On Margitay's Notion of Reduction by Definition

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ABSTRACT Key Words: Michael Polanyi, Tihamér Margitay, ontological levels, reduction, multiple realizeability.
In a recent article "From Epistemology to Ontology," Tihamer Margitay argues, in addition to other things, that the ontological arguments Polanyi provided for his ontological realism with respect to the levels of reality are insufficient. Although Margitay shows this correctly in the case of arguments from boundary conditions, his arguments are not that convincing against the unidentifyability thesis, the thesis that entity kinds on higher levels cannot be identified with descriptions given on lower levels. I argue that here Polányi relies on a version of the multiple realizeability thesis and this argument can be reformulated in a stronger version against which the counterargument Margitay provides is insufficient.

In his article on Polanyi's layered model of the world, Tihamér Margitay criticizes the arguments about the levels of reality Polanyi has developed in support of his ontological realism.[1] I find most of the provided counter arguments convincing and I agree with the basic claim Margitay sets forth through a step by step scrutiny of the relevant Polanyi texts. His strategy is to list all the distinctly Polanyian arguments for emergence, or, in the terms of present day analytic discourse, for the autonomy of higher level entities postulated by higher level sciences. He shows that they are non sequitur arguments, at least in the form they have been presented by Polanyi.

In what follows, I point out, that, although I think Margitay is basically right in his criticisms, his argument is not convincing enough at one particular point where he argues that the reduction of higher level entities such as machines and biological entities can be made unproblematic by reference to industrial standards, that is, in definitions of higher level notions in lower level vocabulary as in the case of nuts and bolts (137). What I will try to show below is that there is a plausible way to defend Polanyi against the argument from industrial standards. To achieve this goal, I will analyze the original Polanyian arguments, I will provide a slightly strengthened version of them in line with the original intentions of Polanyi and, lastly, I will point out that under this interpretation the argument is less easy to defeat.

In his article under point 5.2., Margitay scrutinizes Polányi's semantic arguments for the unidentifiability of higher level entities with lower level entities (136-138). As Margitay summarizes, by these arguments "Polanyi tries to show that machines cannot be identified by their physical-chemical topography." and therefore "machines are ontologically distinct from physical objects." To investigate the way Margitay criticizes Polanyi, first I will reformulate the Polanyian arguments to draw a picture of their structure and then I will turn to the counter arguments developed by Margitay.

Reconstructing the Original Arguments

As I see things, Polanyi has two main arguments for his ontological distinctness thesis. These have also been identified by Margitay, but I would like to give a more detailed analysis of their structure in order to facilitate my argument. The first argument has to do with the possible identification of machines as kinds with their lower level descriptions. In Polanyi's view "[a physical-chemical topography] could describe only one

particular specimen of one kind of machine" (KB 175). This means that a lower level token of a higher level kind would be insufficient to grasp the higher level kind, and would leave out many lower level configurations that are equally fitted to the higher level entity kind. So, the first premise Polányi relies on is that (i) there is a one to many relationship between higher level entity kinds and lower level entity kinds.

At another locus he adds further detail to the above premise: "[a physical-chemical topography] could not characterize a class of machines of the same kind, which would include specimens of different size, often of different materials, and with an infinite range of other variations" (KB 175). This amounts to two things. On the one hand, it implies that (ii) from a lower level point of view, any lower level difference (size, material, etc.) is relevant in identifying different particular specimens of machines. On the other hand, it seems that for Polanyi (iii) having an infinite range of different specimens of a higher level kind helps to warrant the unidentifyability thesis.

So much for the first starting point; in another place, Polányi says the following: "a complete physical and chemical topography of an object would not tell us *whether it is a machine*, and if so, *how it works*, and *for what purpose*" (TD 39, my emphasis). Here the question is whether it is possible to deduce the higher level characteristics of an entity from its description at the lower level. The question is somewhat oblique in this form. A more precise form of the question asks: given the total absence of conceptual instruments to identify the higher level properties of an entity, are the lower level descriptions alone sufficient to deduce the higher level properties of the same entity? If not, then one cannot grasp the higher level entity as a comprehensive entity by relying only on a lower level description.

To sum up, the first argument says that one cannot identify the higher level entities or concepts with lower level ones, whereas the second argument says we are not able to deduce the higher level properties of an entity from knowledge about the lower level description of the same entity. The first argument is in parallel with the classical argument for multiple realizeability (MR) developed by Putnam and Fodor (Putnam 1960, 1967, Fodor 1974). In other words, it says that in cases of machines or living organisms, one cannot formulate the following biconditional statement: if something is a lower level X kind, then it is a higher level Y kind and if something is higher level Y kind then it is a lower level X kind. This amounts to the metaphysical statement that X cannot be identical with Y. So, from this point on I will call the first argument the argument from MR. The second might be called the underivability (UD) argument. UD says that one cannot simply deduce higher level properties on the lower level such as being a specific kind of machine or having a specific purpose.

Counter Arguments by Margitay

Against the above arguments, Margitay develops his counter argument in two steps. Firstly, he shows us that the argument provided by Polanyi for the unidentifiability of higher level entities with lower level ones is insufficient because there are working cases of reduction where the derivation can be done, and this rejects UD. His response is as follows: "It is generally *not* true that concepts and laws of a scientific theory cannot be reduced to that of another *just because* the latter does not have the concepts of the former" (137).

This is then warranted through the example of the reduction of thermodynamics to statistical mechanics. Although Margitay does not mention it, at least since Nagel's account (Nagel 1961) of this case, it became a

classical example of successful reduction. Nagel differentiates between homologous and heterogeneous reduction and this distinction helps to clarify relevant things. In the case of homologous reduction, the vocabulary of the reducing theory contains all the same terms that the reduced theory contains. In cases of heterogeneous reduction, the reduced terms are absent from the lower level vocabulary so to reduce the higher level to the lower we are in the need of special laws, so called bridge-laws, or connecting principles and only with their help are we able to connect the two frameworks. The reduction of the phenomenal theory of heat to statistical mechanics is a case of heterogeneous reduction, so to connect the lower level theory to the higher level one we are in need of extra generalizations. The connecting principle in this case connects a lower level derived property called mean kinetic energy with the term heat from the higher level. This is a one to one relation. After formulating the connecting principle on empirical grounds, the relation between the two theories becomes a deductive one and we have an adequate case of reduction.

Because this is a clear case of reduction, we can use it as a case against UD. As Margitay puts it "[t]he lack of concepts at the lower level is not enough to show the unidentifiability of the higher level entities by lower level descriptions" (138). At this point, one might rightfully ask what is the reason why Margitay does not use this example against the MR thesis, but this question can be answered easily.

In spite of its strengths, the above example of reduction has an important weakness in the context of Polányi's thought. It deals with a specific region of reality, the physical realm, where there is no emergence, according to Polányi. Therefore, the field is still open for the reply that in the case of machines, living things, or intentional beings, there are no plausible examples like this one and from relevant passages in, for example, *The Tacit Dimension* (33-34), it seems that for Polanyi the scope of his theory of emergence is restricted to machines and living things.

The second counterargument by Margitay can be seen as an attempt to fill in this gap. This is the most important phase of his argument. Here he considers the possibility of reducing machines as machines to their physical-chemical realizers to counteract the mentioned worries. As he formulates:

> But even a *much weaker reduction*, in which the concepts of the higher level theory are *identified* with or *defined* in terms of lower level concepts, would be enough to identify comprehensive entities by lower level descriptions" (137, my emphasis).

So, there are serious possibilities to consider and these are also more relevant against Polanyi. Margitay thinks that in the case of industrial standards neither the UD argument, nor the MR argument is enough to block reduction. With the example of thermodynamics, he made a good case against UD; the same is true of industrial standards. Now he turns to MR and from the case of industrial standards, he builds an argument against Polanyi's general conclusion that all machines are emergent, irreducible entities that can only be identified on the higher level by their operational principles. To achieve his goal he relies on the following starting points:

> (1) "[S]ome machines may be—and indeed are for some purposes—identified by their physical parameters in industrial standards" (138).
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> (2) "[I]f a class of machines of a particular type were finite, it could be identified by the class of the physical descriptions of each specimen. […] unidentifiability is not true of several types of machines. Industrial standards reduce the possible variations of simple tools and fittings…" (138).

> The argument goes something like this. There is a real example from a practical context, the example of industrial standards, where scientists define/identify higher level entity kinds by a finite list of lower level descriptions and this case is an exception to the MR thesis as it is formulated by Polanyi.

I think there are at least two interesting, but also somewhat problematic points in this line of thought. The first that I investigate is the relation of definitions and criteria for lower level identification with reduction. Is it enough to have a full-fledged reductive explanation to define a higher level notion by a list of lower level descriptions? The second point is relevant also to answer the first question. In his paper, Margitay argues that the reduction of the possible variations in simple machines by industrial standards is in itself a good case against the MR thesis. I think this is the point where a defender of Polányi might have a chance to block Margitay's argument. In my view, this argument is insufficient because the thesis that an infinite number of different realizers is necessary for the emergentist consequences of the MR thesis to hold is not true.

Let me start with the question concerning Margitay's suggestion of reduction by definition. Where Polanyi argues that "a complete physical and chemical topography of an object would not tell us whether it is a machine", Margitay argues that there are cases when machines can be identified without reference to their operational principles by lower level definitions in industrial standards. I think Margitay is right in that at least in some cases it is possible to identify machines by reference to industrial standards and therefore some machines as entity types can be selected from a lower level point of view, but I also think that this will not solve the problem of reduction or of emergence.

Although a definition of this kind helps us to provide lower level identity criteria for a higher level entity, it will not explain the entity reductively. In other words, it will not explain in the terms of the lower level the higher level order that is grasped by a higher level concept. This is because to achieve a reductive explanation that explains the higher level order and that also achieves ontological simplicity which is an important goal of reductive attempts, one has to find a special kind of identity statement, an identity statement that identifies a lower level property kind with a higher level property kind as in the mentioned case of thermodynamics and as suggested by Nagel (1961).

My second point will explain what is left unexplained in my first note. It concerns some details of the MR argument and its relation to the problem of identification and identity statements. In locus (2) Margitay explains why he thinks that in the case of industrial standards the MR argument loses its force. From that text, it is clear that he thinks (iii) to be a constructive, necessary component of the MR thesis. So, for him to have a case of MR, an infinite number of different realizations of a higher level entity kind is needed. In this case, the only possible lower level definition would be an open-ended alternation of lower level physical topographies and such an open-ended alternation is certainly not a viable definition.

Here it is useful to reconsider the MR thesis. In the introductory phases of this essay, I have tried to differentiate some aspects of the MR argument. Now I will focus on the first part of it (i) that says that in the case of machines and living things there is a one to many relationship between higher level kinds and lower level kinds. I think, although Polanyi's formulation of the MR argument is a bit fuzzy, his argument has the same tendency as that of Fodor's (1974) classical argument.

Fodor told us that the identity theorists in the context of the philosophy of mind are wrong but not simply because there are an infinite number of different realizers for higher level psychological kinds. In his view, the main problem is elsewhere; it is that there is no traceable correspondence between higher level and lower level kinds. We simply cannot find one lower level property or a property that is derivable in lower level theories which is common to every lower level realizer. Therefore from a lower level perspective, one cannot grasp the principle that unifies all the realizers and for the same reason one cannot explain the higher level laws or causal generalizations in lower level terms. If this is true, it does not help us that the lower level realizers belong to a finite number of lower level kinds, because, from a lower level perspective, the unity of these kinds and the higher level laws by which they can be covered are simply invisible. The set in which they belong can only be constructed by the use of higher level concepts and criteria encoded in higher level terms.

So, Margitay might be right that there are cases of MR where it is possible to define a higher level kind by a finite alternation of lower level kinds, but the unity of those lower level kinds itself belongs not to the lower level, but exclusively to the higher level. A one to one relation between levels means that the structure of the two realms is somewhat isomorphic. The absence of such structural connection between the realms is the only good reason why the higher level vocabulary is ineliminable. If this strengthened MR thesis is in place, it becomes clear why the low number of variations in simple tools is not enough to show that industrial standards are good counterexamples to the MR thesis.

To show that industrial standards are good counterexamples, Margitay should show us that the definitions given in the standards are not only finite but that they are able to grasp the order expressed by the higher level concept on the lower level. But for a standard to be able to do this the engineers have to find a lower level property that is strictly identical with that of the higher level kind; without this, it is not clear that a lower level definition can explain anything interesting on the higher level. In the end, this means that a proper definition that is able to explain higher level principles has to be an identity statement that connects a lower level kind to a higher level one. If there is no such connection, following Fodor and Putnam, one is justified to say that, although multiply realized higher level entity types are constituted of physical parts, their constitutive properties are not physical properties. So, Polanyi is right in saying that machines as machines are not physical things. I think this line of thought constitutes a weighty burden for anyone who argues against the Polanyian tenet.

If this strong MR thesis is true in cases of machines and living organisms, the Polanyian view that machines and living organisms are emergent entities and can only be identified by their operational principles remains defendable. Even if we are in the position of constructing definitions like industrial standards referred to by Margitay, prior knowledge of higher level principles is needed to construct the standard. The reasons why the elements of a finite definitive alternation are applied to the same group can originate only from the higher level description. So, the order that constitutes machines is up there and cannot be understood on the lower level.

As I see things now, there are only two ways to avoid this conclusion. The first is to prove that the MR thesis is false in general or, if it false in at least some cases, to prove there are industrial standards relying on proper bridge-laws as is required by the classical Nagelian theory of reduction. Both would prove Polanyi to be false in this respect.

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Endnotes

[1]Quotations from Tihamér Margitay's "From Epistemology to Ontology" in *Knowing and Being: Perspectives on the Philosophy of Michael Polanyi* are simply noted by page in parenthesis in the text.

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