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Truth and Transformation in Isotype Picturebooks: Analyzing *Railways under London* (1948) by Marie Neurath

1 Introduction

We do not know much about truth in picturebooks. This holds for descriptive and narrative picturebooks alike. With respect to descriptive (or non-fiction/informational) picturebooks, we can posit that they should represent the world in a truthful manner. Moreover, the information given in text–picture combinations should be accurate, objective, and comprehensible for the addressed audience. It goes without saying that these norms are often violated, for instance in those descriptive picturebooks that convey propagandistic messages. Therefore, we have to examine to what extent a descriptive picturebook represents the world according to the norms of truth, accuracy, objectivity, and comprehensibility.

With respect to the Isotype picturebooks created by Marie Neurath and her collaborators, one can safely assume that the intention was to convey knowledge according to the aforementioned norms. The transformation of knowledge as possessed by experts (for instance biologists or anthropologists) to knowledge potentially possessed by children, was at the heart of Isotype procedures. In order to find out what the relevant knowledge was, a complex process of fact-checking was carried out. Isotype rules for transforming knowledge into pictures were used in order to achieve graphics that not only show something but also help in explaining the respective phenomenon. The additional support by the Isotype picturebook texts is also very functional for this purpose (although this has, to my knowledge, not been widely researched).

This chapter deals with aspects of truth and transformation with respect to the Isotype picturebook *Railways under London* (1948) that appeared from Max Parrish in London. In contrast to *If You Could See Inside* (1948) and *I'll Show You How It Happens* (1948) from the same year, both aimed at young children, *Railways under London* addressed children aged 9–12. (This means that a prototypical child reader was born between 1936 and 1939 and had experienced the war.) *Railways under London* is a complex descriptive picturebook relating to the conceptual frame mentioned in the title (for a typology, see Meibauer 2015 and Campagnaro 2021).

The overall topic of the book, railways under London, that is the London Underground, is attractive for a number of reasons. The London Underground

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opened its first line on 10 January 1863. It is probably the most famous underground railway system in the world. Two seminal visual designs contributed to this popularity.

First, the logo of the London Underground, the so-called roundel, which is a red circle with a horizontal blue bar laid over it. The bar shows either the name of the respective station or the word *UNDERGROUND*. This famous logo was designed by Edward Johnston in 1916.[1] It is widely used for informational purposes and can be seen in every station, on trains, timetables, and maps.[2] Second, the map of the London transport system designed by Harry Beck in 1933:[3] this is a landmark of graphic design and is based on the idea that, for solely informational purposes, the topographical relations of stations are relevant, not their exact location on a map being true to scale. Basically, the plan consisted of lines in vertical and horizontal positions, and 45-degree angles connecting the symbols for the stations. Arguably, there is some overlap in the Isotype principles and the design of the London Underground map (see Kinross 2017, 143–144).

In 1948, memories of the heavy bombings on London were still present in the cultural memory as well as in the minds of individual people. Although most children were evacuated, they were aware of the fact that stations were used as shelters, but as these were attacked by German air raids, they were not always a safe place (Cooper 2014). These wartime experiences are not mentioned in Neurath's book, however. Instead, the book focuses merely on technical and architectural contents, trying to show "the mechanical wonders" (a quotation from the inside front flap) of this underground world.

The outline of this chapter is as follows: In Section 2, matters of truth in picturebooks are discussed, with a close view of the Isotype picturebooks. I will argue that it is not the picture itself that can be true or false, but only the description of the picture. However, pictures can be used in deceptive ways. In Section 3, I will describe the picturebook *Railways under London* in more detail. The exact description always takes place with regard to the fine adjustment between (perceived) reality and its graphic or textual representation. It becomes clear that transformation is a complex process that requires precise consideration of what is comprehensible to a child reader. In Section 4, I will discuss to what extent transformation preserves truth or risks deception. The point is that the (uninten-

1 Edward Johnston (1872–1944) was a British teacher of calligraphy who had a major influence on the development of calligraphy and typography in the twentieth century. See Taylor (2016).

2 Cf. the modified version of the roundel with the publisher's name *Kindler* on the cover of Miroslav Šašek's book *London* (1960 [1959]).

3 Henry Charles "Harry" Beck (1902–1974) was a British technical draftsman and graphic designer. See Garland (1994).

tional) omission of relevant information can have a misleading effect. Section 5 concludes the chapter.

2 On truth in descriptive picturebooks

In picturebook theory, there has not been much systematic reflection about truth in picturebooks. This holds for the textual as well as for the pictorial level. Obviously, this has to do with the widespread concentration on narrative picturebooks where matters of representation of reality are usually discussed under the label of mimesis. When it comes to descriptive picturebooks, the situation is somewhat different, because here, it seems to make more sense to ask whether the pictorial and textual information being given to the child is true.[4] Yet, with the notable exception of Løvland (2016), we are faced with a lack of systematic reflection and analysis.[5]

It is widely acknowledged that informational picturebooks are somehow related to "facts", and that these facts are supposed to be "true". But then, again, it is stressed that informational picturebooks transgress the boundaries of factuality. According to Nikola von Merveldt (2018: 232), informational picturebooks "do not merely represent or illustrate transparent data and facts", and "thus go far beyond facts, readily available elsewhere, to awaken curiosity, inspire awe, and nurture community". This is certainly correct. However, we are left with the question of where exactly truth in picturebooks is anchored and how this information may be used for the purposes Merveldt mentions.

As for the type of pictures, one may rely on the distinction between informing, artistic, and entertaining pictures, as proposed by Bernd Weidenmann (1994). Informing pictures are prominent in instructional situations that serve the acquisi-

4 A note on terminology: I consider the term descriptive picturebook more appropriate than the more widely used term informational picturebook, since narrative picturebooks also always contain information (Meibauer 2015). For the purposes of my argument, nothing depends on the appropriate terminology.

5 Løvland (2016) draws a distinction between four types of truth as related to multimodal nonfiction books: Something is (i) "true because it exists" (as in science textbooks); (ii) "true because its has happened" (as in history textbooks); (iii) "true because it works" (practice related books, for instance hobby books); (iv) "true because the parts are meaningful as a whole" (social science textbooks displaying an (inter)subjective, constructionist approach to social reality). *Railways under London* is best suited to the first category, which the author associates with correspondence theories of truth common in the natural sciences. Sanders (2018) expresses skepticism towards nonfiction literature that aims to convey true facts according to natural science and insists that nonfiction literature should encourage children's critical engagement.

tion of knowledge and skills. It is important that any ambiguity in the pictorial representation be avoided, so that readers can grasp the encoded information in a precise and comprehensive manner. Artistic pictures, in contrast, emphasize aesthetic aspects and allow some vagueness triggering a subjective interpretation. Finally, entertaining pictures aim at captivating viewers' attention and evoking emotions. It may happen that a delimitation of these types cannot be easily drawn, since individual pictures may mix elements of these types in a hybrid manner. Although these three types can be found in descriptive picturebooks, it is obvious that informing pictures are particularly typical for this picturebook genre.

In the parlance of Weidenmann (1994, 12), informing pictures are visual arguments, that is they constitute answers to questions. For instance, a picture showing a gas turbine gives an answer to the question of what a gas turbine looks like. Visual arguments are connected to the criterion of adequacy, since they should encompass all relevant aspects and have to be fine-tuned to the needs of the recipients and the particular instructional setting. Within the realm of informing pictures, we further differentiate between representative (realistic) pictures and logical pictures. Since different types of maps exist, I would like to add maps as a subtype of informing pictures (see Kümmerling-Meibauer and Meibauer 2015) (see Figure 1).

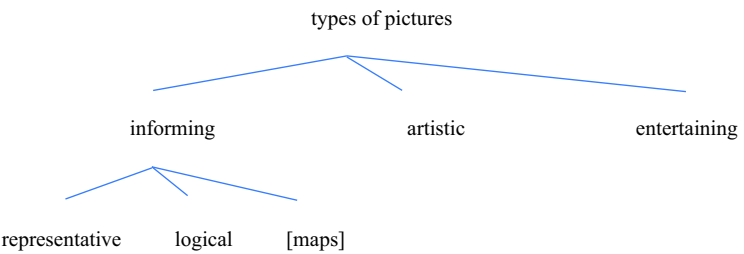

Figure 1: Types of pictures according to Weidenmann (1994). The bracketed category is our addition.

The label of representative picture refers to all pictures that depict something, such as a person, a thing, or an event (Peeck 1994). For instance, a picture of a person shows a relation of similarity to the real person who is depicted. Logical pictures comprise all types of diagrams (for instance Venn diagrams or Isotype diagrams, see Walker 2013) that stand in an iconic relation to aspects of reality (Schnotz 1994). In particular, they may visualize connections between qualitative and quantitative aspects, as in the case of demonstrating how religions are distributed across the population of a large city. Finally, maps represent a part of the world while having also logical properties.

With respect to the pictures in *Railways under London*, the category of "representative picture" appears to be correct. It seems that entertaining and artistic elements do not occur. Logical elements occur only marginally, as we will later see. There is one map that I will also discuss in more detail later on. The electrical-circuit diagrams that we can find, are seen as a subtype of representative pictures (like the London Underground map).

Whether pictures can be true or false, has been extensively discussed in recent research in the philosophy of pictures. Typically, it is asked whether pictures have propositions, that is bearers of truth. In declarative sentences such as "This is a snowflake", the proposition would be *p* = 'that X is a snowflake'. The proposition *p* is true if there is a situation in the world that is correctly described by *p*. I would argue that pictures do not contain propositions in themselves, because they are not sentences (though see Grzankowski 2015). However, pictures can be described by natural-language sentences. Thus, we can point to the picture of a snowflake in *Too Small to See* (1958, 25) and say, "This is a snowflake". Then, the sentence is true if the picture shows a snowflake, and false if this is not the case. We are able to judge this, because the picture has a content (it shows *something*) that resembles more or less something we know about our world.[6]

In the same vein, I would refute the idea that pictures are speech acts (cf. Eaton 1980, Korsmeyer 1985). Speech acts, for instance assertions, are natural-language utterances. Pictures are not utterances in this sense but two-dimensional representations. The picture of the snowflake does not assert that this is a snowflake. However, the picture can be used within an act of communication. That means, for instance, that one can use a picture to warn or inform about something. Thus, one can use a picture in a communication like one can use gestures or mimicry.

By the same token, pictures cannot lie. Only when pictures are accompanied by a description, and this description is deliberately false, can one say that someone lied by using the picture for a deceptive purpose (Viebahn 2019). For instance, if one presents a picture showing a snowflake accompanied by the caption "This is an apple", then this is a lie.

Furthermore, beyond the described pictorial content, there may be contextual aspects that contribute to an enriched (implied) meaning of the picture description (Abell 2005). For instance, with respect to the depiction of the snowflake,

6 This does not mean, of course, that some sort of correspondence theory of truth is the only applicable one. But I would argue that the example applies well to one prominent aspect of joint attention to picturebooks, namely the truthful description of what a picture shows.

one can infer that this is not the original size of a snowflake and that snowflakes normally do not occur with a black background.

This said, we can name a number of aspects that are relevant with regard to a truthful description of a picture in the case of *Railways under London*:

(i) In representative pictures, there should be a resemblance relation between the depicted object and the real object. Thus, the picture of an escalator should be similar to the real escalator, at least in some relevant aspects. This is important, since otherwise pictures cannot fulfill the task of informing about the properties of a depicted thing.

(ii) Isotype pictures typically show abstraction, that is a lack of naturalistic detail that is principally regarded with suspicion. The idea is that abstraction facilitates learning of the relevant properties, while too much detail distracts from learning or even prevents it. However, even if abstraction can very well go together with accuracy, it is not clear how much extra illustrative meaning will be helpful for understanding. As we will see, showing that posters decorate the wall behind the escalator is not necessary for understanding how the escalator works.

(iii) Isotype pictures show a certain isomorphy between aspects of reality and its depiction. For instance, in a picture of a train station, certain elements in the picture correspond structurally to certain elements in reality. One norm for scientific pictures is that there should be some structural preservation of properties of reality in the scientific pictures (cf. Kulvicki 2014, 133–153). Arguably, this is the case in those pictures that show electric circuits. Moreover, this can be assumed for maps insofar as they are not completely fictional.

(iv) What is very important, if one analyzes children's books, is to ask whether these books are comprehensible for the intended audience. It seems that some pictures in *Railways under London* and the accompanying texts are quite hard to understand. Other pictures are burdened with technical details and seem to presuppose physical knowledge. Is this mixture helpful (because it offers a variety of approaches), or does it contribute to the impression that we are faced with a miscellaneous and chaotic mixture of informational pieces? In order to check whether these aspects are fulfilled in the result of transformation to be analyzed, I now consider *Railway under London* in detail.

3 Analyzing *Railways under London*

On the inside front flap of *Railways under London*, Marie Neurath explains the advantages of the Isotype approach in the following way. After asking the three *how*-questions "How does the ticket machine give the right change?", "How do the train-doors open when nobody touches them?", and "How do the trains work the signals themselves?" – admittedly, quite demanding questions – she gives the following answer:

> Try to answer these questions by words alone: the mystery remains. Try to explain by showing photographs: it is a little bit easier. But show the young people the drawings in this book and understanding is possible at once.

This means that Neurath defends the idea that drawings can be superior to photographs because the former are able to leave out detail.[7] By the same token, this may be misleading if the actual mechanical processes are oversimplified.

The title double-spread shows the author's name (Marie Neurath), publisher's name (Adprint Limited London), and the distributor's name (Max Parrish & Co Ltd London) on the left side, and the title "Railways under LONDON" on the right side. The name *London* is colored red and set in sans-serif block capitals, like the station names in the roundel. In the lower half of the double-spread, a cross-sectional picture shows a train leaving or entering a train station. The shape of the train station is reminiscent of the bar of the roundel, but this becomes clear only when the big red circle behind the bar is associated with the circle of the roundel. Attractive as this graphic design is, it may be hard to comprehend.

The next double-spread shows the contents: 14 informational units comprise 32 pages. We read the train that is shown in the lower half as the same train that has just left the station, moving from the left to the right, that is in the same direction as the pages have to be turned.[8]

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7 Marie Neurath sees that Isotype graphics, which are indeed in the tradition of technical illustration, have received competition from modern (color) photography. But technical illustration allows procedures such as the cutout diagram, maps, etc., which do not exist in the form of photography, while photographs can also exhibit qualities of subjectivity/objectivity or concreteness/abstractness (Walden 2005, Costello 2018). On truth and objectivity in relation to photography, see Meibauer (2023). That drawings could be more easily understood is probably wishful thinking. In later adaptations of classic Isotype books, for example in Neurath (1971), one finds both Isotype drawings and photographs.

8 By the term 'informational unit', I understand a complete and self-contained picture–text combination. In *Railways under London*, these informational units have titles so that one can easily refer to them.

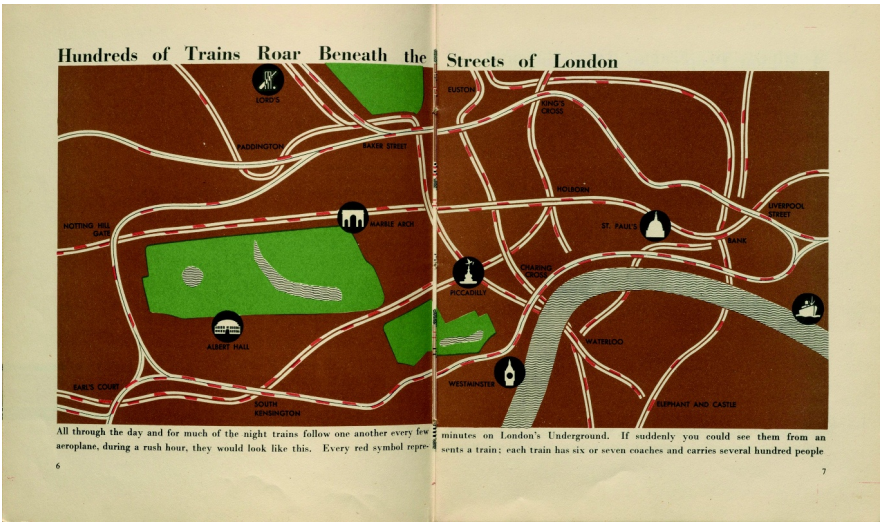

Figure 2: *Railways under London* (1948) by Marie Neurath. Double-spread "Hundreds of Trains Roar Beneath the Streets of London" (pp. 6–7). Private collection.

The first informational unit, "Hundreds of Trains Roar Beneath the Streets of London" (pp. 6–7), shows a map of London (Figure 2). The map represents the river Thames, different underground lines, important parks, and black dots with white symbols inside them: Lord's, Marble Arch, St. Paul's, Albert Hall, Piccadilly, a ship symbol without a name, and Westminster. On the white lines, we see red symbols that represent trains. Using the terminology of Meunier (2017, 25), one can say that this is a figurative map. The gist of this map is to show that the trains are always present in the railway system: "If suddenly you could see them from an aeroplane, during a rush hour, they would look like this." Since, by definition, the tubes are not visible from the perspective of an aeroplane, the book appeals to the reader's imagination, which would make such a view possible. One wonders why Marie Neurath did not use a map resembling the famous London Underground map. The obvious answer is that she wanted to focus on the continuous movements of the trains in the railway network.

The second informational unit, "A Million People Use This Station Every Week" (pp. 8–9), shows the station Piccadilly Circus which is famous for the crossing of two tube railways (Figure 3). What Neurath had in mind was to show the

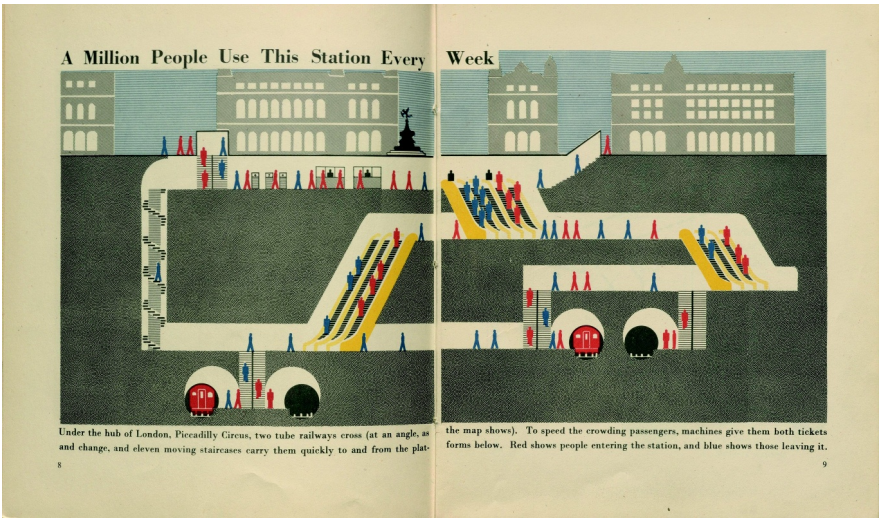

Figure 3: *Railways under London* (1948) by Marie Neurath. "A Million People Use This Station Every Week" (pp. 8–9). Private collection.

movements of the passengers, mirroring the movements of the trains. As Neurath (2017, 87) explains:[9]

> I had a big fight with Parrish over the depiction of the Piccadilly Circus station; he wanted something in perspective, where you could see the angle at which the two lines crossed. I explained that in doing so I was losing all possibility of explaining interchange and alighting. This was about the substance of the method, and this time I couldn't give in. [My translation]

Indeed, that there is a crossing of lines is not pictorially represented in this picture. This is only partly amended by the following passage in the text (pp. 8–9): "Under the hub of London, Piccadilly Circus, two tube railways cross (at an angle, as the map shows)." In the accompanying text, the function of colors is explained for the first time: "Red shows people entering the station, and blue shows those leaving it." This presupposes left-hand traffic for pedestrians.

Parrish may have been thinking of the famous drawing of Piccadilly Circus station by Douglas MacPherson from 1928, which depicted the architectural con-

9 "Ich hatte einen großen Kampf mit Parrish um die Darstellung der Piccadilly Circus-Station; er wollte etwas perspektivisches, wobei man den Winkel erkenne, unter dem sich die beiden Linien kreuzen. Ich erklärte, dass ich dabei alle Möglichkeiten verliere, Umsteigen und Aussteigen zu erklären. Hier ging es um die Substanz der Methode und diesmal konnte ich nicht nachgeben" (Neurath 2017, 87).

struction with its intersecting lines and resulting complex pedestrian circulation in an almost three-dimensional spatial appearance.[10] In this drawing, interchange and alighting of passengers can be represented excellently, although the drawing by no means reaches the level of abstraction of an Isotype graphic. However, it seems to be exaggerated that "the substance of the method" is threatened by the insertion of a well-comprehensible perspectivity. Here, comprehensibility and the insistence on uniform graphic principles come into a certain tension.

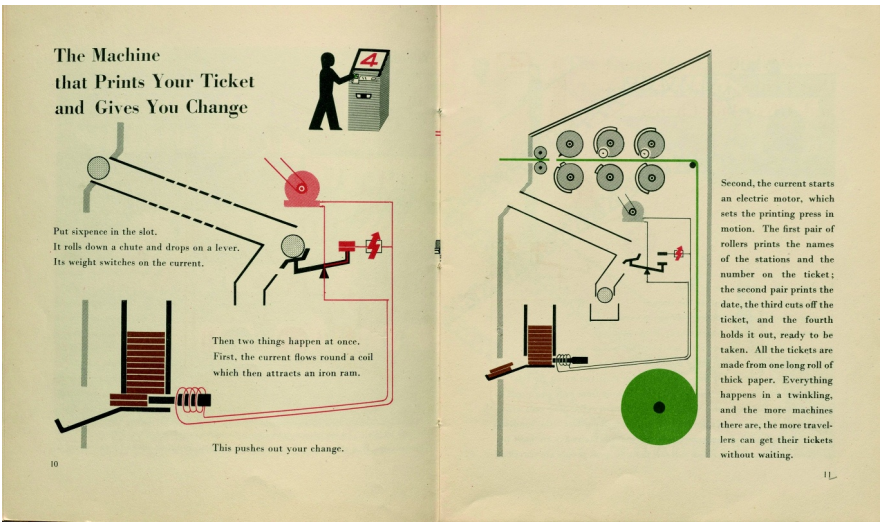

Figure 4: *Railways under London* (1948) by Marie Neurath. "The Machine that Prints Your Ticket and Gives You Change" (pp. 10–11). Private collection.

The third informational unit highlights "The Machine that Prints Your Ticket and Gives You Change" (pp. 10–11) (Figure 4). It is explained that a ticket machine acts out two parallel processes, namely to give change when a coin is inserted in the machine and printing out the ticket. Thus, the process is fast and automatic. It is stressed that "the more machines there are, the more travelers can get their tickets without waiting". Since millions of people use the London Underground, reducing waiting time is important for accelerating traveling times.

10 Douglas MacPherson (1871–1951) was a British artist who worked on the London Underground's building and branding project. MacPherson studied art at the Westminster School of Art. He was an illustrator for William Luson Thomas's weekly *Graphic* – renamed the *Daily Graphic* in 1898 – from 1890 to 1913.

In the upper-right corner of the left page, we see an Isotype figure operating the ticket machine, which has the number "4" on it. Interestingly, this is an anaphoric reference to the previous picture "A Million People Use This Station Every Week", in which three vending machines are depicted that have the very tiny numbers 4, 5, and 6. This is an extra bit of information that seems to be superfluous from the point of view of a rigid application of Isotype principles.

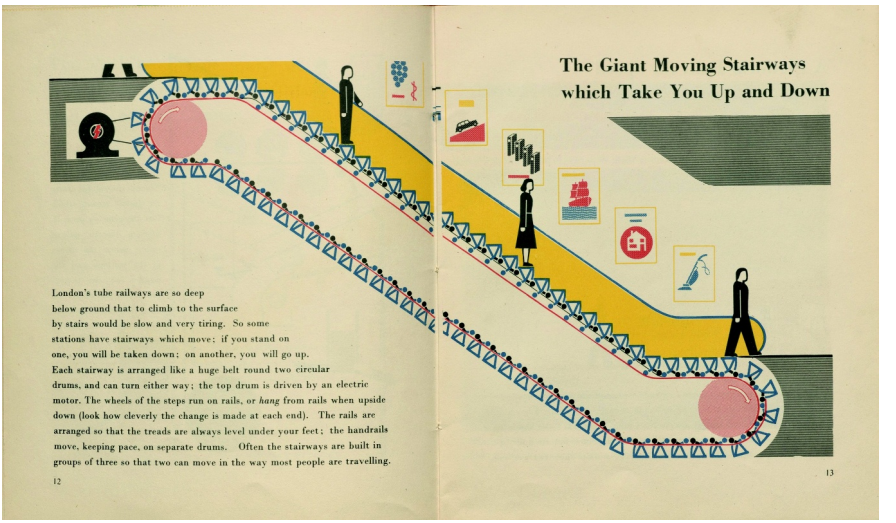

Figure 5: *Railways under London* (1948) by Marie Neurath. "The Giant Moving Stairways which Take You Up and Down" (pp. 12–13). Private collection.

The fourth informational unit, "The Giant Moving Stairways which Take You Up and Down" (pp. 12–13), shows a cross-sectional drawing of an escalator (Figure 5). This picture explains in an appealing manner questions children might already have posed for themselves: Why does a moving stair vanish into the earth? How come a moving stair suddenly appears beneath one's feet? As in the third informational unit, electricity is symbolized by a red arrow. Note that there are six billboards in the background that advertise food, cars, books, ship journeys, houses, and vacuum cleaners. The escalator moves people in such a way that they are quasi-automatically forced to look at the posters. Seen in the austere postwar area, the widespread wish for greater luxury is also alluded to in the picture. It is clear that it is not at all necessary to show the billboards to explain the function of the escalator. However, the posters flanking the escalators serve to anchor them as particular escalators in the visual world of the London Underground.

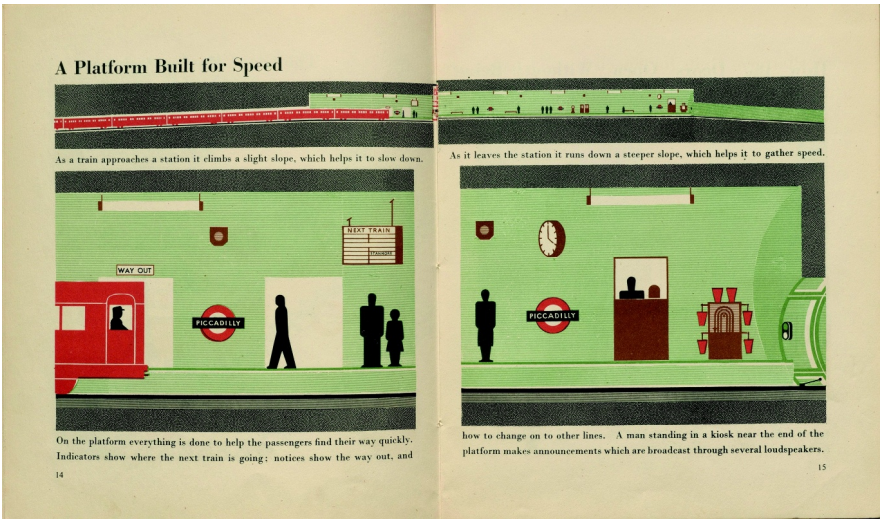

Figure 6: *Railways under London* (1948) by Marie Neurath. "A Platform Built for Speed" (pp. 14–15). Private collection.

The fifth informational unit, "A Platform Built for Speed" (pp. 14–15), comprises two pictures, each picture flowing across the double-spread (Figure 6). The upper picture shows that stations are not built in an exact horizontal dimension: "As a train approaches a station it climbs a slight slope, which helps it to slow down. As it leaves the station it runs down a steeper slope, which helps it to gather speed". In the lower picture, using a magnification technique, we see a part of the Piccadilly station which becomes clear from the two roundels. There is no indication of the slope. Instead, the typical furnishings of a station with a kiosk, an indicator, a clock, and signs showing the way out is highlighted.

The following four informational units relate to several technical aspects. The sixth informational unit, "How the Doors Open Without Being Touched" (pp. 16–17), explains how the doors are locked by using compressed air, and how they can be opened by diminishing the compression. "Without being touched", however, has to be taken with a grain of salt, since the text makes clear that a guard touches a switch in order to start the mechanism of door-opening. Compressed air is marked by blue color, as has already been explained in the inside front flap. For the first time, technical expressions like *piston* and *valve* are printed in the pictures, in order to give the correct names to the relevant graphic depictions.

It is tempting to compare this informational unit to a poster that the Bauhaus artist László Moholy-Nagy designed for London Transport in 1937.[11] This poster, "Quickly Away Thanks to Pneumatic Doors", explains that automatic, pneumatic doors speed up the process of opening and closing the doors. Evidently, if doors open and close on a mechanical basis, this would lead to wasted time. Furthermore, it is stressed that the train cannot move until all doors are closed. Again, with doors being closed mechanically, it may happen that the train moves while the doors are still open. Therefore, pneumatic doors contribute to speed as well as to safety. This is also a subtext in Neurath's book.

As for the graphic design of this poster, we see that the roundel symbol is made use of. The doors are in the middle of the circle while the train partly occupies the horizontal bar. The pneumatic system is not explained in a detailed way. In the middle of the doors, the rubber is highlighted with black lines. Rubber also contributes to the passengers' safety, since it reduces the risk of injury.[12]

The seventh informational unit, "The Power which Drives and Lights the Trains" (pp. 18–19) extends the topic of electricity and explains how electricity is used with the doors, the lights, the heaters, the brakes, and the motors. It is shown how the electricity system extends down the whole train, and a cross-section picture of the train visualizes how these systems work in their respective locations (p. 19).

The eighth informational unit, "How Air Puts on the Brakes" (pp. 20–21) further pursues this topic of electricity and safety. It is shown that the brakes operate via compressed air. When the brakes are off, there is no compressed air in the brake cylinders. When the brakes are on, "the compressed air in the tank has forced up the valve, rushed into the cylinders and pushed on the brakes" (p. 21).

The ninth informational unit, "Signals Worked by the Trains Themselves" (pp. 22–23), demonstrates how the trains automatically trigger green and red lights in order to avoid collusion.

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11 László Moholy-Nagy (1895–1946) was a Hungarian-US painter, photographer, typographer, and stage designer. From 1923 to 1928 he was a teacher at the Bauhaus; in 1935 he went to London. See Koetzle (2019).

12 This poster, though it shows a text–picture combination, is definitely not a picturebook, and it is definitely not addressed to children. Yet, it shows similarities with a modernist page design, in that it combines a simple descriptive text with three drawings, depicting three stages of the door's movement, namely closed, half opened, and fully opened. There are two further differences with respect to a children's book page design: First, the poster has an appellative function; viewers are urged to use the tube. Second, the very salient caption "Quickly away, thanks to (pneumatic) doors", written in big letters, with "pneumatic" written over the word "doors". Obviously, this design is intended to catch the attention of pedestrians since they would like to find out what the topic of this poster is.

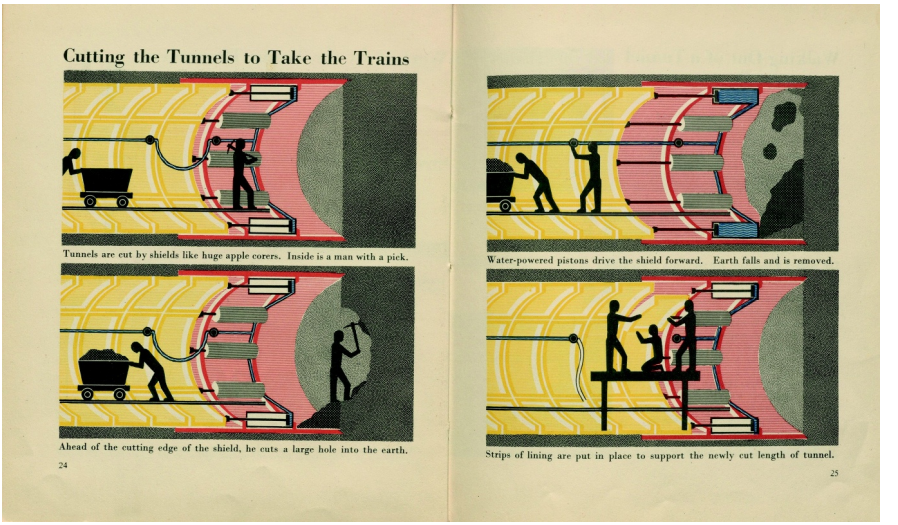

Figure 7: *Railways under London* (1948) by Marie Neurath. "Cutting the Tunnels to Take the Trains" (pp. 24–25). Private collection.

The tenth informational unit, "Cutting the Tunnels to Take the Trains" (pp. 24–25) shows how a tube is constructed (Figure 7). Four pictures are used, each with a short description: (a) "Tunnels are cut by shields like huge apple corers. Inside is a man with a pick"; (b) "Ahead of the cutting edge of the shield, he cuts a large hole into the earth"; (c) "Water-powered pistons drive the shield forward. Earth falls and is removed"; and (d) "Strips of lining are put in place to support the newly cut length of tunnel". Although through this sequence of images the dynamics of the shield drive is reproduced, this seems to be an oversimplified description of a very complex building process.

The following two informational units focus on the topic of safety. In the eleventh informational unit, "Walking out of a Tunnel in Safety" (pp. 26–27), the topic of safety is taken up again. This time the electrical system that will work when the train is forced to stop in a tunnel is shown. Passengers leaving the train and walking to the next train station must be protected from the electrical current and the tunnel must be lit.

The twelfth informational unit, "Cars which Lock Themselves Together" (pp. 28–29), continues with the topic of safety and explains how cars are safely joined together and how they are unjoined. Again, the already known elements of electricity and compressed air are invoked in the course of the explanation.

Escalators have been already depicted in the fourth informational unit. In the thirteenth informational unit, "Going Up in a Giant Lift" (pp. 30–31), the

reader is shown how passengers enter a lift that brings them to the station exit. What is not mentioned explicitly are staircases that are very important in cases of emergency, when the electricity has broken down.[13]

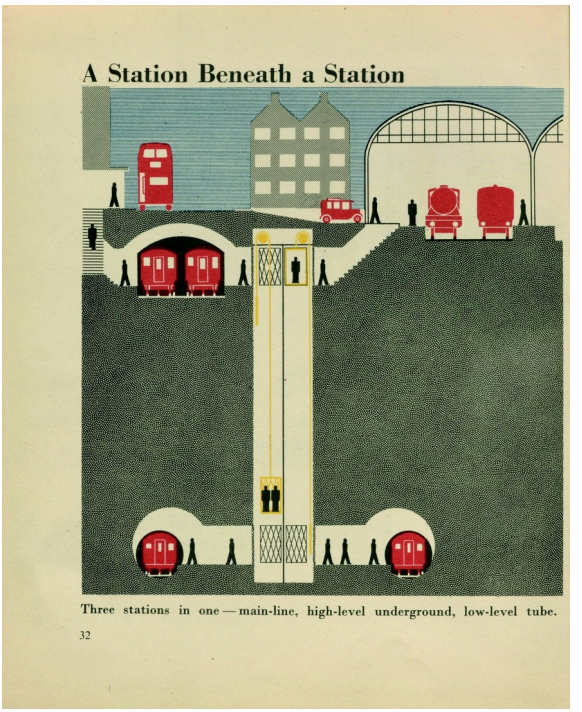

Figure 8: *Railways under London* (1948) by Marie Neurath. "A Station Beneath a Station" (p. 32). Private collection.

Finally, the informational unit "A Station Beneath a Station" (p. 32) shows, by means of a cross-section, the combination of three sorts of stations, namely "main-line, high-level underground, low level tube" (Figure 8). Here, information is left out, since the distinction between a high-level underground and low-level tube has not been explained yet, and the decisive information that the combination of the three stations facilitates the fast transport of people since they can switch to other modes of transport (a taxi and a bus are also to be seen), is left out and obviously represents information to be derived by an alert readership.

13 Arguably, the invention of lifts has made tubes (as well as skyscrapers) possible.

By and large, the book shows the following script.[14] Thus, it seems to take on the perspective of an ordinary tube user who enters a station, uses the railway, and then leaves (or changes) the station. However, this order is not expressed explicitly, but results implicitly from the arrangement of the informational units and must therefore be inferred by the reader.

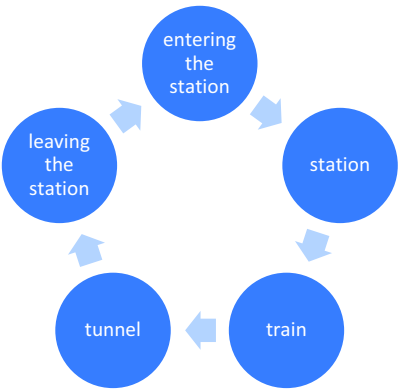

Figure 9: Rough script of *Railways under London.*

When we look at the individual informational units, we find a more complex sequence: map, station, ticket machine, escalator, platform, doors, electric power, brakes, signals, construction of tunnels, escape in the tunnel, locking cars together, lift, combination of stations (changing trains). It is clear that the sequences "doors, electric power, brakes, signals" and "escape in the tunnel, locking cars together" are related to the general concept of safety. This shows that the safety-related aspects are less integrated into the overall structure of the book and constitute subscripts. Safety is certainly an important topic in the construction of underground railways, but of course not the only one. Matters of aesthetics, for instance the architectural design of the London Underground stations, are completely disregarded: they are not the subject of a separate informational unit.

Beyond the script mentioned above, the following background knowledge plays a role by linking the individual information units. Most passengers are likely to want to get to their destination as quickly as possible. Shortening travel times directly contributes to gaining leisure time. But the speed of the railroads

14 A script is a cognitive structure concerning sequences of events that occur regularly in everyday experience and are therefore stored as a retrievable pattern. One can assume that residents of London have stored a script "riding the tube".

should not be at the expense of safety. An optimal transportation system is both fast and safe. Increasing speed was not only possible by introducing more powerful railcars. The closeness of the connections, the architecture of the stations, and the length of the walking paths in the case of intersecting stations also matter. In the course of automating processes, both the requirement for speed and safety were taken into account, because human decisions appeared to be more susceptible to failure than automated operations. The speed of the individual passengers' movement through the transport system is also helped by their ability to quickly orientate themselves in the entrances to the stations, within the stations themselves and in the tube carriages. The design of the London Underground (for instance logos, typeface, map, display systems, loudspeaker announcements) was a huge step forward here. Since some stations were enormously congested by public traffic, passengers had to be guided in such a way as to avoid congestion or even panic. All these aspects come to the fore in Marie Neurath's book, but they remain to some extent inexplicit. The book therefore counts on independent, rational readers who can deduce the general connection between speed and safety for themselves from their own practice and the technical information given in the book.

The page design of the book uses different patterns for guiding the reader's view. On several double-spreads, the train is situated at the top (pp. 14/15, pp. 18/19, pp. 20/21, pp. 28/29), while a more specific information is given in the picture–text combinations below. Some page designs require that picture–text combinations be read from the left page to the right page (for instance pp. 16/17). The graphic design makes sublime uses of areas that symbolize soil. On the book covers, a brown surface has white parallel lines. In other pages, soil is depicted by means of tiny dots (p. 19). The inventory of Isotype persons is restricted: We find symbols for man, woman, and child, but also for guard, driver, and several workers in the tunnel (pp. 24/25).

Mostly, the texts refer to the pictures so that the reader can search the pictures for certain details. Conversely, a complex picture is explained by the text, as in the following example (pp. 28/29):

Here we look down from the top on two cars which are being pushed together. The hooked tongues press against wedges (shown in yellow) which force them into slots, where the wedges (pushed by the compressed air) fix them firmly.	Once the cars are joined, the current flows through the spring contacts. One current opens the taps in the pipes of compressed air. To separate these cars, we must push the wedges again. Can you think how this could be done?

The deictic expression *here* refers to the picture. The functions of the yellow color are explained. Yet there are parts of the picture that are not explained. That the

lock is black, for instance, has to be inferred by the readers. At the end of this text, readers are directly addressed with a question. On p. 20, the technical terms *valve* and *cylinder* and the *off/on* positions of the switch appear as part of the pictures, but this is an exception. Normally, looking at the pictures and reading words/text is strictly separated.

Interestingly, several units engage the reader by showing movements: doors are closed, cars are locked, lifts go up and down, and the escalator moves. The specific kind of movement also has to be inferred by the reader in the event that the process is distributed across two pages (pp. 28–29). This shows that the Isotype representation is not simple, but rather it builds on the logical abilities of the viewer.

What we have found, then, is that the method of adding several informational units, which are organized by an underlying script, allows a reading that can also focus on individual items and omit others. Therefore, the selected informational units are also to be understood as exemplary. A coherent and comprehensive presentation covering all relevant aspects of the London Underground is not intended.

4 Transformation, truth, and deception

According to the Isotype principles of Otto Neurath, as outlined by Groß (2015, 234–242), there are two transformational principles, namely systematization and reduction. Transformation is simply the translation of a specific content from one system of signs to another system of signs.[15] Systematization means that, for instance, colors or symbols for persons are assigned a unique meaning. This happens on the level of the so-called lexicon (the set of basic signs) as well as on the level of the syntax (the level of the picture where signs are combined). Reduction means that irrelevant details are left out. With respect to the level of signs, the elementary is intended. With respect to pictures, schematization is called for. Groß (2015, 254) summarizes these dimensions in the following table (my translation):

15 "Abstrakter formuliert ist Transformation die Übersetzung eines Gehaltes von einem Zeichensystem in ein alternatives Zeichensystem, von einer Methode in die andere" (Groß 2015, 235). In my own translation: "More abstractly, transformation is the translation of a content from one sign system to an alternative sign system, from one method to another".

Table 1: Transformation principles of Isotype (Groß 2015, 254).

Transformational principles	**Principle of systematization**	**Principle of reduction**
Simple level of signs	Lexicon	Elementarization
Complex level of pictures	Syntax	Schematization

According to Otto Neurath, an Isotype picture is well-formed ("richtig") if it is coarsened by careful simplification ("durch vorsichtige Vereinfachung vergröbert") and thus leads to clear statements (Groß 2015, 240). It is obvious that the graphic design of the Isotype pictures, on the one hand, still preserves transformational principles (such as a renunciation of perspectival correctness or the use of schematized symbols for persons), but on the other hand it strives for a richer inventory of graphic devices.

Walker (2013, 402) comments that "some of the drawings/charts, however, were deceptively straightforward and clear, and particularly engaging because of this". This assessment raises the question of whether the degree of transformational simplification is appropriate or whether necessary information has been omitted to enhance the educational or aesthetic effect. We can safely assume that Marie Neurath and her team have done their best to calibrate information in order to avoid misleading the readership. In this sense, the depictions and accompanying texts can be regarded as truthful, although sometimes the impression arises that the descriptions and explanations are either too simple or too difficult for the intended readership.

Beyond that, there are of course other ways to encourage reader engagement. It seems that at least some of the pictures leave out pictorial potential that would be helpful if one is eager to trigger interest in the London transport system. A brief comparison with *London* (1960; the English original edition appeared in 1959 under the title "*This is London*") by Miroslav Šašek and *Underground* (1976) by David Macaulay can illuminate this point. In *Railways under London*, the reader can never look into the tunnel. The only picture that shows a cross-sectional representation of the tunnel, with a wagon, blocks every perspective (p. 19).[16] This picture focuses on the electric devices in the train. It shows schematized persons (two women and a man), but only because they use electronic devices (electric heating and an emergency brake). Macaulay, in contrast, shows a perspectival picture with a deep look into a tube, which is void of a railway and of persons.

16 Compare also the similar picture of a wagon in the tunnel, where one sees the back of the wagon (dust wrapper, backside).

This is an austere, architectural picture, highlighting the construction of a tunnel. Šašek, in contrast, provides a perspectival view, by showing his typical caricatured persons and painting a joyful and colorful picture of the urbanity of the Piccadilly stations. This picture contrasts with Neurath's picture "A Platform built for Speed" (lower picture), in which we see six Isotype-like persons without any individual traits besides their social roles as passengers, driver, and guard. Neurath and Macaulay definitely do not build on emotional engagement of the child viewer, while Šašek does.

Table 2: Tunnel pictures in comparison.

Tunnel	Neurath (1948)	Šašek (1959)	Macaulay (1976)
Perspective	–	+	+
Person	+	+	–
Humor	–	+	–
Color	+	+	–

In sum, then, while the transformations in *Railways under London* may be more or less convincing (and, to a certain degree, a matter of taste), they certainly succeed in providing technical knowledge about the railways, with an implicit focus on safety. One could critically argue that the fine-tuning between reality and its graphic representation is not always optimal because relevant information is simply omitted. This does not make the information incorrect, but in terms of comprehensibility it requires the child reader to actively fill in information gaps. This was certainly the intention of Marie Neurath as a "transformer" (Kinross 2017). In principle, children were seen as inquisitive beings who were capable of learning, that is the acquisition of knowledge.

5 Conclusions

Railways under London holds a unique position in the world of descriptive picturebooks. Although individual cut-out diagrams of subway stations have been used in picturebooks before (for instance, in *Drei Jungen erforschen eine Stadt. Eine kleine Stadtkunde mit vielen Fotos und farbigen Bildmontagen* (1933) by Friedrich Böer, Werner Bürger (ill.) and Erich Kranz (ill.); *A Book of Trains* (1941) by W. J. Bassett-Lowke and F. E. Courtney (ill.)), an entire thematic book on this subject, focusing on structural aspects (architecture and technology), stands out from

the rest.[17] In comparison with *If You Could See Inside* (1948) and *I'll Show You How It Happens* (1948), the selection of subtopics is more successful, as they relate to the overarching script of entering and leaving a subway station.

That said, we may ask whether the information given is truthful, accurate, and objective. Although it is not always possible to judge this well – especially from a historical point of view – we trust the information given, especially since it can be assumed that it was prepared in consultation with London Transport and is therefore very reliable.

Turning to the matter of comprehensibility (or accessibility), we find that some technical drawings, such as the pictures of electrical circuit systems, are not easy to understand. Either the child reader already has prior knowledge here, or he or she actually manages to develop the respective facts by looking at or reading an informational unit several times. Also, understanding cutaway drawings and maps demands some prior understanding, although they also invite viewers to acquire the respective literacy.

The colors are not used in a consistent manner, since red and blue can mean different things across the whole book. As for the texts, there are more simple and more complex texts, containing more technical vocabulary. It is not clear whether these differences are intended or simply resulted from the problem of transforming aspects of reality into a textual representation.

There are definitely different degrees of abstraction in the pictures, so that some picture contents show a clear similarity to reality (and thus a higher recognizability) than others. Likewise, some texts are denser and more presuppositional, while other texts are very simple and elementary. In this way a quite differentiated means for learning has been prepared, but we do not know exactly under which circumstances it could be perceived by children who are willing to learn. In any case, it is assumed that children make a pact of trust when reading, that is, they trust that the information given to them is reliable and true (Harris 2012).

Although *Railways under London* successfully "transforms" the perceived reality, making use of established forms of representation, so that the output certainly meets the criteria of truthfulness, accuracy, and objectivity, it can be observed on a deeper level that contemporary ideological attitudes play a certain role (Stephens 2018). By and large, this ideology implies that the speed, efficiency, and safety of the London Underground are facilitated by technical devices. This

17 A precise classification of corresponding representations in the history and theory of technical illustrations by using image comparison methods, is a task for the future (Dünkel 2015, Meibauer 2025).

reflects the optimism of the postwar years and the hope in a new era of wealth propelled by technical inventions. The modernity of this approach lies in the fact that these aspects are still relevant for constructing systems of transportation in the world's big cities.

Bibliography

Primary sources

Bassett-Lowke, W[enman] J[oseph]. *A Book of Trains*. Ill. F.E. Courtney. Harmondsworth: Penguin (Puffin Picturebook, 10), 1951 [1941].
Böer, Friedrich. *Drei Jungen erforschen eine Stadt. Eine kleine Stadtkunde mit vielen Fotos und farbigen Bildmontagen*. Ill. Werner Bürger and Erich Kranz. Baden-Baden [Berlin]: Herbert Stuffer Verlag, 1946 [1933].
Macaulay, David. *Underground*. Boston: Houghton Mifflin, 1976.
Neurath, Marie. *Railways under London*. London: Max Parrish, 1948.
Neurath, Marie. *I'll Show You How It Happens*. London: Max Parrish, 1948.
Neurath, Marie. *If You Could See Inside*. London: Max Parrish, 1948.
Neurath, Marie. *Too Small to See*. 2nd edition. London: Max Parrish, 1958 [1956].
Neurath, Marie. *Über das Atom*. Übersetzt und bearbeitet von Ingrid Baumgartner. Klagenfurt: Verlag Buch und Welt, 1971.
Šašek, Miroslav. *London*. Munich: Kindler, 1960 [1959].

Secondary sources

Abell, Catharine. "Pictorial Implicature." *The Journal of Aesthetics and Art Criticism* 63.1 (2005): 55–66.
Campagnaro, Marnie. "Stepping into the world of houses. Children's picturebooks on architecture." *Verbal and Visual strategies in Nonfiction Picturebooks. Theoretical and Analytical Approaches*. Eds. Nina Goga, Sarah Hoem Iversen, and Anne-Stefi Teigland. Oslo: Scandinavian University Press, 2021. 202–219.
Cooper, Nick. *London Underground at War*. London: Amberley Publishing, 2014.
Costello, Diarmuid. "What is Abstraction in Photography?" *British Journal of Aesthetics* 58.4 (2018): 385–400.
Dünkel, Vera. "Comparing Images." *The Technical Image. A History of Styles in Scientific Imagery*. Eds. Horst Bredekamp, Vera Dünkel, and Brigit Schneider. Chicago, London: The University of Chicago Press, 2015. 14–17.
Eaton, Marcia. "Truth in Pictures." *The Journal of Aesthetics and Art Criticism* 39 (1980): 15–26.
Garland, Ken. *Mr Beck's Underground Map*. Harrow Weald: Capital Transport, 1994.
Groß, Angélique. *Die Bildpädagogik Otto Neuraths. Methodische Prinzipien der Darstellung von Wissen*. Heidelberg: Springer, 2015.
Grzankowski, Alex. "Pictures have propositional content." *Review of Philosophy and Psychology* 6 (2015): 151–163.

Harris, Paul L. 2012. *Trusting What You're Told. How Children Learn from Others*. Cambridge, MA: The Belknap Press of Harvard University Press.
Kinross, Robin. "Von Isotype lernen." *Die Transformierer. Entstehung und Prinzipien von Isotype*. Ed. Brian Switzer. Zurich: Niggli, 2017 [2009]. 125–154.
Koetzle, Hans-Michael. *László Moholy-Nagy.* Munich: Hirmer, 2019.
Korsmeyer, Carolyn. "Pictorial assertion." *Journal of Aesthetics and Art Criticism* 43 (1985): 257–265.
Kümmerling-Meibauer, Bettina, and Jörg Meibauer. "Maps in picturebooks: Cognitive status and narrative functions." *Barnlitterært Forskningstidsskrift* (BLFT) 8.1 (2015).
Kulvicki, John V. *Images*. London: Routledge, 2014.
Løvland, Anne. "Talking about something real: The concept of truth in multimodal non-fiction books for young people." *Prose Studies* 38.2 (2016): 172–187.
Meibauer, Jörg. "What the child can learn from simple descriptive picturebooks. An inquiry into *Lastwagen/Trucks* by Paul Stickland." *Learning from Picturebooks: Perspectives from Child Development and Literacy Studies*. Eds. Bettina Kümmerling-Meibauer, Jörg Meibauer, Kerstin Nachtigäller, and Katharina Rohlfing. London: Routledge, 2015. 51–70.
Meibauer, Jörg. "*As 'objectively' as possible*. On truth and objectivity in photographic early-picture books: The case of *The First Picture Book* and *The Second Picture Book* by Mary Steichen and Edward Steichen." *Photography in Children's Literature*. Eds. Elina Druker and Bettina Kümmerling-Meibauer. Amsterdam: Benjamins, 2023. 67–93.
Meibauer, Jörg. *The Visual Culture of East German Picturebooks 1945–1990: Architecture, Traffic, and Design of Childhood*. Berlin, Boston: De Gruyter, 2025.
Merveldt, Nikola von. "Informational picturebooks." *The Routledge Companion to Picturebooks*. Ed. Bettina Kümmerling-Meibauer. New York: Routledge, 2018. 231–245.
Meunier, Christophe. "The Cartographic Eye in Children's Picturebooks: Between Maps and Narrative." *Children's Literature in Education* 48 (2017): 21–38.
Neurath, Marie. "Lehrling und Geselle von Otto Neurath in Wiener Methode und Isotype." *Die Transformierer. Entstehung und Prinzipien von Isotype*. Ed. Brian Switzer. Zurich: Niggli, 2017 [2009]. 15–102.
Peeck, Joan. "Wissenserwerb mit darstellenden Bildern." *Wissenserwerb mit Bildern. Instruktionale Bilder in Printmedien, Film/Video und Computerprogrammen*. Ed. Bernd Weidenmann. Bern: Huber, 1994. 59–94.
Sanders, Joe Sutliff. *A Literature of Questions. Nonfiction for the Critical Child*. Minneapolis, London: University of Minnesota Press, 2018.
Schnotz, Wolfgang. "Wissenserwerb mit logischen Bildern." Wissenserwerb *mit Bildern. Instruktionale Bilder in Printmedien, Film/Video und Computerprogrammen*. Ed. Bernd Weidenmann. Bern: Huber, 1994, 95–148.
Stephens, John. "Picturebooks and Ideology." *The Routledge Companion to Picturebooks*. Ed. Bettina Kümmerling-Meibauer. London: Routledge, 2018. 137–146.
Taylor, Richard. *Edward Johnston – a Signature for London.* London: Unicorn, 2016.
Viebahn, Emanuel. "Lying with Pictures." *British Journal of Aesthetics* 59.3 (2019): 243–257.
Walden, Scott. "Objectivity in Photography." *British Journal of Aesthetics* 45.3 (2005): 258–272.
Walker, Sue. "Graphic explanation for children, 1944–71." *Isotype: Design and Contexts 1925–1971*. Eds. Christopher Burke, Eric Kindel, and Sue Walker. London: Hyphen Press, 2013. 390–447.
Weidenmann, Bernd. "Informierende Bilder." *Wissenserwerb mit Bildern. Instruktionale Bilder in Printmedien, Film/Video und Computerprogrammen*. Ed. Bernd Weidenmann. Bern: Huber, 1994. 9–58.