Studies in History and Philosophy of Science 54 (2015) 20–30

Contents lists available at ScienceDirect

Studies in History and Philosophy of Science

journal homepage: www.elsevier.com/locate/shpsa

The ontic conception of scientific explanation

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ARTICLE INFO

Article history:
Received 12 January 2013
Received in revised form
29 May 2015
Available online 3 August 2015

Keywords:
Causal explanation;
Filler terms;
Ontic conception;
Mechanistic explanation;
Mechanism;
Wesley Salmon

ABSTRACT

Wesley Salmon's version of the ontic conception of explanation is a main historical root of contemporary work on mechanistic explanation. This paper examines and critiques the philosophical merits of Salmon's version, and argues that his conception's most fundamental construct is either fundamentally obscure, or else reduces to a non-ontic conception of explanation. Either way, the ontic conception is a misconception.

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When citing this paper, please use the full journal title *Studies in History and Philosophy of Science*

1. The ontic conception

1.1. Two theses

The ontic conception of explanation has two equifundamental theses, from which the moniker *ontic* derives. The first is that explanations, ontically conceived, are entities that are located within reality among its other spatiotemporal parts. So a conception of explanation is a version of the ontic conception only if it takes explanations to be extant entities that subsist in re.[1] The second thesis is that explanations, ontically conceived, are non-representational. So rather than being, or being constituted by, so-called *explanatory texts* (e.g., sentences, diagrams, models, etc.) that represent aspects of phenomena to be explained, explanations are themselves the phenomena represented by texts.

Advocates have occasionally made this foundational platform of the ontic conception explicit. For instance, Stuart Glennan aptly summarized the first thesis by noting that in any ontic conception 'the locus of explanatory insight is 'in the objects" (2005: 448 fn. 5). Carl Craver, discarding the cautionary use of quotation, asserts the second: 'explanations are not texts; they are full-bodied things' (2007: 27). In turn, such claims straightforwardly derive from assorted remarks of the two originators of the ontic conception, Wesley Salmon and José Alberto Coffa. For example, in his sympathetic rehearsal of Coffa's conception, Salmon wrote: '[f]or Coffa, what explains an event is whatever produced it or brought it about [… t]he linguistic entities that are often called *explanations* are statements reporting on the actual explanation (1990a: 133; italics added).

Together, these two theses imply that the term *explanation* denotes a class of non-representational, mind-independent entities that are located within reality among its other extant spatiotemporal parts, and which scientists can discover, dissect, disrupt,

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[1] The phrase *in re* is synonymous with the phrases *located within being* or *in the matter of*. The preposition *in* takes the ablative case and has the possible meanings of *in*, *on*, *at* (space), or *place where*; *in accordance with*; or *within* (time). The nouns *rem* (singular) and *res* (plural) can have the meanings of terms like *thing*, *being*, or *matter*; *event*, *business*; *cause*; or *property*. And they can be prepositioned adjectively (much as in *de facto heir*, *de dicto modality*, or *per diem rates*), since Latin has no participles of the infinitive *to be*. While *de* likewise takes the ablative, it has meanings too connotative of intentionality—*of* or *about*; *regarding* or *with reference to*; *down from*—which advocates of the ontic conception presumably desire to avoid.

http://dx.doi.org/10.1016/j.shpsa.2015.06.001
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depict, and describe—but, ironically, not explain. A second implication of these two theses is that the very term *scientific explanation* is an oxymoron. Because science is a thoroughly epistemic endeavor shot through with human representation, real explanations could not be scientific without violating the two theses of the ontic conception; while real explanations can be reported on or 'textualized' by scientists, neither the texts nor reports nor any other product of the epistemic, mind-dependent endeavors of scientists could themselves be a real—or if you like, 'in re' or 'ontic'—explanation.

As nearly all other theorists of explanation reject these two theses, they alone distinguish the ontic conception from its competitors. But while necessary and distinctive, they are also insufficient for characterizing any of its versions. These theses only state where the ontic conception locates explanations (in the spacetime universe) and what they are not (explanatory texts), but are silent as to their nature or essence. That is, neither one tells us what explanations are. So if the ontic conception is to be a philosophically important conception of explanation within the metaphysics of science, additional content must be provided.

1.2. The third thesis

Historically, Salmon was the first to substantially fill in this lacuna.[2] To these two theses, he added a third: explanations are exhibitions. If we can momentarily ignore the predicament involved in requiring—on pain of contradiction—that real explanations be non-scientific, then Salmon's version is best expressed as follows:

(*OC*): Scientific explanations are in re exhibitions of events fitting into patterns.

This formulation, which I shall call *the proper construal* (owing to how frequently it was repeated), is supported by extensive textual evidence. For instance, in his magnum opus, Salmon wrote, 'scientific explanation, according to the ontic conception, consists in exhibiting the phenomena-to-be-explained as occupying their places in the patterns and regularities which structure the world' (1984a: 239), and again, 'to explain an event is to exhibit it as occupying its place in the discernible patterns of the world' (1984a: 18). In his paper entitled 'Scientific explanation: three basic conceptions', he again expressed the proper construal thus: '[t]he ontic conception sees a scientific explanation as an exhibition of the ways in which what is to be explained fits into natural patterns or regularities in the world' (1984b: 293 (repr. 1998: 320)). And in his collected papers, Salmon reasserted the characterization: 'to explain an event is to exhibit it as occupying its (nomologically necessary) place in the intelligible pattern. Because of its emphasis on existent physical relationships, this view may be called the ontic conception', and again, '[a]ccording to the ontic conception, it will be recalled, an explanation was described as an exhibition of the fact to be explained in its place within the natural patterns of the world' (1998: 54, 58).[3]

Among those scholars who have most closely attended to Salmon's version of *OC*, there is also general agreement that these characterizations are indeed the proper way to construe the ontic conception. For example, John Forge wrote that, although 'he would have interpolated *and states of affairs* after *event*', these are otherwise 'completely correct and exemplary statement[s] of the ontic conception' (2002: 117 (italics added)). In her biographical entry for the *Dictionary of Modern American Philosophers*, Merrilee Salmon affirmed this interpretation: '[*OC*] maintains that to explain an event is to exhibit it as occupying its (nomologically necessary) place in an intelligible pattern' (2005: 2113; see also Waskan, 2006: 220–222).[4]

Additional textual evidence for the proper construal will accumulate throughout this paper, both from Salmon as well as commentators and interlocutors; but for now, basic principles of interpretive charity dictate that we should take Salmon's characterizations of his own version at face value. So, suffice it to say that, in each of these characterizations of *OC*, explanations are reductively identified with exhibitions; and this identification indicates that the concept EXHIBITION is the central construct of Salmon's version of *OC*.

We have also seen that any genuine version of *OC* distinguishes between real explanations and (explanatory) 'texts', where real explanations are non-representational and mind-independent spatiotemporal parts of the actual world. Hence, for Salmon, ontic explanations are not just exhibitions, but exhibitions in re. What in the world does the exhibiting, if not just the world itself, is a question with no immediate answer. But what is exhibited, for Salmon, is some target phenomenon ϕ—usually described as a token event, $\mathcal{E}$—fitting into a particular pattern, $\#_i$, such that real or actual explanations have the form $\ulcorner exh(fit(\phi, \#_i))\urcorner$. At least this much is straightforwardly recoverable from the proper construal.

1.3. Agenda

The ontic conception of explanation continues to exert significant influence in philosophy of science, and has even been said to be the conception endorsed by most of its practitioners (Strevens, 2008: 6–7). This is certainly the case for the so-called *New Mechanists*, many of whom—following the lead of Glennan and Craver—have advanced a modification of Salmon's version (Wright, 2012: 378–9). Indeed, of all versions of the ontic conception, Salmon's is the most familiar and respected, and much of the positive influence of *OC* owes, both first and foremost, to his work on the topic.[5]

Despite being widely celebrated as the progenitor of contemporary casual-mechanical conceptions of explanation, Salmon's view remains misunderstood. The reason is at least because Salmon himself was systematically unclear about what exhibitions are, and about their relationship to explanations. So rather than doing wonders for the ontic conception, Salmon's exposition of his own view just leaves them.

Actually, the problems run much deeper. While charity dictates treating Salmon's use of the term *exhibition* at face value, i.e., as a deliberate and meaningful technical term in an internally consistent and genuinely ontic conception of explanation, doing so results

[2] While Salmon kindly credited Coffa for the originating insights, Salmon is usually deemed the progenitor of the ontic conception because Coffa never published much on the matter—just a few scattered assertions, but nothing approximating a substantive exposition or sustained defense.

[3] As Salmon generally inclined toward a reist ontology over a factualist one, and frequently focused on token events in particular, I will here default to the same.

[4] Affirmation of the proper construal also comes from those who employ it in service of their own projects. For example, Eric Barnes invoked Salmon's version to articulate a view of so-called *ontologically brute facts*: '[f]or one exhibits the place of the ontologically brute fact in the patterns and regularities which structure the world by demonstrating that it is an ontologically brute fact—and thus has no further causal history. Thus exhibited, the ontologically brute fact is explained in the ontic sense' (1994: 67).

[5] Other versions of *OC* include the instance view of Forge (1986, 1993, 1998, 1999), the mechanistic views of Glennan (2002, 2005) and Craver (2007) and colleagues (Darden, 2008; Machamer et al., 2000), the kairetic account of Strevens (2008), the physical explanation account of Illari & Williamson (2010, 2011), and the ontic constraint view of Illari (2013).

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