On the Influence of Wittgenstein's Tractatus on Toulmin's Philosophy of Science

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Abstract

The paper discusses Toulmin's ideas in the philosophy of science — mainly as set out in *The Philosophy of Science* (1953) — in juxtaposition with Toulmin's reading of Wittgenstein's *Tractatus*. It claims that three themes present in the *Tractatus* had an influence on the core of Toulmin's ideas about scientific explanation: first, Wittgenstein's use of the term "Bild" — interpreted, after Hertz and Boltzmann, as "a model", also a mathematical one; second, the active, not passive, element in our forming a model (expressed in Proposition 2.1); and, third, the account of the system of mechanics as a kind of formal net (resp. "models") with possibly different shapes of "meshes" (the passages from 6.34 on). Thus, Toulmin's thinking of scientific theories as based on the "modes of representation", or "ways of representing", corresponds well to his understanding of the concept of *Bild* model in the *Tractatus*.

The structure of the argument in this paper is the following. First, Toulmin's account of Wittgenstein's *Tractatus* will be sketched out from the angle of philosophy of science. Next, taking Toulmin's book *The Philosophy of Science* (1953) as the subject for the analysis, the relation between his reading of *Tractatus* and his own ideas will be shown. This whole argument is based on two major assumptions that should be indicated and shortly discussed in advance. The first one concerns the reasons for our choosing *The Philosophy of Science* as the basis for an examination. Despite its being an early Toulmin's work on the subject (1953), the main ideas of this book are mostly in accordance with his later complete elaboration of the theme in *Human Understanding* (1972). Thus, it may be treated as a representing the main aspects of Toulmin's conception — at least those that are relevant to our task. The second assumption concerns our treating Toulmin's account of Wittgenstein as set out in *Wittgenstein's Vienna* (1972) as applicable to his earlier considerations presented in the *Philosophy of Science* (1953). We take that the core of Toulmin's understanding of the *Tractatus* — at least what concerns the question of classical mechanics and the role of representation in language and science — was mostly formed as early as in the time of writing this book. In *Wittgenstein's Vienna* this was elaborated in an explicit, deepened form, tied with historical and cultural context, and supplemented by considerations on the importance of the ethical, for the most part inefficable side of our lives and cognitive activity (Propositions from 6.41 on, which we, of course, will not take into account here). Thus we find this assumption justified.

Toulmin's Wittgenstein

To cut a longer story short, in the aspects that interest us most, Toulmin's reading of the *Tractatus* draws on his conviction that Wittgenstein, when constructing its Propos-itions, remained not only under the inspiration of Frege and Russell — whom he explicitly mentions in the Preface — but also, on a par, was preoccupied by problems posed by physicists: Heinrich Hertz and Ludwig Boltzmann — whom he refers to later several times. The main problem Hertz and Boltzmann dealt with was the nature of representation of the world that science gives us and that makes possible for us to understand the physical reality. But while these physicists worked on the representation of the world by physics, Wittgenstein in the *Tractatus* aimed at universaliz-
ing that approach "in such a way that it became applicable to all discourse, and he had been able to execute the very *bildliche Darstellung der Welt* that, in virtue of its isomorphic character, went far beyond a mere metaphorical description" (Janik/Toulmin, 184). As the framework for this extension he found it appropriate to use Frege and Russell's propositional calculus.

For Toulmin the key question in his approach to the *Tractatus* is to understand properly the German word "Bild" as used in this book, rendered in English as "picture" (in the so called "picture theory of meaning"). The term "picture" applied to the conception of language strongly suggests that "propositions" mirror the "facts" as if they were sort of photographs, or mental images, of them. Such an interpretation, however erroneous, had been for a long time widespread in the Anglo-Saxon philosophical world and stems from their looking at Wittgenstein through Machian empiricism and the Vienna Circle logical positivism, instead seeing it essentially in Hertz's and Boltzmann's heredity (Janik/Toulmin 1996, 145). What is wrong in such an approach is the passive, reactive character of our "picturing" the world in propositions. In fact, Wittgenstein discusses this question in active and constructive terms, which is clearly rendered in Proposition 2.1 of the *Tractatus": "Wir machen uns Bilder der Tatsachen". This proposition translated into English by Pears and McGuinness as: "We picture facts to ourselves" (Wittgenstein 1963, 15) means that a *Bild* is something which we produce as an artifact, "just as the painter produces an 'artistic representation' of a scene or person, so too we ourselves construct, in language, 'propositions' having the same forms as the facts they picture" (Janik/Toulmin, 183). Accordingly, Toulmin insists, we had better 'think of linguistic *Bilder* as 'deliberately constructed verbal representations' instead of (...) the much looser English term 'pictures" (ibidem). In his last book, *Return of Reason*, when commenting the Proposition 2.1, Toulmin finds it legitimate to paraphrase it as: "We fashion for ourselves representations of states of affairs" (Toulmin 2001, 74).

Apart from the active character of our *Bild*-forming, Toulmin puts stress on the continuity of the usage of the term "Bild" in Hertz and in Wittgenstein. What is characteristic of Hertz's notion of *Bilder* is that they are representations in the sense of logical or mathematical constructs being formally in accord with the world, not — as it was in Mach's empiricism — in the sense of the mere reproductions of sensory experience (Janik/Toulmin 1996, 183-184). In view of that, the word "Bild", both in Hertz and in Wittgenstein, should be understood as representation rather than the sense of "model" that is to say "picture" (Actually, Wittgenstein himself says in Proposition 2.12: "A picture is a model of reality") In this context, for example, the Proposition 4.014: A gramophone record, the musical idea, the written notes, and the sound-waves, all stand to one another in the same internal relation of depicting that holds between language and the world. They are all constructed according to a common logical pattern (...) (Wittgenstein 1963, 39)

is better intelligible. The models are to be understood as representations in the sense of Darstellungen, not the more subjective Vorstellungen (which, again, Mach had in mind). Therefore, According to Toulmin's reading, it is just 'models' that are able to represent the "facts", possibly being also mathematical, not necessary pictographic ones.

The *Bilder*models provide us with the logical structure of language that allows us to know in advance the possibility, or impossibility, of certain configurations of objects. In the *Tractatus*, they present situations "in logical space, the existence and non-existence of states-of-affairs" (2.11), which assert, or deny, some logical connections between symbols, and thus between some objects in the world. In other words, the models constitute the *a priori* structure of the language, in which certain propositions can have a sense, and some other cannot have (Toulmin, Janik 1995, 185-186). Our actual asserting a particular true proposition must proceed within the *a priori* logical space, being determined by the *Bilder*, or models, of reality. Of course, in the Tractarian vision of language, there exists an "isomorphism" between the formal scaffolding of the language and the structure of the reality itself. In science, we also deal with formal, *a priori* models to be put into relation with experience — for example such deductive systems as Newtonian dynamics. They, in themselves, constitute logical space which a concrete physical or chemical proposition must be placed in. As Proposition 6.341, referring directly to Hertz's *The Principle of Mechanics*, says:

Newtonian mechanics, for example, imposes a unified form on the description of the world. Let us imagine a white surface with irregular black spots on it. We then say that whatever kind of picture these make, I can always approximate as closely as I wish to the description of it by covering the surface with a sufficiently fine square mesh, and then saying of every square whether it is black or white. In this way we shall have a unified form on the description of the surface. The form is optional, since I could have achieved the same result by using a net with a triangular or hexagonal mesh. Possibly the use of a triangular mesh would have made the description simpler: that is to say, it might be that we could describe the surface more accurately with a coarse triangular mesh than with a fine square mesh (or conversely), and so on. The different nets correspond to different systems for describing the world. Mechanics determines one form of description of the world by saying that all propositions used in the description of the world must be obtained in a given way from a given set of propositions — the axioms of mechanics (...) (Wittgenstein 1963, 137-139).

What is important here with such models or representations, that it seems to be possible for us to employ different "nets" — simpler or more complex — to describe the world, depending on the aspects they are able to capture.

**Wittgenstein in Toulmin**

In *The Philosophy of Science* (1953) Toulmin seems to develop his vision of physical sciences on the base of the above Tractarian themes. The recurring problem in this book is the difference between natural history — which can find its theoretical support in quas-Machian empiricism — and physics — that represents the world in the way Hertz, Boltzmann and Wittgenstein spoke about, i.e. by advancing some models of reality and by further working on them. According to Toulmin, the core of physical discovery is our introducing a novel "way of representation", or "mode of representation", that allows us to see the old phenomena in a new way (Toulmin 1953, 17 and further). This mode of representation constitutes a sort of formal, *a priori* framework within which one is able to state physical facts, to advance particular empirical hypotheses, laws and theories. What is characteristic of the ways of representing is that they are not directly deducible from experience, instead, they are actively molded human constructions (analogical to the Hertzian models/Bilder Wittgenstein took up in *Tractatus*, 2.1). The representation may have a pictorial
form – as it is, for example, in geometrical optics that treats light-ray as a straight line – but it does not have to. It may also be a mathematical model. The essential thing is that it allows us to employ some new inferring techniques in our examination of the phenomena (Toulmin 1953, chapter 2). This corresponds to Toulmin’s understanding the concept Bild in the Tractatus.

Apart from that, the fragments concerning Newtonian mechanics from 6.3 on (to which Toulmin refers in his book, in the supplementary section “Suggested reading”), especially those from 6.34 to 6.3611, have their noticeable counterparts in Toulmin’s book. Where Wittgenstein talks about various formal “nets” (with differently shaped “meshes”) to be possibly used to describe the world, there Toulmin considers theories built on different modes of representation – such as, in the field of optics, geometrical optics with the principle of rectilinear propagation of light, wave-theory or corpuscular theory of light. All of them are applicable within a certain scope of phenomena, although we cannot say of any that they are simply true. In fact, they all constitute some specific ways of our seeing the phenomena. This, of course, leaves another question open: when and on what grounds can we employ a particular, chosen theory? And a more general one: how does it come about that one “mode of representation” gains more approval among the scientific community than another, and thus becomes a promising starting point for further investigations? Toulmin tries to answer to them both in The Philosophy of Science and, furthermore, in his later books. But these are no longer Tractarian themes.

References