DO ZOMBIES HUNGER FOR HUMEAN BRAINS?

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INTRODUCTION

John Heil's *From an Ontological Point of View* (Heil 2003) is a tremendous philosophical work. The neo-Lockean ontology the reader finds within its 267 pages is a sensible and refreshing alternative to the neo-Humean ontologies which presently occupy the vast majority of the metaphysical literature. What Heil offers is a much needed change in perspective. Nor are the strengths of the book limited to Heil's willingness to approach central metaphysical problems in largely untried and unpopular way; the book is very clear in its presentation, accessible to wide readership, and tightly argued throughout. Heil's efforts in this book are to be applauded, and the result is one that warrants serious consideration by all those interested in serious metaphysics. But the interest should not end there: the lessons of Heil's book are ones that almost all philosophers ought to take seriously.

Despite the criticism that follows, my overall position should not be taken as anything short of a whole-hearted endorsement of Heil's book. Nonetheless, when philosophy is one's trade, there is always going to be something to disagree about, however much one is amenable to a view.

METAPHYSICS COMES FIRST

One of the central theses of Heil's book is that in philosophy, metaphysics comes first. Once the metaphysics is in place, the problems of other various philosophical sub-disciplines are to be solved through applications of that metaphysic. For instance, Heil claims of the philosophy of mind that "if you get the ontology right, problems in the philosophy of mind take care of themselves." (Heil, 2003: 240). Heil puts this claim to the test by applying the ontology defended in the first two-thirds of the book to a variety of problems: colour, conscious experience, intentionality, and so on. Amongst the problems Heil seeks to tame with his ontology is that of philosophical zombies.

The purported possibility of zombies is the product of thought experiments in the philosophy of mind designed to draw out our intuitions about the nature of consciousness and conscious experience. In the final chapter of his book Heil applies his ontology to the question of zombies, arguing that despite appearances to the contrary, zombies are not possible. Heil claims that the mistaken belief that zombies are possible arises from treating qualities and dispositions as contingently related; as Heil's ontology is one that makes the relation between quality and disposition necessary, zombies are no longer a live possibility (nor an undead one for that matter). I will argue that Heil manages to rule out the possibility of zombies in as

much as they are relevant to a specific objection to physicalism, but that the zombie concept is wider than this, and under the wider interpretation the possibility of zombies is still in tact.

PHILOSOPHICAL ZOMBIES

Philosophical zombies (also known as phenomenal zombies) are not the zombies depicted in countless horror films, nor are they the zombies of Haitian voodoo folklore. A philosophical zombie is human-like being who from the outside seems just like you or me: they act like we do, speak like we do, and spend long parts of the day complaining about chronic lower back pain, just like we do. To all appearances they are just like us. It is *internally* that differences arise. Whereas there is "something it is like" for you and me when we taste liquorice or smell a lit cigarette, there is nothing it is like for the zombie, for zombies are beings that lack conscious experience (see Nagel 1974). And so even though zombies act as if they have all the same experiences we do, their complaints about lower back pain are not accompanied by the sharp pangs of pain that ours are.

Zombies first appeared on the philosophical scene in as a purported counterexample to physicalism. It was thought that if zombies were possible, then consciousness must be a non-physical addition to the world (Kirk 1974). According to this line of thought, if it is true that the physical world is closed, then the non-physical 'extra' would have to be epiphenomenal. Since then zombies have been employed in a number of different arguments, including those: in favour of functionalism, in opposition to functionalism, that challenge the evolutionary value of consciousness, and that raise worries about knowledge of other minds; but however they are employed, zombies serve as useful device for considering the nature of consciousness and our intuitions about it. Most recently David Chalmers has employed zombies in a role much like that for which they were first employed, arguing for the non-reductive supervenience of the mental on the physical on the grounds that zombies are possible (Chalmers 1996).

To be clear, when we ask whether zombies are possible, we are rarely, if ever, concerned with their being *nomologically* possible. Most players in the debate concede that zombies are not nomologically possible. With the laws of nature fixed (or with the fixing of whatever ontological features substitute for laws), beings that are largely like us will enjoy similar conscious experiences. What matters is the *bare logical possibility* of zombies. "[T]he question is not whether it is plausible that zombies could exist in our world, or even whether the idea of a zombie replica is a natural one; the question is whether the notion of a zombie is conceptually coherent" (Chalmers 1996: 96).

Despite typically being lumped together, philosophical zombies are not all alike. In fact, philosophical zombies tend to come in two main varieties, with the difference in characterisation depending largely on the sort of example or argument for which the possibility of zombies is utilised. What I shall call 'Type-1 Zombies' are those most important for objections to physicalism. A type-1 zombie is a perfect (or near perfect) *physical* duplicate of her non-zombie counterpart. She is composed of just those same particles as her counterpart, and has all the same low level physical properties. Physically speaking, she is a particle-for-particle and property-for-property doppelganger of her non-zombie counterpart. Where she differs is in her psychology: the zombie lacks the conscious experience of her non-zombie counterpart.

Type-1 Zombie: A being that is a (near) perfect particle-for-particle and property-for-property physical duplicate of a human being that is entirely lacking in conscious experience.

Type-1 zombies have been widely employed in the 'conceivability argument' against physicalism (see Stoljar 2001). If we understand physicalism as (roughly) the thesis that any two worlds identical in their physical respects must also be identical in their psychological respects, then it cannot be the case that there are (or could be) 'zombie worlds' where all the beings are perfect duplicates of their human counterparts but lack conscious experience. But, the argument proceeds, philosophical zombies are conceivable, and what is conceivable is possible. As this possibility is in conflict with the truth of physicalism, the conclusion of the conceivability argument is that physicalism must be false. As ought to be clear, the conceivability argument can only hope to succeed if the zombies in question are perfect (or near perfect) physical duplicates (that is, type-1 zombies); it is no threat to physicalism that worlds that differ physically from ours might also differ psychologically. (A near perfect duplicate world would suffice just in case that near duplicate world was populated by beings with central nervous systems very much like ours and was otherwise largely indistinguishable from the actual world (see Kirk 2005)).

Whereas a type-1 zombie is a perfect physical duplicate of its non-zombie counterpart, a type-2 zombie is a (near) perfect *functional* duplicate of its non-zombie counterpart. In terms of its behaviours and capacities, a type-2 zombie is indistinguishable from the real mccoy. The difference, as with all zombies, is an internal one. Despite being functional twins, one lacks the conscious experiences of the other. (Though it might be argued that type-1 zombies are just a very specific version of type-2 zombies—ones with a highly prescribed and restricted set of properties—they are so specific, and their role so particular, that they are worth distinguishing nonetheless.)

Type-2 Zombie: A being that is a (near) perfect functional duplicate of a human being that is entirely lacking in conscious experience.

The possibility of type-2 zombies has a number of potential philosophical roles. For starters, it might be argued that the possibility of type-2 zombies poses a threat to functionalist theories of the mental. If mental states are just functional states (as many forms of functionalism contend), and the zombie and its twin have the same functional states but differ in their qualitative mental states, then their difference in qualitative state cannot be identical with any functional state, and so functionalism cannot be true (see Shoemaker 1975 and Block 1980). A second issue raised by the possibility of type-2 zombies concerns the evolutionary significance of consciousness. Under the assumption that zombies are in fact possible, consciousness is no longer metaphysically or logically necessary. In that case we can ask why consciousness arose in the actual world, what purpose it serves, and why it continues to be selected for (assuming it has been). What adaptive significance could conscious experience have for otherwise functionally identical beings? (Polger and Flanagan 1995). Finally the possibility of type-2 zombies raises worries about the status of other minds. If functional similarity can mask the absence of phenomenal consciousness, then what I recognise as pain might apply only to me. Perhaps the actual world is a zombie world (myself excluded), complete with functional

doppelgangers, and even zombie monkeys and bats, who, contrary to much popular thought, have nothing it is like to be them.

The philosophical importance of the possibility of zombies cannot be overstated. I have provided a number of problems they give rise to, or can be applied to, but their general role in thought experiments in the philosophy of mind is much wider. The possibility—and likewise the impossibility—of philosophical zombies brings into focus our intuitions about consciousness, physicalism, properties, functions, and qualities. It is an important conclusion then when Heil claims that zombies are impossible.

HEIL ON ZOMBIES

I should start by noting that Heil does not distinguish between the two types of zombie, treating philosophical zombies as a single group. And though Heil is not alone—most theorists treat philosophical zombies as if they all answered to a single well-defined concept—it is clear that the various roles zombies play in philosophical argument and thought experiments in the literature (not to mention whatever uses might yet still be devised) cannot be satisfied by a single zombie concept, and it is ultimately a mistake to treat them as if they do. Unfortunately Heil falls victim to this error, made all the more significant as Heil's argument against the possibility of zombies is only successful when applied to type-1 zombies.

Heil argues that in order for zombies to be possible one needs an ontology that separates the dispositional (or functional as some will say) from the qualitative. (The 'separation' here is of a logical sort; it might be the case that the two are *contingently* connected, but they will not be *necessarily* connected.) This typically comes in the form of a distinction between properties: there are various qualitative properties, or 'qualities', and these are distinguished from the dispositional or functional properties (Heil 2003: 245). It is only through the exploitation of this distinction that one can begin to speculate about having physical or functional similarity in the absence of qualitative similarity. This gets only worse, Heil contends, when it is combined with a 'levelled' ontology. A 'levelled' ontology is one that permits "levels of being": ontological strata whereby one sort of property (here the qualitative properties) is fundamental, and supports the 'higher level' properties (here the dispositional-cum-functional properties) when something is added to the former (Heil 2003: 244). It is not enough that the fundamental properties take on some arrangement (however complex), new laws of nature must also be added. It is generally part of such 'levelled' ontologies that the upper level properties are 'multiply realizable' (that is, many different configurations of the fundamental properties are capable of supporting them), another ontological thesis Heil argues should be rejected.

Ontological stratification is a defining characteristic of the neo-Humean ontology known as 'humean supervenience'. According to defenders of humean supervenience, the world is an array of strictly qualitative local matters of fact on which all other facts supervene (Lewis 1986). The dispositional facts are distinct—they supervene on the qualitative—providing ample logical space between the qualitative and the dispositional for the possibility of creatures that exactly resemble one another dispositionally, but nevertheless differ qualitatively. In other words, a neo-Humean world is the perfect breeding ground for philosophical zombies. Just to be clear, the most common Humean stratified ontology puts qualities at the most fundamental level, but these are not qualities of conscious experience, or 'qualia'. The structure is typically three-tiered: the fundamental level is made up of inert

physical properties that are qualitative—often properties of shape, mass, spin, and so on; the second level is a functional level—where the multiply realised functional properties can be supported in a variety of ways by the first level; the third level is where consciousness and the qualities of conscious experience reside—these too can be supported in a number of different ways. Though not essential, it is often part of the story that the laws that dictate the actions of the fundamental entities and cause the second tier to arise from the first are not sufficient for the production of the third tier; it takes something more for that to occur (see Chalmers 1996).

Heil's arguments against 'levelled' ontologies take up much of the first third of the book. As our present interests concern whether or not zombies are possible within Heil's ontology, there is no need to rehearse his anti-level arguments here. It should suffice to note that Heil's preferred ontology is, in the relevant sense, entirely flat. The rejection of levelled ontologies leads into Heil's rejection of multiple realisability: without a levelled ontology there can be no upper level properties, hence there can be no upper level properties capable of support by multiple configurations of the fundamental properties. A flat ontology has no space for multiple realisability. According to Heil, levelled ontologies and multiple realisability are the products of a mistaken theory about the connection of word to world he calls "the picture theory," according to which ontology can be read off our language. As our languages have many different names for the same thing (such as lump of clay and statue, or mental and physical), the mistaken theory tells us we must find a place for the various properties corresponding to each, giving rise to ontological strata. From the rejection of the picture theory comes the rejection of ontological strata. In its place Heil proposes a flat ontology—just one level of properties—which serve as the truthmakers for a huge range of different facts and predicates. The statue is not distinct from the clay—facts about it are made true by the same particles and properties that make true claims about the clay—avoiding the need for ontological strata. (Heil also recognises the role various concepts play in our thinking about statues and clay, but they are not something we need bother with here.)

Rejecting levelled ontologies is Heil's first move against the possibility of zombies. Without a two-tiered (or three-tiered, or multi-tiered) ontology, one can no longer speak with ease about the possible absence of upper level properties. That a distinct layer within a stratified ontology might exist without the others seems perfectly clear, after all, the conception of distinctness is built into the ontology itself. It is with similar ease that one might begin to imagine that each lower tier could exist—just the way it is—without the next tier up resting on it. Once you have got that far, the thought that there might be physical beings with particles and physical properties that are fundamental-level or functional-level duplicates of humans but that lack the uppermost conscious level takes barely any work at all. In fact, the thought is so natural (and levelled ontologies of this sort so popular), that many opponents of zombies have conceded this much, and try instead to argue that the *conceivability* of zombies does not make for a genuine possibility (for example, see Hill 1997). (Though I myself have worries about the move from conceivability to possibility more generally, I have a hard time seeing how anyone who endorses a levelled ontology like the one described can deny that zombies are possible.) However, in the absence of a levelled ontology, this ease of reasoning is lost. That is not to say that zombies are not still conceivable, nor that they are no longer possible, but one very quick and easy route to the possibility of zombies has been blocked.

The rejection of levelled ontologies is Heil's first attack on the possibility of zombies, but his main argument is borne out of the ontology he develops in the core of his book. That ontology is a 'flat' ontology centred on properties whose nature is

both qualitative *and* dispositional. According to Heil, it is not the case that there is a fundamental qualitative level and a distinct functional level with distinct properties in either, there is just one level, and it has both. But not only is the ontological landscape flat, the dispositional and the qualitative are both within each property. In fact, they are *identical*. There are no distinct dispositional and qualitative properties, nor are the dispositionality and qualitativity aspects of a property—they are one and the same thing. Or, more correctly, 'dispositional' and 'qualitative' are two ways of describing the same property.

Ontologies that separate the dispositional (functional) from the qualitative by making their connection at best contingent (like those defended by so many neo-Humeans) are far better suited to the possibility of zombies than those that do not; zombies simply prefer the kinds of brains Humeans think we have. Add levels to such an ontology, and it gets even easier to see how the possibility of zombies might arise. But Heil's ontology is nothing like this—the qualitative and the dispositional *cannot* come apart. There *cannot* be a creature that is property-for-property and particle-for-particle identical with you or me that has all the dispositionalities we do but lacks the qualitative aspects. Nor does it make any difference if we are speaking of the qualities of physical particles or the qualities of conscious experience: where we find qualities we find dispositions, and where we find dispositions we find qualities, regardless of the type of qualities we are talking about. The two go hand in hand: anything with all the same physical properties as a normal human has *everything* in common with a normal human, conscious experience included. "Agents or systems possessing identical powers must be qualitatively identical as well" (Heil 2003: 247). In other words, according to Heil, because the qualitative and the dispositional are necessarily connected, zombies are impossible.

As I have said, I have doubts about Heil's conclusion. Once we take seriously that there are two types of zombie, I think Heil has every right to claim that type-1 zombies are impossible, but his conclusion cannot be extended to type-2 zombies as well. In fact, though I agree with Heil's claim that within his ontology perfect duplicates could not differ qualitatively, I think it is entirely possible that two agents or systems might be *functionally* identical but qualitatively dissimilar. I will get to that argument shortly; for now I want to quickly rehearse the problem that Heil raises for type-1 zombies and what this means for those arguments that rely on their possibility.

A type-1 zombie, recall, is a perfect (or near perfect) physical duplicate of her non-zombie counterpart: she is composed of just those same particles as her counterpart, and has all the same low level physical properties. Imagine such a being within Heil's ontology. As properties have a kind of double-life, property-for-property identity carries with it dispositional *and* qualitative identity. The necessary tie between the two rules out the logical space in which they could be separated. Because of the very specific way type-1 zombies are characterised, a property-for-property functional duplicate of a human is necessarily another human, conscious experience in tact. Hence, Heil's ontology renders type-1 zombies impossible.

The philosophical upshot of Heil's rejection of zombies is that the conceivability argument against physicalism cannot go through. The conceivability argument requires as a key premise the possibility of type-1 zombies; without this premise the conclusion cannot be reached. It should be noted, however, that the failure of the conceivability argument in no way constitutes a defence of physicalism. All the physicalist can claim is that one potential argument against physicalism has been countered—the threat of zombies has been defanged. But there is nothing in Heil's ontology that forces a physicalist reading at all. Due to Heil's dual-natured

properties, a property-for-property duplicate is both functionally and qualitatively identical, but these dual-natured properties need not be physical. It might turn out that the only way to have mental capacities is to have mental properties, and that these carry with them mental qualities. The dual-nature of properties does nothing to rule out a division of properties into mental properties (with mental dispositions and mental qualities) and physical properties (with physical dispositions and physical qualities). Perhaps humans are a happy mix of the two. This is not to revert to a levelled ontology, as the properties in question would all reside at the same level, it merely takes seriously the thought that the fundamental level has a mixture of properties. (Despite Heil's ontology being open to such a reading, I suspect his preference is to think of properties as all being of one type. In fact, just as Heil suggests we read the identity of the dispositional and qualitative as really just being two ways to describe one and the same property, I suspect he would recommend that we think of 'mental' and 'physical' as two names for properties, where the distinction is lacking in ontological force.)

So much for type-1 zombies. But what of type-2 zombies? I suspect Heil would claim—especially given the quote above—that function and quality go together, so it is of little moment whether we are considering beings that are (nearly) property-for-property identical or beings that are (nearly) functionally identical. In other words, I suspect Heil would claim that it makes no difference if we are dealing with type-1 zombies or type-2 zombies; but I would have to disagree with him.

ZOMBIES RESURRECTED

Despite Heil's claims to the contrary, zombies remain a live possibility—even within Heil's framework. What I will argue is that Heil's ontology allows for functionally identical things that can nevertheless differ qualitatively. The reason Heil can counter type-1 zombies but not type-2 zombies is that within Heil's ontology property identity is sufficient, but not necessary, for functional identity. This applies most obviously to objects far less complex than human beings, but once this is recognised it is clear that there is sufficient logical space for beings that are functional duplicates of humans but that differ qualitatively or lack conscious qualities altogether. That is, Heil's ontology provides sufficient logical space for the bare logical possibility of type-2 zombies, enough for the possibility of zombies to be alive and well. What needs to be shown is that property identity is not necessary for functional identity. (As an aside, Heil's preference for trope theory means that strictly speaking property identity is out of the question; those who are worried should substitute 'exactly similar' for identical.)

My argument starts with Heil's notion of 'overall dispositional make-up' (Heil, 2003: 93). An important part of Heil's account of dispositionality is that *all* the properties of an object contribute to the overall set of dispositions and qualities an object possesses. For any property *P*, if *P* is had by some object *a*, then *P* contributes to the 'overall dispositional make-up' of *a*. (As Heil takes all properties to be both dispositional and qualitative, *P* will contribute to both the overall dispositionality of *a*, as well as the overall qualitativity of *a*: our concern for now is only with the former.) The key feature here is that of *contribution*: the dispositions that give *P* its identity (that is, whatever set of dispositions serves to characterise *P*) need not be the dispositions had by *a*. For example, let us assume that one of the dispositions that characterises *P* is water solubility. It does not follow from *a*'s having *P* that *a* will be water soluble. Borrowing an example from Heil, it might be the case that a certain sugar cube is soluble in water because it has the property *P*, but if we encase that

sugar cube in Lucite, we have an object *a* (the cube-encased-in-Lucite) that is in possession of *P*, but is not itself soluble in water. The cube-encased-in-Lucite's possessing *P* will *contribute* to its set of overall dispositions, but they will not be in direct correspondence with the dispositions that characterise *P*.

As a second example, consider what happens when *P* is a property like being 'knife-shaped'. In combination with properties that confer the appropriate degree of hardness—such as 'steeliness'—*P* imbues its possessor with the disposition to cut. However, replace 'steeliness' with something more like a buttery consistency and the resulting buttery object has no such disposition (Shoemaker, 1980). The contribution of many properties to the set of overall dispositions of an object is what George Molnar has dubbed 'polygeny' (Molnar 2003: 194). It is because of the polygenic nature of properties that we find an isomorphism between the properties possessed by an object and the set of dispositions it has.

To help make things clearer, let us say that a disposition is 'exemplified' by an object when that object is capable of manifesting the disposition in question. Hence, with regards to water solubility and the cube-encased-in-Lucite, the cube-encased-in-Lucite does not *exemplify* the disposition water solubility. In contrast, the (unencased) sugar cube *does exemplify* water solubility. To avoid possible confusion, note that 'exemplification' as I am using it is distinct from 'manifests' or 'manifestation'. For an object to *exemplify* a disposition is for it to have a disposition such that that disposition is 'ready to go' were the correct conditions to arise; to *manifest* a disposition is for those conditions to arise and the disposition in question to produce its prescribed effect. There are soluble and non-soluble substances (exemplification), and then there are soluble substances that go into solution, and those that do not (manifestation). (To avoid any early objections that might arise, let me point out that the isomorphism does not make for a new level of properties. The exemplified dispositions are capacities of the object that it has in virtue of just the one level of properties; the ontology remains flat.)

The point of thinking in terms of 'overall dispositional make-up' is to recognise that there is no transparent path from (1) the properties an object possesses to (2) the dispositions it exemplifies. Metaphysically speaking there is bound to be an incredibly complex set of recipes that take us from (1) to (2), but we are epistemically in the dark with regards to most of those recipes, and might always be. For starters, we are only able to guess at what the real properties are, and are largely clueless about how many different property types there might be. Our knowledge has come a long way, but our knowledge of what the real properties are is still highly inadequate. Moreover, even with a greater knowledge of properties than we currently possess, the nature of polygeny provides an additional hurdle to our knowledge.

In the case of the cube-encased-in-Lucite we see that the properties of the Lucite *inhibit* the dispositions that would otherwise be exemplified by the sugar cube. But this is just one of the potential polygenic interactions. Various combinations of properties can: (i) *inhibit*—block or reduce the exemplification of a disposition, (ii) *enhance*—increase the range of scenarios that a disposition could be manifested (think of super fragility), (iii) *combine*—some combinations might give rise to novel and surprising dispositions in a synergistic manner, (iv) *ignore*—certain combinations do nothing to inhibit or enhance. Lucite just has whatever properties Lucite happens to have, but when combined with the sugar cube the properties of each combine, inhibit, and so on, to produce the set of dispositions exemplified by the cube-encased-in-Lucite. The change we have noted (the lack of solubility) is a clear case

of inhibition by the new properties brought in by the Lucite, but others are bound to be influenced in other ways as well.

So far I have shown that the polygeny of properties means that by varying the properties we can have all sorts of different dispositions exemplified by an object. We have a property-to-dispositionality isomorphism. But in order to argue that property identity is not necessary for functional identity, it must be shown that similar or identical functionality can be achieved via non-identical sets of properties. In other words, what has yet to be seen is whether we can 'fake out' certain things by providing *different paths to the same exemplified dispositions*.

It only takes the briefest look at the world to recognise that different properties can support identical functions: my ceramic vase is fragile, as is my crystal stemware, my glass sculpture, and the plastic cases that hold my compact discs. Functional similarity is all around us, but the properties possessed by the parts that make up baked clay, crystal, glass, and plastic, all differ greatly. We do this all the time: we recognise in various objects similar exemplified dispositions, without thinking that (or it being the case that) those objects share the same properties. We tend, pre-theoretically, to group objects together in terms of these dispositions (fragile things, smelly things, green things, flammable things, etcetera). As Heil argues, it would be a mistake to assume that what all these objects have in common is a *dispositional property* (and conclude from that, like Jackson, Pargetter and Prior do that dispositional properties are second order properties that supervene on first order categorical properties (Jackson, Prior and Pargetter: 1982, Prior 1985, Jackson 1998)). That is not the point I am making. What I am pointing to is the raw empirical data that Jackson and company make use of: we group otherwise disparate objects together in virtue of their having (and manifesting) similar dispositions. But we do not take the objects to be similarly propertied otherwise (and again, it is a mistake to see this dispositional similarity as requiring, or evidence of, property similarity).

For those having trouble, or those reluctant to agree, consider a case of two objects whose functional similarity we might, *prima facie*, take to require similar properties. The case I have in mind is that of the water solubility of salt and sugar. This is what we might think of as a 'hard case' of property/dispositional disconnect, as the two are quite similar, in contrast with the clay/glass fragility case above. Must of us are quite familiar with salt and sugar, and though they differ in taste, they are both water soluble, and it is far from obvious that this should arise from a difference in properties. (Or at least it is far from obvious for those who have spent little time thinking about it; others might suspect that the different tastes betray the facts about the properties, and they would be right.) But, as it happens, the water solubility of salt depends on quite different properties than that of sugar. To explain how this is so, allow me to quote at length:

> Both salt and sugar are soluble in water, but this similarity is coincidental, like the fact… that Davy Crockett and Franz Kafka shared a taste for raw dough. The crystal lattice of sodium chloride is held together by very strong electrostatic attractions between alternating positively charged (sodium) and negatively charged (chlorine) ions. In water, crystalline sodium chloride dissolves into individual sodium and chloride ions because the attraction between Na^+ and Cl^- is greatly exceeded by the electrostatic attraction between Na^+ and the partially negatively charged oxygen atom of a water molecule, and between Cl^- and

> one of the partially positively charged hydrogen atoms of a water molecule. Water molecules are therefore able to insert themselves between these ions; the energy needed to separate an Na^+ from a Cl^- is more than provided by the energy released when bonds form between water molecules and these ions. A sugar cube, in contrast, is not an ionic crystal. It dissolves in water because of the electrostatic attraction between the hydrogen atom in the sugar's hydroxyl group, which has a partial positive charge, and a water molecule's oxygen atom. The redistribution of electronic orbitals that results, a "hydrogen bond," is energetically favorable, so by forming hydrogen bonds, water molecules can insert themselves between neighbouring molecules of the sugar cube, and the cube dissociates. Hydrogen bonds do not form when salt dissolves (Lange 1994: 115-6).

The long and the short of it is that we can have two objects *a* and *b* that differ in terms of their properties, but exemplify the same disposition. This begins to drive a wedge between functional identity and property identity. But to get from here to there it must be possible to have two objects *a* and *b* such that they differ in terms of their properties, but that nevertheless exemplify *many or most* of the same dispositions. Making that step requires we focus on our lack of *a posteriori* knowledge of what the actual properties are.

If the polygeny of properties allows that we can have two objects that are similar in some dispositional respect but differ in their properties, then it seems reasonable to assume that with the right combination of properties we could get greater and greater dispositional similarity. There is no conceptual barrier to this possibility; it seems, *a priori*, to be a perfectly good possibility, even if only the barest of logical possibilities. The only potential barrier is an *a posteriori* one: the actual properties might let us down. Assume, for instance, that properties only come in a handful of varieties. If that were the case, then the odds of being able to get differing combinations that were capable of producing a large degree of dispositional similarity would be very low indeed. That is not to say that it would be impossible, as the lack of variety could perhaps be compensated for by number (three *F*'s and fourteen *G* properties might make for very different exemplified dispositions than three and thirteen), but it would be less plausible. But however implausible it may be, it is not impossible, and it gets more and more likely as the variety of properties increases. Furthermore, no one is in anything close to a position in which they could claim to have even the roughest idea about what exactly the properties are. To insist that we lack the variety of properties that would make general dispositional similarity plausible is to claim to have knowledge about what properties there are that no one can sensibly have (for now at least). And even if someone did know more about the properties we find around here than I think is the case, what about properties throughout the universe, the likes of which we might never encounter? Even if we limit the scope of properties to just those that appear at some time and place in our universe (so called 'immanent' properties (see Armstrong 1978)), the epistemic possibilities are far too great for anyone to confidently reject the argument above. The scope of epistemic possibility for what properties there are is too large for anyone to claim that the actual properties do not allow for the logical possibility of dispositional duplicates with dissimilar properties.

So it appears that within Heil's ontological framework there exists at least the bare logical possibility of dispositionally identical (or near identical) beings that

differ in their properties. (At the very least, if this is in fact not possible, no one in their right mind could presently claim that this is the case—and that ought to suffice.) But we have not yet got type-2 zombies. In order to have type-2 zombies the dispositionally identical beings must be qualitatively distinct.

Anyone who has followed the argument thus far should have no problem seeing that beings or objects with different properties can be qualitatively distinct. Just as the properties contribute to the overall *dispositional* make-up of an object, they also contribute to the overall *qualitative* make-up of an object. Properties have a dispositional and qualitative dual-nature; the exemplified qualities are as much a product of polygenic combination of the properties as the exemplified dispositions are. Change the properties, and you change the exemplified qualities. Moreover, there is no conceptual reason why different sets of properties would fail to produce different exemplified qualities; and hence no reason why they could not produce exemplified qualities such that there are no exemplified qualities of conscious experience—after all, do we not think this is the case for nearly every being on the planet other than us? Now it might happen, and is surely logically possible, that different properties will produce the same or similar exemplified qualities. This is nothing more than the argument I produced above as applied to qualities. But the bare logical possibility of qualitative similarity without property similarity in no way implies that two beings with different properties that are dispositionally similar will also be qualitatively similar. This could occur—it is logically possible—but it would be nothing more that a rare case amongst what are otherwise qualitatively dissimilar beings.

So there you have it: within Heil's flat ontology of dual-natured properties, there is logical space enough for the possibility of beings that are functionally identical to us, but that lack conscious experience. Between them and us is a huge continuum of possible beings that resemble us functionally and differ to a greater or lesser extent qualitatively. There are the type-2 zombies that lack consciousness altogether, but there are those who are otherwise like us but cannot feel pain, those for whom green looks like what I see when I see red, and those for whom music produces sensations like the smell of burning toast. Once the dispositional is cleaved from the qualitative, the space of possibilities opens right up. Type-2 zombies are alive and well.

CONCLUDING REMARKS

I have argued that when it comes to philosophical zombies, Heil is well covered for one type, but in trouble with the other. But it may turn out that Heil is slightly worse off than I take him to be. In distinguishing the two types of zombies, I suggested that type-1 zombies might just be a highly specific version of type-2 zombies. In as much as that is correct, the possibility of zombies within Heil's ontology increases. Additionally, my interpretation of 'property-for-property' identity was very much Heil-friendly, but that phrase is really quite ambiguous. It is clear that what the neo-Humeans mean by 'property' is not what Heil does, and perhaps the interpretation the neo-Humeans have in mind has much more to do with functionality than anything else. In that case, the type-1 zombies start to look more and more like type-2 zombies, and Heil is in a worse position than I take him to be. That said, I think Heil's ontology is entirely on the right track, and if it allows for zombies, so much the better for zombies.

Regardless of how well Heil succeeds in fighting off zombies, the metaphysical approach he takes is to be admired. Even if zombies remain a live

possibility, it is clear that treating the problem as a problem of applied ontology helps clarify the issue and avoids many dead-ends and blind alleys. Ontological thinking cuts to the heart of the issue, and it is on ontological grounds the debate ought to take place. Heil's ontology and his ontological approach to problem solving both deserve a great deal of attention, even if zombies are nearly as happy with Heilian brains as they are with Humean ones.

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