

From being ontologically serious to serious ontology

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Abstract

The paper first argues that if one takes current fundamental physics seriously, one gets to a metaphysics of events and relations in contrast to substances and intrinsic properties. Against that background, the paper discusses Heil's theory of properties being both categorical and dispositional and his rejection of levels of being. I contrast these views with a Humean metaphysics. My concluding claim is that Heil's account of properties opens up the perspective of a conservative reductionism, which avoids the common reservations against reductionism.

1. *Relations vs. intrinsic properties*

In this paper, I shall take the liberty to simply pin down a few central issues that arise in constructing a comprehensive metaphysics, basing myself on some of the discussions in the preceding papers. I shall first mention my methodological background of metaphysics grounded on science, then consider Heil's view of properties (sections 2 & 3) and finally explore the perspective of his rejection of the conception of levels of being leading to a conservative reductionism (section 4).

There is a mutual dependence between science and philosophy. One cannot separate metaphysics from science, as is evident for instance from the causal argument for physicalism whose crucial premise is the completeness of physics. But one cannot simply read one's metaphysics off from science either. It is the business of the philosophical interpretation of scientific theories to put forward proposals for ontological commitments that are reasonable consequent upon scientific results.

The history of philosophy is dominated by atomism in the sense of the metaphysical position according to which the world is composed of small, indivisible substances (atoms in a literal sense). These substances are characterized by a few intrinsic properties, they are endurants, existing as a whole for all the time or for a certain time, having no temporal parts, and they are the foundations for change, change being the alteration of accidental properties of these substances. That position fits well with classical mechanics and the classical 192 field theories of the nineteenth century. But it does not fit into the fundamental physical theories of the twentieth century:

- The unification of space and time in *special relativity*, which is maintained in *general relativity*, provides a strong argument for the metaphysics of a block universe (see notably Balashov (2000)): there is a four-dimensional continuum of space-time. Everything that there is simply exists in space-time, occupying a point or a region of space-time; existence is not relative to a time (e.g., it is wrong to maintain that only that what is present exists). The content of the block universe are perdurants – events and processes, the latter having spatial as well as temporal parts. An event is defined by the properties that occur at a space-time point (maybe properties of space-time points themselves, may be properties of fields), a process is a sequence of events. There are no substances that persist as a whole for a certain time (endurants), being the foundations of change. Persisting objects are

continuous sequences of events that are similar as regards their properties, forming what is known as a world-line, change is variation in the properties of such events.

- *Quantum theory* provides for a strong argument for a metaphysics of relations instead of intrinsic properties (that metaphysics is put forward under the names of holism and of structural realism; see Esfeld (2004) and the references therein): what is fundamental according to quantum theory are relations of entanglement among quantum systems. As far as the fundamental physical properties are concerned that quantum physics considers, quantum systems do not have these properties separately, but are linked with each other by relations of entanglement; there are no intrinsic properties underlying those relations. Even if there are processes of a dissolution of entanglement (known as state reductions), leading to properties that belong to quantum systems individually, the relations of entanglement are fundamental.
- Turning to space-time itself, there is a strong argument stemming from field theories in favour of the existence of space-time points (see Field (1980), chapter 4). However, *general relativity* provides for a strong argument against the conception of space-time points as substances that are characterized by intrinsic properties (the hole argument; see Earman & Norton (1987)). Instead, the properties of space-time points consist in the metric relations in which these points stand. Thus, the philosophy of 193 space-time fits well into structural realism (see Esfeld & Lam (forthcoming) and Lam (2006, this volume)).

These are piecemeal arguments. There are properties that are neither properties of space-time nor touched by quantum entanglement, most notably mass and charge. Consequently, the last two arguments say nothing against considering those properties as fundamental intrinsic properties. However, regarding properties such as mass and charge as intrinsic is by no means mandatory. More importantly, we lack a unification of quantum theory and general relativity. Nonetheless, whatever may be the future fundamental physical theory that achieves a unified treatment of the phenomena that are currently considered by two different theories, it would be unreasonable to expect that future theory to go back behind the unification of space and time as considered by general relativity or the holism that quantum entanglement manifests. Even if we ignore as yet the content of that future theory, the metaphysical direction seems clear: events instead of enduring substances, and relations instead of intrinsic properties.

2. *Powerful vs. Humean properties*

The points sketched out in the previous section are to my mind simply commitments that any attempt at a comprehensive contemporary metaphysics should accommodate. It is a pity that many metaphysicians base themselves on common sense instead of paying heed to science. The last two points are at odds with Heil's insistence upon intrinsic properties. However, they do not touch upon Heil's main concern.

The central element of Heil's ontology is his view of each property being both categorical (or qualitative) and dispositional. More precisely, the distinction between "categorical" and "dispositional" is one among predicates, each property being categorical and dispositional in one, making true categorical and dispositional descriptions. That view can be applied to intrinsic properties as well as to relations. If each relation is both categorical and dispositional, it includes the disposition to produce further relations. In the following, I shall

therefore take the liberty to use the notion of properties as a generic one, covering both intrinsic properties and relations.

An ontology that regards properties as being both categorical and dispositional is less parsimonious than an ontology that admits only categorical properties. What is today known as Humean metaphysics is the paradigmatic example 194 of a parsimonious ontology of the latter kind. According to David Lewis's thesis of Humean supervenience, for instance, what holds the world together is a network of spatio-temporal relations between points. At those points are fundamental physical properties that are intrinsic and categorical. That's all (Lewis (1986), pp. ix-x). Laws are statements that describe certain salient patterns of regularities in the distribution of these properties. What the laws are supervenes on the distribution of these properties as a whole. The same goes for causation – both on a Humean regularity account as well as on a counterfactual account like the one of Lewis himself (the truthmaker for the counterfactual statements is the distribution of the fundamental physical properties over the whole space-time of the actual world; see Armstrong (2004), p. 445, and Loewer (forthcoming), section II). Dispositions also supervene on the distribution of the fundamental physical properties in space-time.

Humean metaphysics has to accept the whole distribution of fundamental physical properties in space-time as primitive. Given that distribution, vertical explanations are possible: one can explain how certain configurations of fundamental physical properties make certain higher-level descriptions true. But it is not possible, given the distribution of fundamental physical properties in a certain region of space-time, to account for why there are the fundamental physical properties instantiated in other regions that there are in fact. Given the big bang at the origin of the universe, it is not possible to answer the question why the distribution of fundamental physical properties in the universe developed as it did. The only thing that one can do is this one: given the whole distribution of fundamental physical properties in space-time, one can write down the salient patterns of regularities in the distribution of these properties in the form of laws. The laws are merely descriptive, summing up what there is.

Humean metaphysics therefore faces the problem of induction in a metaphysical form: there is nothing in the past distribution of properties that could make true the prediction that the future distribution of properties will be like the past one. Lewis (1994, section 3) assumes that nature is kind to us, that is, that there will be a few simple salient regularities that apply to the distribution of physical properties throughout the whole universe; but there is nothing in the past distribution of properties that could make such a claim about the whole universe true.

If we switch from a Humean metaphysics of intrinsic, categorical properties to a metaphysics of categorical relations, nothing of substance changes as regards the issues just raised. Again, given the big bang at the origin of the 195 universe, it is not possible to answer the question why the distribution of fundamental physical relations in the universe developed as it did.

This lack of an account is a good motivation to go beyond the sparse ontology of Humean metaphysics and to admit dispositions, that is, powers. If the tokens of fundamental physical properties or relations include the power to produce further tokens of fundamental physical properties or relations, then we have an account of why, given the distribution of tokens of fundamental physical properties in a certain region of space-time, there are certain other tokens of fundamental physical properties in other regions. Thus, given the big bang at the

origin of the universe, admitting powers at the origin of the universe provides us with metaphysical tools to answer the question why the distribution of fundamental physical properties in the universe developed as it did. In general, if the tokens of the fundamental physical property *A* include the power to produce tokens of the fundamental physical property *B*, then we have an account of why there are sequences of the type *AB* in the universe.

There are two versions of a metaphysics of powerful properties discussed in the current literature:

- 1) The one version considers each property to be categorical and dispositional in one. More precisely, to the extent that there is a distinction between the categorical and the dispositional, it is a distinction among predicates or descriptions instead of properties. This version is favoured by Charlie Martin and John Heil among others (see Martin (1997, in particular sections 3 and 12), Heil (2003, chapter 11), as well as Mumford (1998, chapter 9), Mellor (2000, in particular pp. 767–768) and Kistler (2005)).
- 2) The other version identifies properties with powers (see Shoemaker (1980), Bird (2005), as well as Ellis (2001, in particular chapters 1 and 3); Ellis, however, admits powers as well as categorical properties as two different kinds of properties existing in the world).

Laurent Freland (2006, this volume, section 2) argues that categorical and dispositional predicates exclude one another so that we cannot conceive properties as being both categorical and dispositional without compromising realism. If this argument proves sound, it refutes the first of these versions, but it does not touch the second one.

For the purposes of this paper, the second version is sufficient. The main contrast is the one between a Humean metaphysics and a metaphysics of powerful properties. The difference between the two versions of that latter metaphysics is not great to my mind: the first version does not conceive the distinction 196 between the categorical and the dispositional as an ontological one (so that one cannot even talk in terms of qualitative and dispositional aspects of properties), and the second version does not conceive powers as pure potentialities, but as real, actual properties – and thus as categorical in a certain sense. Furthermore, each power can be considered as qualitative in a certain sense, since it is the power to produce certain specific effects.

According to the ontology of powerful properties, there are necessary connections. If tokens of the property *A* are or include the power to produce tokens of the property *B* among other things, then the connection between the *As* and the *Bs* is a necessary one. Consequently, if it is a law that all *As* are followed by *Bs*, this is so because the *As* have and exercise the power to produce *Bs*. The laws of nature thus are metaphysically necessary. In any world in which there are *As*, the law that *As* produce *Bs* holds.

However, one may wonder whether anything is gained in adding powers to one's ontology. It is not an explanation of why *As* are always followed by *Bs* to say that *As* are or include the power to produce *Bs* among other things – in the same way as it is not an explanation of why opium makes people fall asleep to say that opium is or includes the power to produce sleep in people among other things. Since we consider fundamental physical properties, there is, of course, not the possibility to go further down in the level of explanations. Is it therefore not simply a mark of intellectual honesty to concede that explanations come to an end once we have reached descriptions in terms of fundamental physical properties and to accept the distribution of the fundamental physical properties over the whole space-time as primitive?

It is correct to point out that adding powers to one's ontology does not lead to a gain in explanation. One either has to accept the whole distribution of fundamental physical properties as primitive or one has to accept powers – such as the power of *As* to produce *Bs* – as primitive. The point at issue is a comprehensive and coherent metaphysics. One may voice reservations against admitting powers, since they do not lead to a gain in explanation. But one may also voice reservations against a Humean metaphysics, since one simply has to accept the whole distribution of fundamental physical properties in space-time as primitive, there being no necessary connections. Are there arguments to prefer one of these metaphysical positions to the other one?

3. *Two arguments from physics*

197 Let us turn to physics. Both the friends of Humean metaphysics and the friends of powerful properties claim support from physics; Heil himself, however, does not invoke physics. As regards the Humeans, since Russell's famous paper denouncing the notion of causation as production or generation of something (Russell (1912)), they claim that our fundamental physical theories do without the notion of powers or forces. All that our fundamental physical theories state are certain regularities in the distribution of physical properties. There is thus not more to causation than the Humean acknowledges (cf. for instance Redhead (1990), pp. 145–147; Loewer (2001), pp. 322–324; Field (2003), section 1). However, the friend of powerful properties objects to the Humean that the world of Humean metaphysics is static, whereas physics – notably cosmology – shows that our world is dynamical (e.g. Mumford (1998), p. 214; Ellis (2001), pp. 1–2; Molnar (2003), pp. 135–137, 178). According to the friend of powers, the admission of powers is mandatory in order to account for the actual world being dynamical. In that respect, one can pursue two arguments stemming from our two current fundamental physical theories. Let us consider these arguments.

1) What holds the world together? According to Lewis' thesis of Humean supervenience, there are fundamental physical properties instantiated at points that are linked by spatio-temporal relations. In short, what holds the world together are spatio-temporal relations. Humean metaphysics in general presupposes space-time, that is, the network of spatio-temporal relations. These relations are considered to be categorical, and this is seen as proving that the unity of the world can be accounted for in terms of categorical properties only.

However, as we know from general relativity and its application in cosmology, space-time cannot be separated from matter, and it is itself a dynamical entity. Space-time has its origin in the so-called big bang, and it is in continuous expansion. This physical theory of space-time shows first that the metaphysics of powerful properties can be applied to spatio-temporal relations too (cf. Bird (2005), p. 459). Since these relations are dynamical and interact with non-gravitational energy-matter, they can be considered as making true descriptions in terms of powerful properties in the same way as any other fundamental physical property does. More importantly – and also more controversially – one can raise the following question: 198 What distinguishes a world with a dynamical space-time as described by general relativity from a conceivable world with a Minkowskian flat space-time, that is, a fixed given background network of spatio-temporal relations as some sort of an arena into which physical entities are inserted? One can maintain that a persuasive answer to this question consists in

saying that the spatio-temporal relations in a dynamical space-time as described by general relativity include certain powers to produce changes in non-gravitational energy-matter as well as in the metric structure of space-time itself. However, that answer is not mandatory. The Humean can simply accept these changes – like all other changes at the fundamental physical level – as primitive.

2) The interpretation of quantum physics gives much more often rise to a metaphysical position that admits irreducible dispositions (powers) than does the interpretation of general relativity. Nonetheless, the relations of quantum entanglement are not dispositions as such. They can be considered as categorical. There is an interpretation of quantum physics, going back to Everett (1957), according to which quantum entanglement is universal, encompassing all objects in the world and all their properties. According to that interpretation, the world simply is a huge entangled quantum state, and that's all. That interpretation does not call for the admission of powers. But that interpretation implies that all our other scientific theories, apart from quantum physics thus interpreted, are strictly speaking false: there are no disentangled states out there in the world, hence there are no properties having definite numerical values at all. For instance, the state of Schrödinger's cat remains forever entangled with the state of the atom among others, so that the atom never is in a state of being either integral or decayed and the cat never is in a state of being either alive or dead. To my mind, this is a good reason to reject that interpretation: it is simply not coherent with our other scientific theories, not to mention our common sense knowledge.

The other interpretation of quantum physics – or set of interpretations, of which the one going back to Ghirardi, Rimini & Weber (1986) is the most prominent one – recognizes processes of a dissolution of quantum entanglement, known as state reductions, that lead to physical properties possessing definite numerical values. The talk of dispositions or powers in the interpretation of quantum physics is usually linked with that interpretation: the idea is that quantum systems have dispositions or powers to acquire physical properties possessing definite numerical values by means of state reductions. Hence, if one takes a dynamics like the one proposed by Ghirardi, Rimini & Weber (1986) to describe the actual world, the argument is that at least in a world like ours, the relations of quantum entanglement include the power to dissolve themselves (power of state reductions; that power has moreover to be such that there is room for state reductions being probabilistic). (Perhaps this is so in any possible world. For this argument, nothing depends on whether a world of universal quantum entanglement is merely conceivable or also metaphysically possible; the same remark applies to the conceivable world mentioned in the previous argument). However, it is always open to the Humean to simply accept quantum entanglement and the processes of its dissolution as primitive (that is, for instance, simply accept the dynamics that Ghirardi, Rimini & Weber (1986) propose as primitive).

If one endorses a metaphysics of the fundamental physical relations being or including powers on the basis of considerations such as the mentioned ones, no commitment to unmanifested powers ensues. As regards these fundamental powers, there is no question of manifestation conditions being outside of them, since there is nothing but quantum entanglement and / or a dynamical space-time to start with. These fundamental powers are quite different from common sense dispositions such as sugar being soluble in water. As regards these latter dispositions, the conditional analysis may be right (see Sparber (2006, this

volume) and the references therein). However, as Malzkorn (2000) has shown, the conditional analysis on its own does not settle the issue of the ontology of dispositions.

This section of the paper is inconclusive: we need strong metaphysical arguments why we should prefer a metaphysics of powerful properties to a Humean metaphysics, since the latter is more parsimonious. The arguments stemming from fundamental physics have some persuasive force, but there is no cogent argument from contemporary fundamental physics that favours a metaphysics of powerful properties against a Humean metaphysics (as there are cogent arguments from contemporary physics that favour a metaphysics of events against a metaphysics of substances and a metaphysics of relations against a metaphysics of intrinsic properties). The mentioned arguments come down to exploiting the intuition that there is more to causation than just some regularity pattern or other in the development of the distribution of fundamental physical properties. However, these arguments are unable to provide any reason why 200 that view of causation is right. I think there is an argument for that view of causation, but it relies on biological and mental causation. I shall turn to that argument in the next section.

4. *Reduction vs. elimination*

Heil's ontology is directed against the view of levels of being. There are no levels of being. Thus, it is inappropriate to talk in terms of a single level of being as well. Taking fundamental physics into account, the view we get to is the following one: there is quantum entanglement, and there are processes of the dissolution of quantum entanglement, resulting in classical physical properties (as described by an appropriate dynamics of quantum systems). Tokens of these properties arrange themselves during cosmic evolution in configurations some of which are more and more complex, making true not only descriptions in terms of fundamental physics, but also descriptions in terms of chemistry, biology, neurobiology, psychology, etc. Thus, there are levels of complexity in the organization of configurations of fundamental physical properties, and there are levels of description, but no levels of being.

This position is a reductive physicalism: everything that exists is either a fundamental physical token or identical with a configuration of fundamental physical tokens. Modern science provides for a strong argument in favour of reductive physicalism: anything that is in some way or other connected to physical causes and effects can stand in causal relations only if it is identical with fundamental physical tokens or their configurations (the most prominent recent elaboration of that argument and its consequences is Kim (1998) and (2005); for a recent discussion of Kim's position see the papers in Esfeld & Fantini (2005)).

The causal argument for reductive physicalism is independent of the theory of causation that one holds. Even a Humean regularity account or a Lewisian counterfactual account of causation does not open up a way to avoid the reductionist conclusion of that argument by turning systematic overdetermination into a plausible option (see Sparber (2005) who argues against Loewer (2001)). Nonetheless, the metaphysics of causation is relevant when it comes to spelling out the reductionist position to which that argument points. How can one show that, for instance, biological tokens and mental tokens are identical with configurations of physical tokens? That task would be easy if biological and mental properties were defined by their physical composition – as arguably chemical properties are. That task would be impossible to accomplish if biological and 201 mental properties were qualitative intrinsic and categorical properties. In that case, given the causal argument for physicalism, they

would not only have no effects whatsoever, but it would also be entirely mysterious how they could arise in cosmic evolution, being caused by physical tokens. Fortunately, there is another conception of biological and mental properties available, namely the functional one. According to that conception, biological and mental properties are notably defined by some characteristic effects that their tokens have. One then discovers configurations of physical tokens that are sufficient to bring about the effects in question, and the causal argument provides a convincing reason for holding that any biological and any mental token is identical with a configuration of physical tokens. Since functional properties are defined in a causal way, the metaphysics of causation is pertinent to spelling out reductive physicalism.

Although the causal argument for reductive physicalism is cogent, reductionism meets with many reservations. In order to win over the philosophers' community – and the public in general – it is crucial to set out that position in such a way that one does not provoke the “nothing but ...” objection (“the mental is nothing but brain states” etc.), giving rise to the impression that something has been left out. Note that identity applies in both directions: if all biological and all mental tokens are identical with configurations of physical tokens, then some configurations of physical tokens are biological or mental tokens. It is hence not true to say that biological and mental tokens are replaced with configurations of physical tokens. This position is an ontological reductionism only for the following reason: everything that there is in the world is a physical token or a configuration of physical tokens; but not everything that there is in the world is a biological or a mental token.

The same applies to descriptions: descriptions that use biological and mental concepts are true in the same way as descriptions that use physical concepts. Both belong to a comprehensive and coherent system of our knowledge. Entities that are identical with configurations of fundamental physical tokens make true higher-level descriptions in the same way as they make true physical descriptions. There is only one relation of truth-making.

However, we need an account of how one and the same token can make true both a fundamental physical description and higher-level descriptions. If we are to avoid reintroducing levels of being, that account can only be one that shows how any concept that a higher-level description uses can be coordinated with a concept that can be constructed within fundamental physics in such a way that the higher-level concepts are nomologically coextensive with 202 physical concepts (so that we can in principle deduce the higher-level descriptions and theories from the fundamental physical ones). This position then is an epistemological reductionism because it is not possible to construct for any physical concept a higher-level concept that is nomologically coextensive with the physical concept in question. In short, pace Heil (2003, chapter 6), one cannot subscribe to ontological reductionism (identity of all higher-level tokens with configurations of fundamental physical tokens) without subscribing to epistemological reductionism (theory reduction) too.

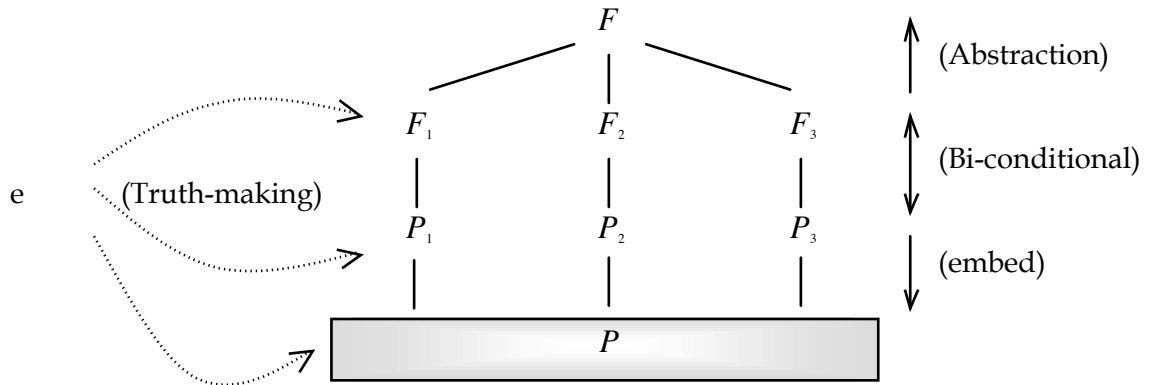
How can we achieve such nomologically coextensive concepts? According to an idea pursued by Christian Sachse and myself, any higher-level functional concept that a higher-level functional theory F uses can always be made more precise by introducing functional sub-concepts F_1, F_2, F_3 , etc. These functional sub-concepts can be constructed in such a way that they are nomologically coextensive with the physical concepts P_1, P_2, P_3 , etc. that are constructed within a fundamental physical theory in order to describe in physical terms the tokens that make true the functional theory F . However, there is no question here of a semantic way of meaning analysis from the concepts of P to the concepts of F (and *vice*

versa). The meaning of these concepts is distinct. The aim is to achieve a nomological coextension of certain concepts constructed within F with certain concepts constructed within P (see Esfeld & Sachse (2006) and Sachse (2006, this volume)).

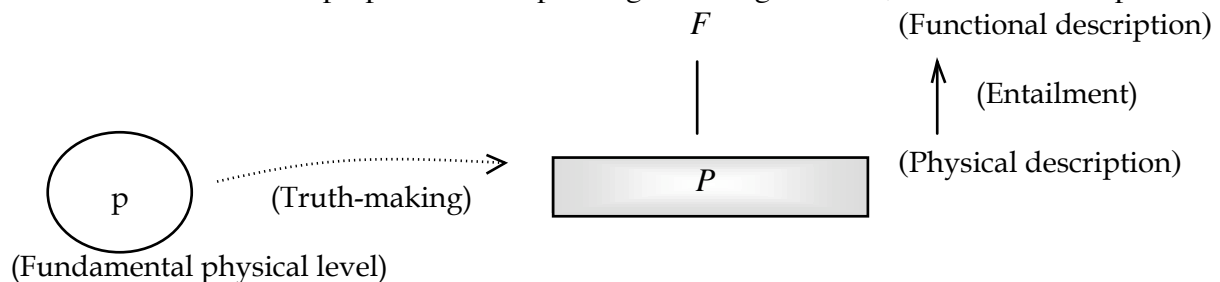
The proposal can be summed up in this way:

- 1) Within a comprehensive fundamental physical theory P , we can construct concepts P_1, P_2, P_3 , etc. that describe the tokens that come under the concepts of a functional theory F , for any F .
- 2) For any F , we can make the concepts of F more precise by constructing functional sub-concepts F_1, F_2, F_3 , etc. that are nomologically coextensive with P_1, P_2, P_3 , etc.
- 3) We can then reduce F to P by inferring F_1, F_2, F_3 , etc. from P_1, P_2, P_3 , etc., given the nomological coextension, and get to F by simply abstracting from the conceptualization of side effects that distinguish between F_1, F_2, F_3 , etc.

The model we then get to is this one: the entities that there are in the world – the domain “e” on the left hand side of the drawing below – make true descriptions that are related to each other as shown in an idealized way on the right hand side of the drawing: 203



This model is remarkably distinct from the standard reductionist position that goes like this: there are fundamental physical properties instantiated at space-time points. The fundamental physical properties and their configurations make true a fundamental physical description in the first place. Some of these configurations furthermore make true chemical, biological, neurobiological, etc. descriptions. These latter descriptions are entailed by the fundamental physical descriptions. I take Lewis’ thesis of Humean supervenience as well as Jackson’s *a priori* physicalism to amount to something like this position (cf. Chalmers & Jackson (2001)). There are some passages in Heil (2003) that can be read in that way too (e.g. pp. 41, 45), but this is not Heil’s considered position (see chapter 6). This austere reductionist position still is in the grip of the levels of being model: there is only one level of being, the fundamental physical one, making true a privileged level of descriptions, the fundamental physical ones, some of which then imply further, higher-level descriptions. The distinction between this conception and the standard functionalist one is that the functionalist adds higher-level, functional second-order properties corresponding to the higher-level, functional descriptions.



204 This model gives with some reason rise to reservations about reductionism, for there are only physical entities, and non-physical descriptions are true, but only in a derived, secondary way. The first model, however, does not invite any such worries.

Let us now apply the issue of a Humean metaphysics vs. a metaphysics of powers to these two different ways of spelling out reductionism. Consider the view of causation within Humean metaphysics (I shall confine myself to a Humean regularity view of causation; nothing of substance changes if one switches to a counterfactual account à la Lewis). The fundamental properties are categorical only. Causation is nothing but certain contingent patterns of regularities in the distribution of the fundamental categorical properties. Functional properties, however, cannot be conceived as being categorical only, for what they are consists in the effects that they cause. Humean metaphysics can hence not admit functional properties. We therefore end up with the position that the referents of functional descriptions are configurations of fundamental physical tokens only and that these configurations make true higher-level, functional descriptions in a somewhat secondary way, these descriptions being derived from the fundamental physical descriptions. In brief, Humean metaphysics is committed to the second model of reductionism that provokes the charge of eliminativism with respect to functional properties such as biological or mental ones: they are not really there, being replaced with physical properties and some contingent regularity patterns in the distribution of physical properties.

By contrast, consider a metaphysics of powerful properties. There is no problem to conceive functional properties as being or including certain powers. Functionalism is often linked with the causal theory of properties (Shoemaker (1980)). If powers go down to the fundamental physical level, there is no problem in maintaining that functional, biological or mental properties exist in the same manner in the world as do fundamental physical properties: some configurations of physical tokens genuinely are biological, or mental tokens. In short, in order to avoid the “nothing but ...” charge against reductionism and be able to maintain a conservative reductionism as outlined in the first drawing above, we have to conceive the dispositional character of properties as applying to all properties including the fundamental physical ones.

That argument can be illustrated by turning to mental causation. Mental causation is experienced in such a way that our intentions produce a good deal of our behaviour in the sense that the existence of the behaviour in question is grounded on the intentions. Humean metaphysics cannot accommodate that 205 experience as being veridical. In Humean metaphysics, the description of a token mental intention refers in each case to – and is made true by – a configuration of fundamental physical tokens. Most of the configurations of fundamental physical tokens that make true a description of the type “intention to raise one’s right arm” are contiguous in space and time with configurations of fundamental physical tokens that make true a description of the type “right arm going up”. But according to Humean metaphysics, there is nothing in the former configurations that brings about the latter configurations and thus is the ground for their existence. It is simply a contingent matter of fact that configurations of the former type are usually followed by configurations of the latter type.

Russell said in his famous rejection of the law of causality (that is, in short, the idea of the cause having the power to bring about the effect): “A volition “operates” when what it wills

takes place; but nothing can operate except a volition.” (1912, p. 11) However, the causal argument for physicalism tells us that if a volition operates, then the volition is identical with a configuration of physical tokens. The causal argument is an argument for the identity of biological, mental, etc. causes with physical causes. It would lose its point if that identity were to deprive the biological, the mental, etc. of its causal force. Thus, in short, if there is mental causation – or biological causation – and if the mental, or the biological causes are identical with physical causes instead of being eliminated, then the physical causes have to include the power to bring about the effects that define the mental, or the biological causes. Of course, this means only that the physical properties are powerful as well, but not that dispositions in general possess the characteristic features of intentionality.

The argument from functional – notably mental – properties for a metaphysics of causation in terms of powers seems to me to be the most cogent argument for a metaphysics of powerful properties in contrast to a Humean metaphysics. Going for a reductionism that does not provoke the usual reservations has a price, namely to conceive every property as including certain powers. There is nothing from physics that rules out a metaphysics of causation in terms of powers; there are even some considerations from fundamental physics that one can pursue in that sense, although they alone do not lead to a cogent argument for that metaphysics.

There are a lot of open issues here. For instance, it is not at all trivial whether all our mental experience can be conceptualized in terms of entities that are functional, being defined by characteristic effects. Conceiving properties as powers or as being categorical and dispositional in one commits us to a functional view of 206 qualia, for it is not possible to separate in that conception a qualitative from a functional-dispositional aspect of properties (cf. Sollberger (2006, this volume)). In short, all the work that remains to be done consists in explaining how functional tokens that are identical with physical tokens make true our beliefs about consciousness, conceptual content, free will, norms, values, etc. Nonetheless, it seems to me that we can gain from Heil’s book the perspective of a coherent overall metaphysics of the world and ourselves that is reductionist without eliminating anything.

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