

# The Points of the Picture: Hertz and Wittgenstein on the Picture Theory

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## Hertz's Picture Theory

Literally translated as "picture," the German word *Bild* is used by Hertz in the introduction to the *Principles of Mechanics* to denote a representation that shares the same relation among its constitutive objects as the objects it represents. In this sense pictures are models of the external world in virtue of possessing a relational identity between the picture's objects and the objects of the world. Thus pictures in the Hertzian sense are pictures of the real world because they contain an identical property, namely a specific relation between objects.

According to Hertz, a picture must meet three requirements: permissibility, correctness and appropriateness. These requirements make pictorial representation possible and are also for Hertz the general philosophical conditions of scientific investigation.

The most basic requirement is that pictures must adhere to the laws of logic. This condition is termed "logical permissibility," which simply asserts that pictures should not contain logical contradictions. Not only would a contradicting relation fail to picture, it could not be thought, for the laws of logic are derivative of the "laws of thought" such that "[w]hat enters into the pictures, in order that they may be permissible, is given by the nature of the mind" (Hertz, 1994, 325). The first requirement, then, is not a feature of representation per se, but is rather a precondition for thought in general.

The second requirement, correctness, is the definitive feature of pictorial representation. Correctness requires that "...the necessary consequents in thought of our pictures are the necessary consequents of the objects pictured" (Hertz, 1994, 323). A correct picture enables us to predict future phenomena because it shares a relation among its constitutive objects with those of the external world. Thus, for Hertz, the property of correctness grounds the practice of induction. An incorrect picture fails to have a relational identity with external phenomena, and in a strict sense is not a picture since it does not satisfy this second requirement. Nonetheless, Hertz does not claim that for each phenomenon there corresponds only one correct and permissible picture. It is possible that two permissible but different pictures entail the same inductive result. Thus there can be two (or more) permissible and correct pictures corresponding to the same phenomenon.

In order to better explain this feature of Hertz's position, it is helpful to distinguish between a strong and weak sense of pictorial representation. According to a strong interpretation, pictures share every relation among its objects with the objects represented. In this sense pictures are isomorphic to an actual state of affairs and reveal the total sum of relations between its constitutive elements. Thus, according to a strong interpretation, pictures in principle provide an open avenue to the nature of the physical world—that is, every relation between every object *can* be discovered. A weak interpretation requires that pictures do not necessarily share all of the relations between its constitutive elements and the state of affairs it represents. The weak interpretation thus claims that pictures may provide

limited access to the nature of the external world—the actual nature of the world may be in principle opaque. Hertz's theory in the Introduction promotes the weak sense. In fact, Hertz maintains an epistemic humility in regards to determining which relational features the external world and pictures share, thus denying in principle the strong interpretation:

The pictures which we here speak of are our models of things; these models are in conformity with the things themselves in *one* important respect, namely, in satisfying the above mentioned requirement [that the necessary consequents of a picture share the necessary consequents of external objects]. For our purpose it is not necessary that they should be in conformity with the things in any other respect whatsoever. As a matter of fact, we do not know, nor have we any means of knowing, whether our models of things are in conformity with the things themselves in any other than this *one* fundamental respect (Hertz, 1994, 324).

The fundamental requirement for a picture is that it shares *enough* relations between its constitutive objects with the physical world in order to act as a predictive tool. Hertz suggests that a picture's predictive value does not imply that it share a complete relational identity with the objects it represents. Rather, Hertz maintains that a picture's predictive value need only depend on a partial relational identity. Thus two (or more) pictures can represent the same phenomena since each is only required to have partial identity; that is, each picture can share different relational identities of a specific phenomenon yet still have predictive value. However, two permissible and correct pictures are not identical. They may differ in what Hertz calls "appropriateness," the third requirement of pictorial representation. A picture of greater appropriateness captures more necessary and inherent properties of objects—an appropriate picture explains the phenomena in virtue of the properties of the phenomenal objects. A Newtonian account of momentum, say, is preferable to an occasionalist view because the Newtonian position explains momentum in terms of the objects under investigation rather than the agency of God. Thus the more appropriate picture contains "...more of the essential relations of the object—the one [picture] that we may call the more distinct" (Hertz, 1994, 325).

It does not follow, however, that two pictures cannot possess the same degree of appropriateness, correctness and permissibility. The key reason for the occurrence of more than one appropriate picture is "empty relations": "[e]mpty relations cannot be avoided altogether; they enter into the pictures because they are themselves simply pictures, and indeed pictures produced by our own mind and necessarily affected by the characteristics of its mode of picturing them" (Hertz, 1994, 324). Hertz's claim that pictures "enter into" other pictures suggests that some pictures are layered—that is, composed of sub pictures. By using this term I do not mean to imply that Hertz's picture theory is matched by an ontology of separate states of affairs multiply represented through sub-pictures. Instead, Hertz claims that pictures necessarily contain internal rela-

tions that are not relationally identical to the external world (since the mind necessarily imposes empty relations onto pictures). That is, pictures do not bottom out at a set of ultimate propositions that directly mirror that world's ontology. Thus, overall, Hertz promotes a weak picture theory: since empty relations are unavoidable even a perfect science cannot produce isomorphic pictures.

### Wittgenstein's Picture Theory

In its essential features, Wittgenstein's version of the picture theory is indebted to Hertz. Wittgenstein, like Hertz, believed that representation of the physical world occurs through pictorial relationships—that “[w]e make to ourselves pictures of the facts” (Wittgenstein, 1922, 2.1). However, unlike Hertz, Wittgenstein posits an ontological framework that deeply impacts his version of the picture theory. Thus what initially appears to be only an extension of Hertz's theory eventually develops opposing theoretical requirements. To see how Wittgenstein's ontological commitments affect his theory, we must first discuss propositions and how they correspond to reality.

### Propositions and Pictures

The third proposition of the *Tractatus* states: “[t]he logical picture of the facts is the thought.” Thus for the early Wittgenstein the essence of thought is to relate objects according to the rules of logic. It is not inherent to thought that it be shared or even expressed. Nonetheless, when thoughts are expressed it is through a proposition: “[i]n the proposition the thought is expressed perceptibly through the sense. We use the sensibly perceptible sign (sound or written sign, etc.) of the proposition as a projection of the possible state of affairs” (Wittgenstein, 1922, 3.1 – 3.11).

Since thought—a picture—is expressed through propositions, there must be important similarities between pictures and propositions. For Wittgenstein, propositions represent a possible relation between objects—that is, they represent a possible state of affairs. The *Tractatus* illustrates this very explicitly: “[t]he essential nature of the propositional sign becomes very clear when we imagine it made up of spatial objects (such as tables, chairs, books) instead of written signs. The mutual spatial position of these things then expresses the sense of the proposition” (Wittgenstein, 1922, 3.1431). The “objects” of propositions are names and the various ways names connect through grammatical means are the relations. Further, the meaning of a proposition is the state of affairs represented by names and the relations between them. Thus “[t]o the configuration of signs [names] in the propositional sign corresponds the configuration of the objects in the state of affairs” (Wittgenstein, 1922, 3.21).

A proposition is “completely analyzed” if the relations between the objects (or names) are clear and exact. Each thought and proposition, if meaningful, contains an identifiable and unique relation between the constitutive objects. Moreover, each proposition can in principle be reduced to a proposition that clearly exhibits how its constitutive objects relate to one another. Thus Wittgenstein claims that “[t]here is one and only one complete analysis of the proposition” (Wittgenstein, 1922, 3.25). Further, a completely analyzed proposition will either picture an existing state of affairs, or a merely possible state of affairs—the proposition will be true in the former case and false in the latter.

Proposition 4.01 firmly ties Wittgenstein's propositional and pictorial theories together: “[t]he proposition is a picture of reality. The proposition is a model of the reality

as we think it is.” Mirroring Hertz's terminology, a proposition is a model relating a set of objects. For Wittgenstein, however, pictures are models of the world in virtue of sharing the rules of logic with the world: “[w]hat every picture, of whatever form, must have in common with reality in order to be able to represent it at all—rightly or falsely—is logical form, that is, the form of reality” (Wittgenstein, 1922, 2.18). Thus it is possible for a proposition to represent the world because its specific form of representation shares, through logical laws, the form of reality—the logical form endows a proposition with the ability to share a relational identity. Thus “[t]he proposition communicates to us a state of affairs, therefore it is *essentially* connected with the state of affairs. And the connexion is, in fact, that it is its logical picture” (Wittgenstein, 1922, 4.03). In sum, a proposition represents the world by picturing a relation between objects and can be about the world by sharing logical possibilities; that is, the relations between objects of a picture and objects in the world are logical, and as such, pictures are able to represent the world.

### Atomic Facts, Elementary Propositions and Pictures

For Wittgenstein, atomic facts—basic indivisible objects and the relations between them—are the ontological elements of the world. Wittgenstein's version of the picture theory claims that atomic facts can be represented through propositions, that is, through names and the relations words posit between names: “[o]ne name stands for one thing, and another for another thing, and they are connected together. And so the whole, like a living picture, presents the atomic fact” (Wittgenstein, 1922, 4.0311). This is not to say that every proposition clearly represents atomic facts. Like Hertz, Wittgenstein claims that the majority of propositions contain both relational identities and empty relations. Wittgenstein's statement of this claim is couched in the parlance of atomic facts, “[a] proposition presents the existence and non-existence of atomic facts” (Wittgenstein, 1922, 4.1). That is to say, the majority of propositions are composed of both non-representing relations and relational identities.

The crucial difference between Hertz and Wittgenstein's version of the picture theory is Wittgenstein's notion of elementary propositions. An elementary proposition is a completely analyzed proposition and as such does not contain a mixture of relational identities and extraneous relations, but instead either isomorphically corresponds to an atomic fact or simply fails to represent reality. Thus “[t]he simplest proposition, the elementary proposition, asserts the existence of an atomic fact” (Wittgenstein, 1922, 4.2), and since an atomic fact is nothing more than a relation between objects, “... [an] elementary proposition consists of names. It is a connexion, a concatenation, of names” (Wittgenstein, 1922, 4.22). All propositions are, in principle, reducible to a specific set of elementary propositions to the effect that we could know exactly which elementary propositions correspond to which atomic facts (and which fail to do so). Wittgenstein thus states that “...in the analysis of propositions we must come to elementary propositions, which consist of names in immediate combination” (Wittgenstein, 1922, 4.221), and “[i]f the elementary proposition is true, the atomic fact exists; if it is false the atomic fact does not exist” (Wittgenstein, 1922, 4.25). That is, a proposition's final analysis is its corresponding elementary proposition.

Wittgenstein is not stating here that we as a matter of practice reduce propositions into elementary propositions, but rather that the meaningful use of propositions demands that propositions in principle *can* be decomposed. A picture must in principle reduce to elements

which do or do not represent an atomic fact. The *Tractatus*' picture theory thus promotes a strong interpretation of pictorial representation. Wittgenstein's theory demands an isomorphic relation between a picture and what it represents, and although we may not in practice reach any proposition's complete analysis, atomic facts—and thus the ultimate constituents of the physical world—are in principle discoverable.

### The Two Picture Theories

Hertz's *Bildtheorie* lacks the ontological commitment of the *Tractatus*. Hertz supports an object-relation ontology, but never makes the explicit leap to something like atomic facts. Thus, Hertz should be read as promoting a weak interpretation of pictorial representation for three reasons: 1) Hertz maintains that a picture of the actual ontological constitution is in principle not necessary; 2) empty relations necessarily occur in every picture and cannot be separated from the picture; and 3) even in an ideal world, two (or more) appropriate pictures are possible, thus a state of affairs can be represented in opposing manners (i.e. no isomorphic connection is necessary for representation). For the early Wittgenstein, pictures of the world's ontological constitution are necessary because empty relations (i.e. non-corresponding elementary propositions) can in principle be separated from non-referring pictures and for each state of affairs there corresponds a unique elementary proposition.

### Literature

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