and in various orientations and relations: up-down, front-back, part-whole, center-periphery, etc. These structures are directly and repeatedly experienced because of the nature of the body and its mode of functioning in our environment" [11]. The Isotype may enact laws that relate to image schemas, for instance by

⁴ Accordingly, Neurath did not have a strictly negative attitude towards the Berlin School, he just wanted to free Gestalt psychology from metaphysical elements.

establishing connections between objects or events on the basis of patterns that have been shaped as such by recurring bodily experiences.

The Isotype not only functions like iconic signs and at the same time acts symbolically since it simultaneously abstracts reality and generates meaning qua convention; beyond this, it also activates the indexical sign value as a relationship to reality exists. The indexical sign is defined by a physical connection to the objects of which it shows something. But since this relationship is only indirect, we are not dealing here with no easily identifiable, “normal” indexical sign category, but rather so-called “degenerated indices” [12]. According to Peirce, the index is a sign that can also have “merely” a causal connection to an object. Accordingly, the physical object connection can also be determined via the capacity for indication. Against this background, physical connection does not necessarily mean direct physical contact, something that Sigrid Weigel has emphasized in her seminal article “Indexikalische Bilder. Spur, Ähnlichkeit und Codierung. Peirce’ Semiotik – bildtheoretisch gewendet” from 2015 [13]. Peirce himself offers the broadest possible definition when he formulates that the index is a sign whose reference to the designated object is based on being “really affected” by it [14]. This affection can also be triggered, as in the case with the Isotype, on a cognitive level.

To summarize, the combination of all three sign categories means that the Isotype is embedded in our social structure and value systems, but not exclusively and completely like linear letter fonts, because it is at the same time related to sign systems whose meanings are quite “natural” and unavoidable. The latter fosters its connection to image schemas, since both reveal that we live and are connected to physical objects and events.

2. Artistic and Technical Requirements

Looking at the artistic origin of Neurath’s Isotype it becomes clear how the connection to physical objects and events is even established in the genesis itself. In *From Hieroglyphics to Isotypes: A Visual Autobiography*, Neurath describes the difficulties that almost all of the collaborators involved in form-finding had to overcome: “... some of them worked very hard to get away from the various painting techniques of the day, which tended either towards realism or towards a kind of expressionism – that is, toward lines and color effects more akin to musical expressionism, without any informative element in it” [4]. Among the co-developers, however, was Gerd Arntz (1900-1988), an artist who did not have to adapt first, but whose artistic expression was already so developed before the collaboration that it anticipated Neurath’s stylistic ideas of pictorial statistics: “It was an exception when a painter called Gerd Arntz, before he came in contact with our work, tried to use simplified representations of human beings, animals, machine etc. in his own work. Such a man was of course particularly well qualified to play a considerable part in forming the Isotype style, which is of importance as well as the Isotype vocabulary and the Isotype grammar, if one is allowed to use these terms in such a context” [4]. Arntz belonged to the Cologne Progressive artists’ group, which had gathered around Franz W. Seiwert (1894-1933) in the early 1920s and whose political home was located between pacifism, socialism, communism and anarchism. The figures and objects in the works of these artists are characterized by the compressed, stencil-like character. They thus contrast the style of painterly representation of other artists, for whom, as Neurath explained, exorbitant lines and colorfulness were characteristic.

Two issues of *a bis z*, a magazine of the Progressives, edited by Heinrich Hoerle, demonstrate not only the reception of the Isotype, but also the formal-technical parallels of the pictorial statistics (No. 8 from May 1930; see Fig. 11) and the artworks by the Progressive artists depicting the proletarian as a reduced schema (No. 12 from November 1930; see Fig. 12). The Cologne Progressives created almost exclusively woodcuts and linocuts. This not only set them apart from the technics of Expressionism, to which most of the Cologne Progressives had previously belonged and which they then rejected, but also from the New Objectivist artists who were ideologically close to the Progressives, but worked realistically and also distanced themselves from the pathos of

Expressionism through their sober, objective style of representation. But it was only through the consistency of the printing technique that the most consistent, diametrical departure from ornate, subjective lines and brushwork was achieved. And these print media corresponded perfectly with the production process of the Isotype symbols. Neurath explains: “When we started, simple symbols were drawn rather realistically, but by using a new technique they soon become simplified without becoming less self-explanatory. We cut out the symbols – little silhouettes of cows, goats, potatoes, ploughs and human beings – from colored paper, thus reducing the outlines to a minimum and of course avoiding internal lines wherever possible. This simplification led us to prepare little blocks from which we printed the symbols that we wanted to paste on the charts we were exhibiting. The combination of these developments led us to a style of our own, which enabled us to pass from technical or biological drawings to statistical or organizational ones without altering our rules or our technique of presentation” [4].

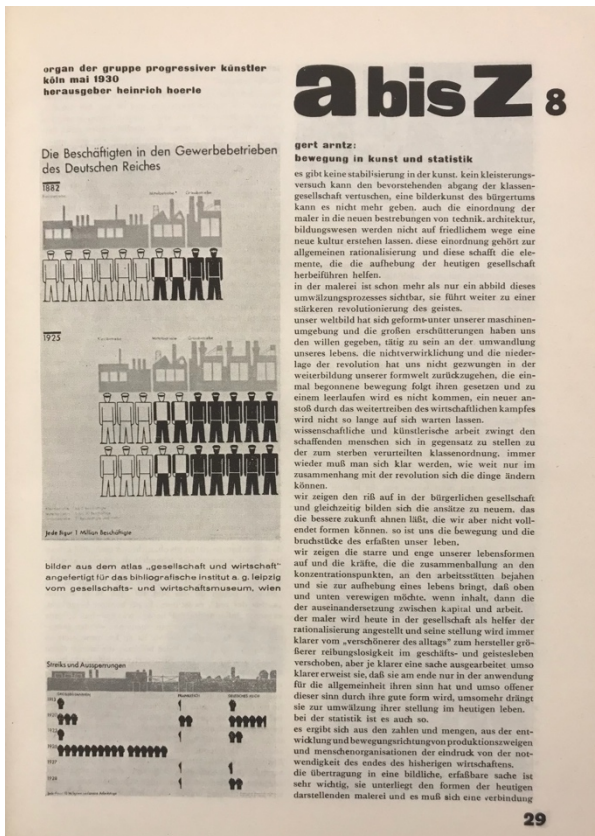


Figure 11: Frontpage of *a bis z*, Vol. 2, No. 8 (May 1930).



Figure 12: Frontpage of *a bis z*, Vol. 2, No. 12 (November 1930).

The importance of the stencil like character becomes especially clear when looking at pictorial statistics that did not exactly follow the Vienna method in terms of abstraction. Their shapes are related to the painterly representations (see Fig. 13). The Isotype in its foundation in the printing technique, stands out in terms of reducing detail to the bare minimum. No painterly movements were technically able to achieve this factual, physical degree of abstraction – regardless of whether they worked as objectively, or abstractly as possible. Their works were always interpretations of reality. In contrast, the Cologne Progressives intended and technically achieved a condensation of form according to a symbolic language. They were concerned with formulating a sign of the oppressed, the proletarian as an economically conditioned schema. They identified a sign language as the most symbolic form of expression and thus created a kind of “icon of the oppressed proletariat” (Fig. 14). The pictograms of the Isotype adopted these proceedings that resulted in stencil-like cogwheels as a sign for industry or the pictorial sign of a hammer for craftsmanship (Fig. 15).



Figure 13: Aleksandr Rodchenko, The Death of Lenin, 1924 (1924 Smert' Lenina), Poster No. 25 of 25 from the series The History of the All-Union Communist Party (of Bolsheviks) in (Istoria VKP[b] v plakatakh), c. 1926, Merrill C. Berman Collection.



Figure 14: Heinrich Hörl, Arbeiter mit Hammer.

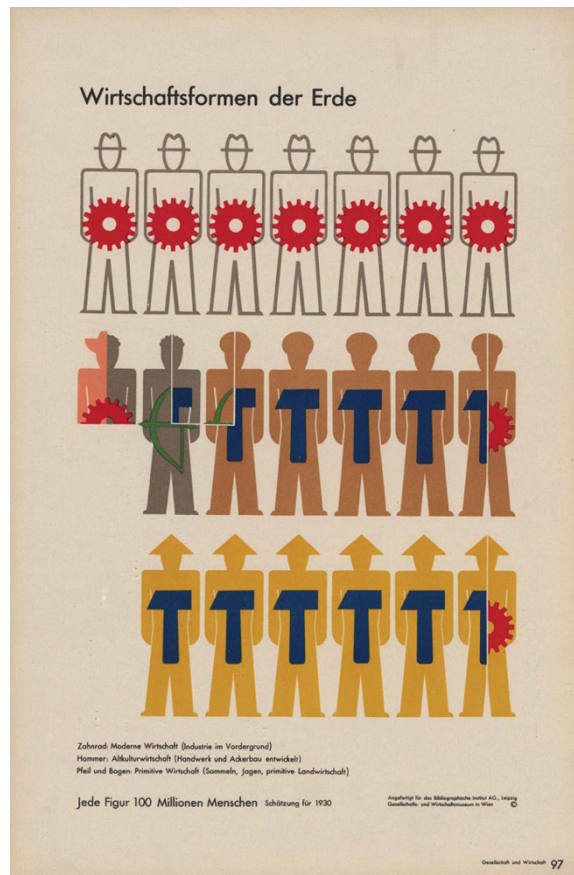


Figure 15: Economic system of the earth, Bildstatistisches Elementarwerk, 1930, Leipzig.

As outlined in the previous section, the indexical character value should be taken into account when specifying the Isotype, and the printing technique is a phenomenological clue here. Woodcuts and linocuts are letterpress printing processes in which a relief-like printing block is produced to create graphics. The formalistic concept of *facture*, which is related to the indexical sign, makes the difference between such a printing process and painterly techniques clear. Defined as “the nature and appearance, the sensually perceptible imprint (the effect) of the work process, which is evident in every treatment of the material”, the *facture* in a print is extremely even and uniform, and thus objective, in contrast to the individual – subjective – brushstrokes of pigment painting, which leave a tactile trace [15]. Corresponding to the indirectness of the physical reference to reality of the “degenerated indices”, the physical influence is only indirect through the previously produced printing block, in which a stencil-like texture was generated by massive impact with a chisel. The print involves this indirect physical influence, which can no longer be experienced tactilely, but still cognitively. This again suggests the close connection of the Isotype to image schemas, which also cognitively abstract our bodily or physical experience of reality. As is well known, the Vienna method no longer relied on prints but on the technique of silhouettes. Nevertheless, it can be argued that silhouettes have a texture that is similarly flat and even as that of a print, which at best emphasizes the edges as form-giving boundaries instead of the lines that fill the boundary to hatch surfaces. What the drawing is to painting in terms of the translation of pigment color application to line hatching, the silhouette is as a stencil-like analog to the print.

The uniformity provoked by the stencil-printing can be stated phenomenologically not only for the tactile, but also for the visual experience: The color values, which are indeterminate in painting (indeterminate because color gradients are generated in painterly processes – with the exception of constructivist and suprematist works), are reduced to singular units in silhouette and printing processes. Analogously, the statistical symbols also function monochromatically – and not only within the surface of a specific symbol, but within the entire system the color spectrum is reduced and coded symbolically. Neurath explains: “In Isotype the colors play an important part. It is not always possible to reproduce a color Isotype in shades of black and white without reducing the richness of an argument or even destroying its main point. We may reduce the outline of a symbol to a minimum, but the colors remain essential in many cases.” [4]. Accordingly, symbols should have the same color and be used for the same or similar contexts. The “viewer, after having seen a large number of such pictorial-statistical panels, [... would] more or less automatically become attuned ... to associate certain symbols and colors with certain ideas and thus grasp even more quickly what it might be about” [7]. This quote makes it clear that the spectrum of forms and colors generated in this way not only drew on the conventions of the current culture, but also sought to create new (more universally valid) conventions. In addition, printing and paper-cutting processes fulfilled the technical requirements for the development of the symbol system, which also enabled the reusability of the pictorial symbols in terms of process technology. The monochromatic color values and reusable stencil shapes ensured technical reproducibility – in contrast to individual painting processes.

Statisticians, economists, social scientists, geographers and social insurance specialists were also involved in the development of the pictograms of the Vienna method/the Isotype. However, it is obvious that Neurath, whose private collection included several prints by the Cologne Progressives,⁵ was first and foremost dependent on the fundamental influence that Arntz exerted on the form-finding process. It was only through the technical and artistic achievements of the Cologne Progressives that the pictorial statistics arrived at the specific style. Neurath had met Arntz in 1926 at the Exhibition for Health, Social Welfare and Physical Exercise (GESOLEI) in Düsseldorf and was able to engage him to work permanently at the GeWiMu in Vienna [3]. In *a bis* z Arntz had finally established the link between his artistic work and Neurath’s pictorial statistics himself: “The more

⁵ For example, Neurath’s collection included “Helft der Internationalen Arbeiterhilfe” (1924) and “Menschen im Gefängnis” (1924) by Seiwert as well as “Hinrichtung” (1928) and “Zum Walfisch” (1930) by Augustin Tschinkel.

clearly a thing is worked out, the more clearly it proves that it ultimately has its meaning only in its application for the general public, and the more open this meaning becomes through its good form, the more it urges the overthrow of its position in contemporary life. It is the same with statistics” [16].⁶

As with the visualization of image schema, where we find a natural process of abstraction implicit in the theory of embodied cognition in a three-fold form of apparition of embodied experience – mental manifestation – symbolic representation [3], we find the “omission of all naturalistic or otherwise superfluous decorative additions,” albeit through controlled processes made possible or necessary by the printing or cutting procedure [7]. This led to a three- or four-step approach to legibility as the underlying rule at the reception level, which Neurath defined in a lecture at an international conference of architects and urban planners with the following principles: “At first glance, the most important thing must be recognizable; at second glance, additional necessary details; at third glance, the relationship involved; if a fourth glance is necessary, then the picture is bad” [17]. Both the Progressives with their artistic stencil forms and Neurath with the pictograms of his pictorial-statistic method succeeded in creating an image-schematic communication system that was captivating, memorable and at the same time comprehensible. It captivated through its indirect, physical reference, it was comprehensible through its functioning on the border between iconic and symbolic sign value and it was memorable through the joint effect of all three of Peirce’s sign categories.

3. From Hieroglyphics to Unicode

Neurath’s interest in pre-linear writing is well documented. In addition to his preoccupation with children’s drawings, he also studied hieroglyphic writing as part of his theorization of the Isotype. He argued that there “are some differences between hieroglyphics and Isotype. As I have already stated, the fine and clear shape of Egyptian hieroglyphics degenerated gradually into black or cursive characters, without any pictorial features. Hieroglyphics did not use very much color as an essential element of the visual language; the symbols were made in such a way that the bas-relief inscription did not differ considerably from the painted texts” [18]. Hieroglyphics tended to share more with arbitrary symbols, namely letters, than with images. The fact that colors had little significance strengthens this argument. “One can see immediately the difference between Isotype and Egyptian hieroglyphics. We tried not to present more details than are needed for quickly grasping the main points of a picture, whereas the Egyptian painters did not think it sufficient when representing different kinds of slaves or princes to rely on, say, colour alone (indicating brown or black people) but very often added details ...” [18].

The significance of the coding becomes even more clear when looking at the pictorial writing system of the Nahua indigenous people, namely the Huexotzinco Codex (see Fig. 16). The Huexotzinco Codex is an important historical artifact from Mesoamerica dating back to 1531, which records a history of indigenous resistance to colonial taxation as well as religion, agricultural patterns and local political structures. The eight-sheet document contains pictorial visualizations of tribute payments as part of a testimony in a court case against representatives of the colonial government in Mexico ten years after the Spanish conquest in 1521. Huexotzinco is a town southeast of Mexico City in the state of Puebla. In 1521, the Nahua Indians of the city were allies of the Spanish conquistador Hernando Cortés, and together they fought against their enemies to defeat Moctezuma, the leader of the Aztec empire. Between 1529 and 1530, when Cortés was out of the country, the

⁶ For a detailed account of the interpretation of the work of the Cologne Progressives, see also my essay *From Revolution to Reformation: From the Figurative Constructivism of the Cologne Progressives to Léna Meyer-Bergner’s Isotype in Mexico as Anti-imperialist Strategy, 1920-1946*, in: B. Buchloh (Ed.), *From Posada to Isotype, from Kollwitz to Catlett: Exchange of Political Print Culture. Germany-Mexico, 1900-1968*, Museo Nacional Centro de Arte Reina Sofia/TF. Editores, Madrid, 2022, pp. 400–417.

Spanish colonial administrators interfered in the daily activities of the community and forced the Nahuas to pay excessive taxes in the form of goods and services. The Nahuas eventually sued against the abuses of the Spanish administrators.

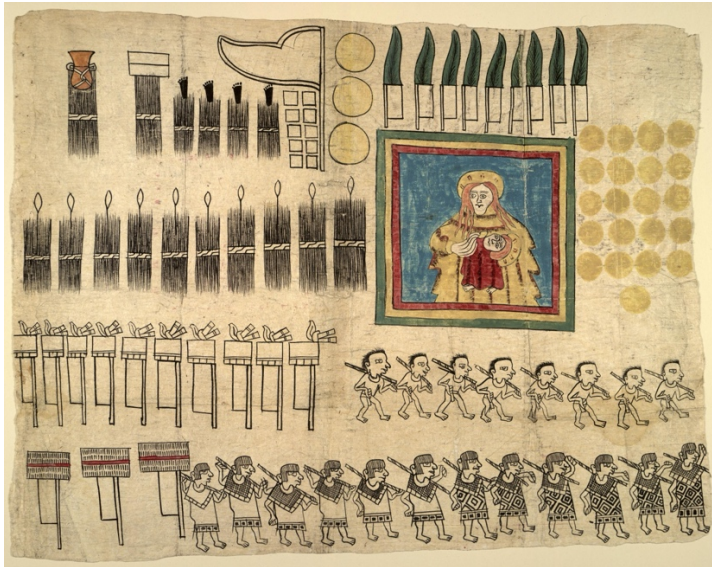


Figure 16: Huexotzinco Codex, Huexotzinco, Mexico, 1531, Harkness Collection, 1525-1651, The Library of Congress.

The Huexotzinco Codex demonstrates how pictograms made it possible to overcome linguistic barriers and to visualize the grievances of the Spanish administration. Instead of coding by color, the figures of the Huexotzinco Codex are characterized by different degrees of structuring of the garments, which encodes group affiliations. But what is more, in clear proximity to the Isotype, a set of certain pictorial symbols represents an exact number of objects. Analogous to Neurath's method, the repetition of pictograms of the same size marks corresponding quantities — instead of scaling the symbols (see Fig. 13). Of course Neurath's method included “merely the translation of long rows of numbers and statistical tables into the famous ‘rows of little men’, but a carefully elaborated system of pictorial pedagogy in which these ‘rows of little men’, or more precisely: the juxtaposition of identical symbols of the same size in each case, whereby quantities of different sizes are indicated by different numbers of the same symbols of the same size in each case, do indeed occupy their significant and of course immediately eye-catching place — but only as part of the overall system, in which other elements also play a significant role. The decisive factor here is the arrangement of the symbols” [7]. However, in a timeless interface, I would argue, the Huexotzinco Codex and Neurath's Isotype share an underlying rule or concept, namely that of a bodily experience in terms of organizing, collecting, counting that we have as children with the objects around us, independent of any culture. It is the same criteria that is of interest, finally, with a view to the more recent applications of pictogram — namely the Unicode pictograms — that will be discussed regarding the previously developed interface between Isotype and image schema with respect to embodied cognition.

Unicode is a character encoding standard for all writing systems on the computer, which was developed in the 1980s under the significant influence of Joseph D. Becker and adopted as an official standard in 1991. As of version 15 in 2023, it contains a total of 149,813 characters. This system, which aims to unite all the world's characters in a single coding standard, also includes pictographs, which have been included in the Unicode block “Miscellaneous Symbols and Pictographs” since October 2010. Pictograms form the basis, which is analog in the case of the Isotype and digital in the case of Unicode pictograms. The pictogram system of the Vienna Method of Pictographic Statistics was also encoded in Unicode [19].







Looking at the large number of unreadable symbols from the collection of more than 100,000 coded characters of the Unicode system, it once again becomes clear where Neurath saw the value of the Isotype: pictograms have the advantage that they can usually be understood directly without

having to learn a specific language. As has been shown at the beginning, sign languages operate on the boundary between iconic and symbolic sign categories. As has also been demonstrated, in pictograms of the pictorial statistics according to the Vienna method the indexical category is also present, namely through the fact of being affected by a physical experience. This argument I have been trying to strengthen on the physical basis of bodily experience which again is a link to image schemas. In other words, the functioning of the Isotype is not only dependent on conventions but simultaneously applies patterns or laws of cognitive and conceptual meaning based on the body's sensorimotor interactions with the environment.

With regard to the Unicode system, however, it must be realized that the universal systematic coding of the textual dimension, which is formative in administrative, logistical terms, in turn initiates a massive counterpoint to the iconic and indexical dimensions the phenomenology of pictorial signs so special. In the Unicode system, characters – including pictograms – are managed by encrypted systems. They are represented in a hexadecimal code point consisting of four digits. This code point is a unique value assigned to each Unicode character (in addition to hexadecimal, there are other types of encoding: decimal, HTML encoding, URL encoding (PHP), etc.). The boundary where the pictorial and realistic ends and the textual/symbolic begins is thus shifted to the administrative level. No longer suitable for direct human readability, the question of power is determined by the administrative apparatus and its systematics. The overall system of the Unicode also makes it clear that characters and symbols are incorporated into the same textual register.

The interest of the Berlin-based artist Marcel Schwittlick in the Unicode pictograms with regard to his artistic practice may be rooted in precisely this tension between coding/administration and physical reference/phenomenology. Not only does the artistic design of the Unicode pictograms strive for the most reduced form – in the sense of a most efficient variant in terms of the number of pixels (Fig. 17) – but Schwittlick also returns the pixel to embossed paper (Fig. 18). Instead of visually perceptible prints, he opts for a tactile experience of the Unicode pictograms as a complete departure from the screen pixels, which are, as it were, removed from the administration of the virtual art market by being unique.



Figure 17: Marcel Schwittlick, Unicode landscape (snow capped mountain  u+1f3d4; camping  u+1f3d5; beach with umbrella  u+1f3d6; desert island  u+1f3dd; desert  u+1f3dc; national park  u+1f3de), 2024.

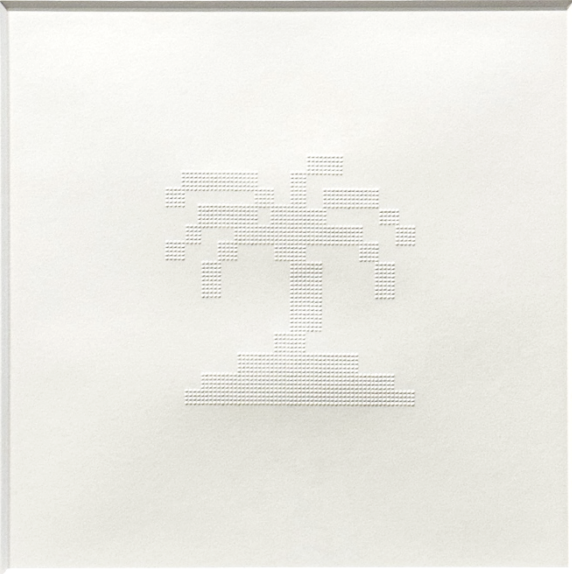



Figure 18: Marcel Schwittlick, Desert Island  u+1f3dd, 2024, Embossed paper, Unique, signed on verso.

References

- [1] A. Leroi-Gourhan, *Hand and Word: The Evolution of Technology, Language and Art*, Suhrkamp, Frankfurt am Main, 1984.
- [2] A. Jansen, *Isotype and Infographics*, in: E. Nemeth, F. Stadler (Ed.), *Encyclopedia and Utopia: The Life and Work of Otto Neurath (1882-1945)*, Vienna Circle Institute Yearbook, Vol. 4, Kluwer Academic Publishers, Dordrecht, 1996, pp. 143–156.
- [3] Hedblom, M. M., *Image schemas and concept invention: cognitive, logical, and linguistic investigations* [Dissertation, Otto-von-Guericke-Universität Magdeburg, 2018].
- [4] Tscharn, R., *Design of Age-Inclusive Tangible User Interfaces Using Image-Schematic Metaphors*. Proceedings of the Eleventh International Conference on Tangible, Embedded, and Embodied Interaction (TEI '17). Association for Computing Machinery, New York, NY, USA, 2017, pp. 693–696. <https://doi.org/10.1145/3024969.3025036>.
- [5] Baur, C., Wienrich, C., & Hurtienne, J. (2022). Form follows mental models: Finding instantiations of image schemas using a design research approach. In: F. Mueller, S. Greuter, R. A. Khot, P. Sweetser, & M. Obrsit (Eds.), *DIS'22: Designing Interactive Systems Conference*, 2022, pp. 586–598. <https://doi.org/10.1145/3532106.3533451>.
- [6] K. H. Müller, *Symbole, Statistik, Computer, Design: Otto Neuraths Bildpädagogik im Computerzeitalter*, Hölder-Pichler-Tempsky, Vienna, 1991.
- [7] P. Neurath, *Das Gesellschafts- und Wirtschaftsmuseum in Wien (1925-1934) und die Entwicklung der Bildstatistik*, in: O. Neurath, P. Neurath (Ed.), *Otto Neurath: Oder die Einheit von Wissenschaft und Gesellschaft*, Böhlau, Vienna, 1994, pp. 59–74.
- [8] K. Grelling, P. Oppenheim, *Der Gestaltbegriff im Lichte der neuen Logik*, in *Erkenntnis*, Vol. 7 (1937/38): 211–225
- [9] S. Kluck, *Gestaltpsychologie und Wiener Kreis: Stationen einer bedeutsamen Beziehung*, Karl Alber, Freiburg/München, 2008, pp. 189–90.
- [10] Neurath, O., *Physicalism: The Philosophy of the Viennese Circle*, in: R.S. Cohen, M. Neurath (Ed.), *Philosophical Papers 1913–1946*, D. Reidel Publishing, Dordrecht, Boston, Lancaster, 1983 [1931], pp. 48–51.
- [11] G. Lakoff, *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*, University of Chicago Press, Chicago, 1987.
- [12] U. Wirth, *Between Genuine and Degenerate Indexicality. Eine Peircesche Perspektive auf Derridas und Freuds Spurbegriff*, in: S. Krämer (Ed.), *Spur: Spurenlesen als Orientierungskunst und Wissenskunst*, Suhrkamp, Frankfurt am Main, 2007, pp. 55–81.
- [13] S. Weigel, *Indexical Images: Trace, Similarity, and Coding*, in: S. Weigel, *Grammatology of Images*, Suhrkamp, Berlin, 2015, pp. 138–143.
- [14] C. S. Peirce, *Nomenclature and Divisions of Triadic Relations, as Far as They Are Determined*, 1998 [1903].
- [15] L. Moholy-Nagy, *From Material to Architecture*, New Bauhaus Books, facsimile of the 1st ed., Gebr. Mann, Berlin, 2001 [1928].
- [16] G. Arntz, *bewegung in kunst und statistik, a bis z*, volume 2, no. 8 (1930): 1.
- [17] O. Neurath, *L'Urbanisme et le lotissement du sol en representation optique d'après la methode Viennoise*, *Annales Techniques* (1933): 44–46.
- [18] O. Neurath, *From Hieroglyphics to Isotypes: A Visual Autobiography*, M. Eve, C. Burke (Ed.), *Future Books*, Vol. 3, Hyphen Press, London, 2010 [1943-1945].
- [19] Bergerhausen, *Unicode. Der unbekannte Weltstandard*, in: J. Bergerhausen, S. Poarangan (Ed.), *deunicode: Die Schriftzeichen der Welt*, Hermann Schmidt, Mainz, Hermann Schmidt, 2011, pp. 9–62.