

## *The dimensions of realization: a critique of the Standard view*

CARL GILLETT

Realization is at the heart of a range of debates in contemporary analytic philosophy, but, oddly, little attention has been paid to the precise metaphysics of this relation. Certainly, from earlier debates, such as that over functionalism, there was a robust, if loose, understanding of realization as a non-causal determination relation holding between properties that, although not identical, were in some sense the same. The key element of

this ‘ur-notion’ was that the realizing property instance ‘played the causal role’ of the realized property instance (reference was also often made to ‘tokens’ rather than instances), although not vice versa.<sup>1</sup>

Closer metaphysical attention has recently been focused on realization, for example by Jaegwon Kim (1998) and Sydney Shoemaker (2001), amongst others. Though they ultimately put them to different uses, the metaphysical accounts of Kim and Shoemaker share the same fundamental features in what is emerging as a standard view of the metaphysics of realization. I shall refer to this budding consensus as the ‘Standard’ or also the ‘Flat’ view, since it assumes cases of realization vary in only one ontological dimension, involving different properties, but not distinct powers or individuals.

My goal here will be to assess the Standard view by reflecting upon a common type of example drawn from the sciences. I will argue that such cases show there are many instances of realization involving not just different properties, but also distinct individuals and powers. My conclusion will be that the Standard view consequently fails as an adequate account of realization and in its place I will offer an alternative, looking back to earlier views, that allows for all the dimensions that may be involved in cases of realization.

Given the central part causal roles play in the ur-notion, proponents of the Flat account unsurprisingly use a ‘causal theory’ under which a property is individuated by the powers it contributes to individuals.<sup>2</sup> More importantly, the Standard view comprises two interconnected claims. The first concerns the individuals in which realizer/realized properties are instantiated and is articulated by Kim when he states, ‘It is evident that a *second-order property and its realizers are at the same level ... they are properties of the very same objects*’ (Kim 1998: 82. Original emphasis here and throughout.) Shoemaker (1999: 297) expresses a similar commitment which I will frame thus:

- (I) A property instance X realizes a property instance Y *only if* X and Y are instantiated in the same individual.

<sup>1</sup> For examples of such early accounts of realization across a number of years, see, for example, Putnam 1967, Fodor 1968, Boyd 1981 and Lycan 1987, amongst many others. It should be marked that there are prominent exceptions to the lack of metaphysical scrutiny of realization such as Poland 1994.

<sup>2</sup> Examples of such causal theories are found in Harré and Madden 1975 and Shoemaker 1980. I shall use the latter in my discussion. To cover all proponents of the Flat account I shall take this commitment to be the relatively weak view that in the actual world all instances of a property contribute the same powers under the same conditions.

The second feature distinctive of the Flat view, concerning the causal powers of realized/realizer properties, is summarized by Shoemaker as follows:

... property X realizes property Y just in case the conditional powers bestowed by Y are a subset of the conditional powers bestowed by X ... (Shoemaker 2001: 78)

Again, Kim endorses a similar claim about powers, in his ‘causal inheritance principle’ (Kim 1998: 54), which we may summarize in this thesis:

(II) A property instance X realizes a property instance Y *only if* the causal powers individuated of the instance of Y match causal powers contributed by the instance of X (and where X may contribute powers not individuated of Y).

Through (I) and (II), the Flat view of realization earns its name by taking realized and realizer properties to share both the individual in which they are instantiated and at least some of the causal powers contributed to this individual. This view thus conflicts with some previous accounts of realization, such as Lycan 1987, that have taken chains of realization relations to hold between properties instantiated in distinct individuals. The Standard account obviously makes no room for any such possibility. (Note that this account is also usually framed as being committed to ‘the’ realizer property, i.e. a single realizer.)

I shall take any account of realization that incorporates (I) and (II) to be an example of the Standard view. Such accounts may obviously differ in other respects, based on further conditions conjoined with these necessary conditions, but here I want to evaluate the underlying position.<sup>3</sup> In order to do this I want to consider an example with a structure common to many cases drawn from the sciences. The example in question is that of a cut diamond,  $s^*$ , which has the property of being extremely hard, H. Let us assume  $s^*$  has as constituents carbon atoms  $s_1$ – $s_n$ , where particular carbon atoms have specific properties/relations including those of being bonded, B1, B2, B3 ... etc., and aligned, A1, A2, A3 ... etc., with other carbon atoms in a very particular way. (Obviously not every carbon atom has each of these relations, but I spare the reader the details since these will be irrelevant for my purposes.) Amongst the causal powers of the

<sup>3</sup> A feature that might also be argued to be necessary to the Standard view is:

(\*) A property instance X realizes a property instance Y *only if* X is an instance of a structural property (as defined by Armstrong (1978)).

However, I argue below that the addition of this condition does not ameliorate the problems raised for any view of realization based upon (I) and (II). If the reader wishes to treat the Flat view as one incorporating (I), (II) *and* (\*), then I invite them to do so.

diamond's hardness is that, call it 'C\*', of causing scratches in glass. Whilst amongst the causal powers of the bonds and relations of alignment of any particular carbon atom is the power, C<sup>D</sup>, of causing a contiguous carbon atom to remain in a small range of its present position in certain directions, relative to other carbon atoms, even under high temperatures and forces.

The sciences have given us a very precise and detailed account of how the hardness of the diamond results from the properties/relations of the individual carbon atoms. The very particular relations of alignment and bonding of the carbon atoms is such that they form a lattice-like structure in which the individual atoms have the characteristic power of causing other atoms to remain in a relatively constrained location even under high temperatures and forces. As a result, the diamond is extremely hard, since it is difficult to change the relative positions of its constituents.

In this case it is clear that H is not identical to any of the particular properties/relations of any individual carbon atom, for H is instantiated in the diamond whilst particular relations of bonding and alignment are instantiated in some carbon atom. Furthermore, H contributes very different powers to s\* from the powers contributed by the relations of alignment and bonding to the carbon atoms. For example, the former contributes the power to cut glass, whilst the latter contribute the power to cause a contiguous carbon atom to remain in a tight relative spatial range. Given these differences, H cannot be identical to any of the particular properties/relations of the carbon atoms. But the sciences have illuminated how the causal powers of the properties/relations of the carbon atoms nonetheless result in the causal powers of hardness in the diamond, but not vice versa. The properties/relations of the carbon atoms apparently 'play the causal role' of H, but not vice versa, and, consequently, it is plausible that H is *realized* by the relations/properties of the carbon atoms.<sup>4</sup> Shortly, I will examine more carefully what this role-playing consists in, but first we need to consider what the Standard account of realization will say about this type of case.

It should be clear that proponents of the Standard view, such as Kim and Shoemaker, must deny that the alignment and bonding of particular carbon atoms realizes the hardness of the diamond. For neither (I) nor (II) is true in this case, since the properties/relations of the carbon atoms are instantiated in different individuals, and contribute distinct causal powers, from the properties of the diamond. The Flat view thus fails to cover a case of

<sup>4</sup> Some may worry that there is an identity between 'hardness-in-diamonds' and a structural property involving carbon atoms. Though I would dispute this claim, below I will show that even granting this point H is *nonetheless* a realized property, since such structural properties are themselves realized. My critical arguments thus hold even if there is such an identity. I continue with this example, since the general worry arises in all cases.

realization and it also erroneously classes the vast swathe of cases drawn from the sciences that are similar to this one. (Note also that the example shows that for some realized property instance we often have many properties/relations that are its *realizers* in the plural.)

No doubt many readers are at this point straining to offer a common response to these concerns. The response goes roughly like this: You have mischaracterized the Standard view, for it takes ‘structural’ properties, in the sense of Armstrong 1978, to be the realizers. Thus in the case of  $s^*$ , the Standard view will take a highly complex structure of carbon atoms, and their properties and relations, to be the realizer of H. Let us call this structural property instance ‘COMBO’ to mark that it is a vast array of interrelated entities. If a structural property such as COMBO is taken as the putative realizer of H, concludes the response, it is no longer implausible that COMBO realizes H in a way compatible with the Flat account.

The metaphysics of structural properties appears more difficult to articulate than the defender of this response supposes, but fortunately we need not delve into these details. Instead, we can quickly show that the response simply relocates the problems facing the Flat view without ameliorating them. Physics presently tells us that the most fundamental known individuals are quarks and leptons, and that the properties of such particles, such as spin, charm, charge etc., are presently the best candidates for fundamental properties. An obvious question concerns the relation between structural properties, such as COMBO, and these fundamental microphysical properties/relations.<sup>5</sup> Once again, it appears that COMBO is not identical to any of these specific microphysical properties/relations of fundamental particles. For under the proposed response, the microphysical properties/relations are instantiated in particular microphysical individuals such as quarks, whilst COMBO is instantiated in the diamond. And there can also be no identity given the difference in the powers contributed by such microphysical properties/relations and COMBO. Although not identical, the sciences again provide evidence that makes it plausible that COMBO is not wholly distinct from such fundamental microphysical properties/relations either. Instead, it appears that such ontologically fundamental properties/relations *realize* structural properties such as COMBO. Given the differences in individuals and powers already noted, the Flat view again cannot class these cases as involving realization. Far from being ameliorative, structural properties

<sup>5</sup> Another question concerns the relation between COMBO (if there is any such property) and the properties/relations of the carbon atoms. The reasons outlined in the text suggest that this relation is plausibly also one of realization.

therefore provide further cases of realization that the Standard account fails to count as such.<sup>6</sup>

It is illuminating to consider a possible diagnosis of why the Standard view has been attractive to philosophers, since this will be helpful in crafting a more adequate alternative. One explanation is that proponents of the Flat account have taken a quite literal view of a realizer X ‘playing the causal role’ of a realized instance Y, thus assuming X must contribute the very same powers as Y. Such literalism about role-playing leaves one committed to (II). But the very nature of the instantiation of a property in an individual is that this property instance contributes powers to just this individual. Consequently, given (II)’s claim that realized and realizer properties coincide in the powers they contribute, one must conclude that realizer and realized instances are instantiated in the same individual. Thus one is also led to accept (I).

Unfortunately, we have already seen that the literal form is not the only way a property, or properties, can ‘play the causal role’ of a realized property. In the case of the diamond and the carbon atoms, the sciences quite clearly show us that the causal power  $C^*$ , of cutting glass, is had by  $s^*$  as a result of the causal powers, such as  $C^D$ , contributed by the properties/relations of  $s1-sn$  to these carbon atoms. But none of the relations of bonding or alignment of the carbon atoms, for example, actually *contributes*  $C^*$  to  $s^*$ , for these relations are instantiated in the carbon atoms and not  $s^*$ . Instead, as we earlier noted, the lattice-like structure produced by the relations of bonding and alignment of the carbon atoms makes these constituents difficult to change in their relative positions and this results in the hardness of the diamond. The diamond  $s^*$  thus has  $C^*$  in virtue of the powers contributed by the relations of bonding and alignment, even though none of these relations themselves contributes the power  $C^*$ . The properties/relations of the diamond’s constituents thus ‘play the causal role’ of the realized property H in a wider sense, one *not* literally involving contributing H’s individuating causal powers to any individual.

A failure to comprehend this non-literal form of causal role-playing may well explain why the proponents of the Standard view never appreciated its inadequacy. However, once one sees the wider form that causal role-playing may take it appears that we can craft a more adequate definition

<sup>6</sup> This use of structural properties appears to be based upon the mistake that in earlier debates Lycan labelled ‘Two-Levelism’. The latter is an inability to appreciate the realized status of many of the properties that are themselves realizers based upon ‘the bipartite view of Nature [as] divided into two levels, roughly the physiochemical and the (supervenient) “functional” or higher-organizational ...’ (Lycan 1987: 38).

of realization looking back to earlier definitions.<sup>7</sup> Consider the following candidate:

Property/relation instance(s)  $F_1$ – $F_n$  realize an instance of a property  $G$ , in an individual  $s$ , *if and only if*  $s$  has powers that are individuated of an instance of  $G$  in virtue of the powers contributed by  $F_1$ – $F_n$  to  $s$  or  $s$ 's constituent(s), but not vice versa.<sup>8</sup>

Unsurprisingly the definition is complicated, but it covers the cases of realization upon which the Standard view focused, as well as those it overlooked. (It should also be marked that under this view we may have a number of realizers and not just 'the' realizer.) The definition allows, for example, that a property  $X$ , instantiated in individual  $s$ , can realize another property instance  $Y$ , also instantiated in  $s$ , by  $X$  contributing, amongst other powers, all the powers individuated of  $Y$ . In addition, the account also covers realization of the type rightly trumpeted by Lycan (1987) and others, and illuminated by our example, where properties/relations of constituents contribute powers in virtue of which a constituted individual has the distinct powers individuated of a realized property.<sup>9</sup>

To conclude, the Flat account fails to accommodate all the ontological dimensions involved in the cases of realization illuminated by the sciences.<sup>10</sup> Reflection upon such examples shows that we should abandon the

<sup>7</sup> It is no surprise that the definition has strong affinities with certain earlier views of realization, for example in Lycan 1987 and Poland 1994, since they also focused upon concrete cases drawn from the sciences. However, these earlier views eschew the causal theory of properties and hence differ from my definition in all the consequent respects.

<sup>8</sup> The definition is defended further in Gillett Unpublished-a. I should also mark my intentions in offering the definition. First, I offer it as an account of the notion of realization implicit in scientific theorizing, and not any folk concept. Second, I take realization to be a basic metaphysical notion whose nature is intimately bound up with a family of notions. In particular, I ultimately believe that realization and constitution are interdefined and I thus offer my definition of realization as a non-reductive, but I hope illuminating, account of its connections to other basic notions.

<sup>9</sup> It should not be thought these types of case are necessarily exhaustive. The definition also allows for examples where property instance  $X$  is instantiated in  $s$  and realizes an instance of property  $Y$  in  $s$ , but where  $X$  contributes none of the powers individuated of  $Y$ . For the powers contributed by  $X$  to  $s$  may still suffice for  $s$  to have powers individuated of  $Y$ .

<sup>10</sup> Unsurprisingly, the Flat view's problems lead to difficulties for the defences of causal efficacy recently based upon it. Gillett and Rives 2001 illuminates the problems with Kim's 1998 defence of the efficacy of 'micro-based' properties; and in Gillett Unpublished-a I provide a critique of Shoemaker's 2001 use of the Flat view to defend mental efficacy. (In my Unpublished-b I also argue that the failure to see that structural properties are themselves realized undermines recent resurrections of type-identity theories such as Jackson 1995.)

Standard metaphysical view of realization and the literal notion of causal role-playing upon which it is apparently based. Happily, however, adopting a wider understanding of causal role-playing also opens the way for a more adequate, dimensioned account of the metaphysics of realization.<sup>11</sup>

*Illinois Wesleyan University,  
Bloomington, IL 61701, USA  
cgillett@titan.iwu.edu*

### *References*

- Armstrong, D. 1978. *Universals and Scientific Realism*. Cambridge: Cambridge University Press.
- Boyd, R. 1981. Materialism without reductionism. In *Readings in Philosophy of Psychology: Vol. 2*, ed. N. Block. Cambridge MA: Harvard Univ. Press.
- Fodor, J. 1968. *Psychological Explanation*. New York: Random House.
- Gillett, C. Unpublished-a. Moving beyond the subset model of realization.
- Gillett, C. Unpublished-b. Identity does not protect mental efficacy.
- Gillett, C. and B. Rives. 2001. Does the argument from realization generalize? *Southern Journal of Philosophy* 39: 79–98.
- Harré, R. and E. Madden. 1975. *Causal Powers*. Oxford: Basil Blackwell.
- Jackson, F. 1995. Essentialism, mental properties and causation. *Proceedings of the Aristotelian Society* 73: 253–68.
- Kim, J. 1998. *Mind in a Physical World*. Cambridge, MA: MIT Press.
- Lycan, W. 1987. *Consciousness*. Cambridge, MA: MIT Press.
- Poland, J. 1994. *Physicalism*. Oxford: Clarendon Press.
- Putnam, H. 1967. Psychological predicates. In *Art, Mind and Religion*, ed. W. Capitan and D. Merrill. Pittsburgh: Pittsburgh University Press.
- Shoemaker, S. 1980. Causality and properties. In *Time and Cause*, ed. P. van Inwagen. Dordrecht: Reidel.
- Shoemaker, S. 1999. Self, body and coincidence. *Proceedings of the Aristotelian Society* Suppl. Vol. 73: 287–306.
- Shoemaker, S. 2001. Realization and mental causation. In *Physicalism and its Discontents*, ed. C. Gillett and B. Loewer. Cambridge: Cambridge University Press.

<sup>11</sup> Thanks to Brad Rives, Sven Walter, and belatedly to Craig Callender, for comments.