CHAPTER 7

Varieties of ontological dependence

Kathrin Koslicki

7.1

A significant reorientation is currently under way in analytic metaphysics. Following W. V. O. Quine's seminal article, "On What There Is" (Quine 1948), metaphysics and its central component, ontology (the study of being), insofar as they were thought of as meaningful enterprises at all, were for most of the second half of the twentieth century construed as concerned primarily with questions of existence, i.e., questions of the form, "What is there?" More recently, though, a number of writers (e.g., Kit Fine, Gideon Rosen, and Jonathan Schaffer) have urged that many of the most central questions in metaphysics and perhaps philosophy in general are more profitably understood not as asking about the existence of certain apparently problematic sorts of entities (e.g., abstract objects), but rather as asking whether one type of phenomenon (e.g., a smile) is in some important sense dependent on another type of phenomenon (e.g., the mouth that is smiling). Existential questions, it seems, can often be answered trivially ("Yes, of course, there are numbers; after all, $2 + 2 = 4$"); but even after these questions have been answered, the status of the entities in question still remains to be clarified, e.g., whether they are derivative of another class of phenomena (e.g., concrete spatiotemporal particulars). The reorientation that is currently underway within contemporary metaphysics really constitutes a return to older traditions, such as those of Aristotle and Husserl, who recognized and emphasized the importance of questions of dependence in metaphysics and philosophy in general.

In order for this approach to metaphysics to stand on firm ground, a good grasp of the notion of dependence is obviously needed. For several decades, it was widely believed that dependence, at least as it concerns systematic connections between entire realms of phenomena (e.g., the mental and the physical or the evaluative and the non-evaluative) could be analyzed by means of the notion of supervenience, i.e., the idea that any difference with respect to one type of phenomenon (e.g., the mental) entails a difference

with respect to another (e.g., the physical). However, after a period of lively interest in supervenience, even its most committed champions were forced to conclude that this notion is not strong enough and lacks the right formal profile to yield a relation of genuine and asymmetric dependence (cf. Kim 1993). For one thing, supervenience is not in and of itself an asymmetric relation. Secondly, supervenience serves to mark merely a relation of necessary covariance between its relata. But, following considerations raised in Fine 1994, we now have reason to believe that no relation that is defined in purely modal terms could yield a genuine relation of dependence. For example, while the singleton set containing Socrates arguably depends on Socrates, the reverse intuitively does not hold; however, since necessarily each exists just in case the other does, necessity coupled with existence alone cannot capture the asymmetric dependence at issue.

Surprisingly, despite the central role dependence has played in philosophy since its very inception, this relation has only recently begun to receive the kind of attention it deserves from contemporary metaphysicians.[1] In this chapter, I would like to contribute to the recent surge of interest in this subject by helping to develop a better grasp of the notion of ontological dependence. In doing so, I am not interested primarily in defending particular positions in first-order metaphysics, e.g., trope theory or Aristotelianism about universals. Rather, the focus of this current project is to become clearer about the kinds of dependence relations to which philosophers who assert or deny these positions in first-order metaphysics appeal. I take this project to be a crucial component of defending a realist position in metaphysics, according to which substantive disagreements in ontology are possible.

Due to space limitations, I presuppose for the purposes of this chapter that construals of ontological dependence in terms of existence and modality do not capture all that is encompassed by this notion.[2] Instead, I focus on the more tempting account of ontological dependence in terms

[1] See for example Correia 2005; Fine 1991, 1995a, 1995b, 2001, this volume, manuscript; Lowe 1994, 1998, 2005b, 2006a; Mulligan, Simons, and Smith 1984; Rosen 2010; Schaffer 2009b, 2010a; Schnieder 2006a, 2011; Sider 2011; Simons 1982, 1987; Smith and Mulligan 1982.

[2] Aristotle's dependence claim in the *Categories*, according to which all the other entities are in some way dependent on the primary substances, is often read in a primarily modal/existential way: if the primary substances did not *exist*, then it would be *impossible* for anything else to *exist*. For a defense of a non-existential reading of Aristotle's dependence claim, see Corkum 2008 and Peramatzis 2008. See also Lowe 1994 for convincing counterexamples to a straightforwardly modal/existential construal of ontological dependence, according to which an entity, Φ, modally/existentially depends on an entity, Ψ, iff necessarily if Φ exists, then Ψ exists. A more interesting non-modal existential construal of ontological dependence is offered in Correia 2005 and Schnieder 2006a; I must leave a detailed discussion of their proposal for another occasion.

of a non-modal and sufficiently constrained conception of essence developed in Fine 1995a. I argue below that even this essentialist account is, as it stands, not fine-grained enough to recognize different varieties of dependence which ought to be distinguished even within the realm of ontology.

7.2

The kind of dependence relation on which I want to focus in this chapter concerns not so much systematic connections between two entire realms of phenomena (e.g., the mental and the physical), but rather relations among entities, their characteristics, the activities they are involved in, their constituents, and so on. For example, smiles depend in some fashion on mouths; but mouths do not in turn appear to depend on the smiles they are manifesting. (As Alice notes, in Lewis Carroll's *Alice's Adventures in Wonderland*, it is not unusual to see a cat without a grin; but to see a grin without a cat is the most curious thing she has ever seen.) I consider the relationship between a mouth and its smile to be a good illustration of what I will call "ontological dependence." (In what follows, whenever I speak of dependence simpliciter, I can be assumed to have in mind ontological dependence, unless otherwise indicated.) Notice that ontological dependence can be, and often is, asymmetric: thus, the dependence smiles exhibit with respect to mouths is plausibly taken to be one-directional and not reciprocated by mouths which may or may not exhibit smiles.

There surely are different varieties of dependence relations and many of them are not relevant to the sorts of cases I have in mind here. For example, one such dependence relation is causal dependence (according to a Humean notion of causation), e.g., the way in which Caesar's death depends on Brutus' stabbing. A second is logical dependence, e.g., the way in which the truth of the conclusion of a valid argument for example depends on the truth of the premises. A third is probabilistic dependence, e.g., the way in which the decay of a particle depends on its half life or the way in which my recovery from strep throat depends on my having taken penicillin. None of these varieties of dependence are instances of what I would categorize as ontological dependence.

Quite possibly, the following examples are cases in which entities stand in an ontological dependence relation of some kind: (i) smiles and mouths; (ii) sets and their members; (iii) events or states of affairs (e.g., lightning or heat) and their participants (e.g., electrons or molecules); (iv) chemical substances (e.g., water) and their molecular/atomic

constituents (e.g., H_2O-molecules);[3] (v) tropes (e.g., the redness of a particular tomato) and their "bearers" (e.g., the tomato);[4] (vi) Aristotelian universals (e.g., redness) and their "bearers" (e.g., objects that are red); (vii) holes (e.g., the holes in a piece of Emmentaler cheese) and their "hosts" (e.g., the piece of Emmentaler cheese); (viii) boundaries (e.g., the boundary around a football field) and their "hosts" (e.g., the football field).[5] In all of these cases, the dependence relation in question is plausibly taken to be asymmetric.

The examples just cited are perhaps plausible candidates for cases which exhibit an ontological dependence relation of some sort. But until we have had a chance to sort out the details more carefully, we should not presuppose that there is just a single relation which deserves to be called by the name, "ontological dependence." In fact, I will be proposing below that the cases considered so far really present us with more than one

[3] In what follows, I will on most occasions (unless I am paraphrasing the views of other philosophers) use the more general terms "constituent" and "complex entity," in place of "part" and "whole." I intend these terms, "constituent" and "complex entity," to be understood in a broad and neutral way which allows for different specific construals of constituency and complexity that is appropriate to different cases. One kind of case in which an object is a constituent of a complex entity is when the former is related to the latter in the straightforward mereological way in which a proper part is related to a whole (e.g., the sense in which an arm for example is a proper part of a body). But we might also count an object as a constituent of the singleton set of which it is the sole member, even though constituency here cannot be understood in a straightforwardly mereological way. Moreover, according to certain approaches to the metaphysics of properties, the redness of a tomato for example might count as a constituent of the tomato whose redness it is. This constituency-based conception of the relation between objects and their characteristics for example might be congenial to trope-theorists or to those who embrace an Aristotelian conception of universals, according to which universals are in some sense "present in" the particulars to which they can be truly attributed.

[4] Not every trope-theorist would endorse this dependence-claim. For example, those who take a reductive approach to particular objects might in fact think the dependence relation in question points in the opposite direction: for example, if particular objects are viewed as bundles of tropes, then it might seem more plausible to take a bundle of tropes to be dependent on the tropes that are being bundled, rather than the other way around. I do not intend to put this example forward as a claim that would be endorsed by all trope-theorists.

[5] I might also have included on the list that follows items that exhibit the relation Husserl, in the *Logical Investigations*, calls "foundation," i.e., the relation that holds between moments and their fundaments. To illustrate, Husserl regards the relation between color and extension as paradigmatic of a dependence relation he calls "foundation"; both of the relata in this case are moments. A color-moment, in Husserl's view, requires supplementation by an extension-moment; and he considers both to be proper parts of a more inclusive whole of which they are moments. Thus, every whole which has a color-moment as a part also must have an extension-moment as a part. Moreover, the relation of foundation here is reciprocal, in Husserl's view: color-moments and extension-moments are mutually founded, in the sense that every color-moment requires an extension-moment that is part of the same more inclusive whole of which the color-moment is part in order for the color-moment to exist, and vice versa. However, the relation between color-moments and extension-moments, on the one hand, and the more inclusive whole of which they are proper parts, on the other hand, is not reciprocal, but asymmetric. I will in what follows assume that the case of Husserlian moments can be assimilated to that of tropes.

underlying relation which merits this title. Thus, if my suggestions in what follows are correct, we should adopt a sufficiently fine-grained approach to ontological dependence that allows us to recognize several species of dependence even within the domain of ontology.

7.3

How, then, do smiles depend on mouths? An attractive idea proposed in Fine 1995a is that smiles are ontologically dependent on mouths roughly in that mouths are constituents in the essences of smiles. The asymmetry in the relationship between mouths and smiles, on his account, is captured by the fact that while mouths are constituents in the essences of smiles, the reverse is not the case; smiles are not also constituents in the essences of mouths. In Fine's view, the being, nature, or essence of an object, x, is the collection of propositions that are true in virtue of x's identity, where "it is true in virtue of the identity of x that . . .," for Fine, denotes an unanalyzed relation between an object and a proposition. The collection of propositions which are true in virtue of x's identity can also be considered a real definition of x. (Real definitions contrast with nominal definitions and concern objects themselves, rather than the linguistic expressions we use to refer to objects or the concepts we use to conceive of them.) Thus, an entity, Φ, is ontologically dependent on an entity, Ψ, on Fine's conception, just in case Ψ is a constituent of a proposition that is true in virtue of Φ's identity; in cases where this holds, Ψ is a constituent of an essential property of Φ:[6]

(ODE) *Ontological Dependence – Essentialist Account* (Fine)*:*
An entity, Φ, ontologically depends on an entity (or entities), Ψ, just in case Ψ is a constituent (or are constituents) in Φ's essence.

Essence, on this account, cannot be understood in the traditional modal way, for reasons laid out in Fine 1994. Such a construal of essence would not capture the asymmetric manner in which for example singleton sets ontologically depend on their sole members, while their sole members do not in turn ontologically depend on the singleton sets of which they are the sole members.

Fine's approach to ontological dependence crucially relies on a distinction between essence, narrowly constructed ("constitutive essence"), and essence, more widely constructed ("consequential essence"). Unless some

[6] Fine's account assumes that we may think of objects as constituents of properties and propositions.

such "narrow/wide" distinction for essences can be drawn, Fine's account of ontological dependence threatens to become vacuous, since everything will turn out to depend ontologically on everything else. This result follows because, in whatever way exactly we draw the constitutive/consequential distinction, the consequential essence of any entity, on Fine's conception, will be closed under logical consequence and all the logical truths will therefore end up in the consequential essence of everything whatsoever. Since for example the proposition that the number 2 is self-identical is a logical truth, the number 2 will turn up as a constituent in the consequential essence of every object whatsoever. And because the number 2 here was picked arbitrarily and every object is self-identical, every object will by the same reasoning turn up as a constituent in the consequential essence of every other object. Thus, if an entity were to count as being ontologically dependent on all those objects which figure as constituents in propositions that belong to its consequential essence, then the notion of ontological dependence would have been trivialized and every object would turn out to be ontologically dependent on every other object. It is thus important, at least for the purposes of providing an informative account of ontological dependence in terms of essence, that the approach in question can avail itself of some more restrictive conception of essence than what is given by the notion of consequential essence.

To this end, Fine considers two distinct methods by which to draw the constitutive/consequential distinction for essences.[7] The first proposal for how the constitutive/consequential distinction might be drawn is outlined in the following passage:

> A property belongs to the *constitutive* essence of an object if it is not had in virtue of being a logical consequence of some more basic essential properties; and a property might be said to belong to the *consequential* essence of an object if it is a logical consequence of properties belonging to the constitutive essence (a similar account could be given for the case in which the essence is conceived in terms of propositions rather than properties). (Fine 1995a, p. 276; his emphasis)

Since the "more basic essential properties" in question presumably just are the ones that figure in the constitutive essence of an object, the method outlined here amounts to taking as basic the notion of constitutive essence and defining that of consequential essence in terms of it by way of logical closure. A proposition then belongs to the consequential essence of an

[7] I am here relying primarily on Fine 1995a, pp. 276–80; but similar thoughts (though presented in a more condensed fashion) are also found in Fine 1995b, Sections 3–4.

object, according to this first approach, if it is a logical consequence of a proposition that belongs to the object's constitutive essence (which of course is not itself to be taken as closed under logical consequence). For example, if the proposition that Socrates' singleton set contains Socrates as its sole member belongs to the constitutive essence of Socrates' singleton set, then the proposition that Socrates' singleton set contains some member or other is admitted into the consequential essence of Socrates' singleton set by logical closure. Since the logical truths are logically entailed by any proposition whatsoever, these propositions will end up in the consequential essence of any object whatsoever by this procedure.

In case the idea of taking the notion of constitutive essence as basic is found to be objectionable in a context in which our aim is to give an account of ontological dependence, Fine also considers a second approach to the constitutive/consequential distinction:

> It is therefore preferable, in the interest of conceptual economy, to see if the notion of dependence can be explained in consequential terms, without appeal to an underlying constitutive conception. To this end, we need an independent way of distinguishing between those objects that enter into the consequential essence as a result of the logical closure and those that enter in "their own right", i.e., by way of the constitutive essence. But this is readily done. For when an object enters through logical closure, it can be "generalized away". (Fine 1995a, p. 277)

According to Fine's second proposed method of drawing the constitutive/consequential distinction, we are to take as basic the notion of consequential essence and define that of constitutive essence in terms of it. The central idea underlying this second procedure is this: if an object enters as a constituent into a proposition belonging to the consequential essence of another object only through logical closure, then such an object can be "generalized away." For example, the proposition that the number 2 is self-identical belongs to the consequential essence of Socrates' singleton set; but so does, for every object whatsoever, the proposition that that object is self-identical. In this way, the number 2 can be "generalized out" of the proposition that the number 2 is self-identical, which belongs to the consequential essence of Socrates' singleton set. Following this second method of drawing the constitutive/consequential distinction, then, only those objects which function as constituents of propositions belonging to the consequential essence of a given entity and which cannot be "generalized out" of these propositions make it into the constitutive essence of the entity in question as constituents of propositions belonging

to its constitutive essence. In this way, it seems that Fine can avoid the result that Socrates' singleton set ontologically depends on the number 2 (and, more generally, on any object whatsoever).[8]

The trouble is that Fine's second method of drawing the constitutive/consequential distinction for essences (i.e., taking for granted consequential essence and defining constitutive essence in terms of it), as it stands, cannot be assumed to take us all the way to an object's constitutive essence. The second proposed method of drawing the constitutive/consequential distinction is based on the idea that those constituents that are intuitively irrelevant to the essential nature of the entity under consideration can be "generalized out" of propositions belonging to an object's consequential essence. But Fine's "generalizing out" procedure is really effective only in removing the logical truths from the consequential essence of an object, since this procedure takes advantage of a special feature of logical truths, i.e., that they remain true under all re-interpretations of the non-logical vocabulary. The "generalizing out" procedure thereby leaves us with a *restricted* conception of consequential essence, i.e., the collection of propositions consisting of an object's unrestricted consequential essence minus the logical truths. But this restricted notion of consequential essence cannot in general be expected to deliver the suitably narrow conception of essence that is needed for an account of ontological dependence along the lines of (ODE). For, unless the narrow notion of constitutive essence is already implicitly presupposed (as is done by the first method of drawing the constitutive/consequential contrast), the entities on which an object depends ontologically need not match exactly those which figure as constituents in propositions that belong to an object's restricted consequential essence.

[8] The following is a more precise characterization of the notion of "generalizing out" (cf. Fine 1995a, pp. 277–8). Consider a proposition P(y), which has an object, y, as a constituent. For example, P(y) might be the proposition that Socrates is identical to Socrates for y=Socrates. Fine's first step is to define the notion of a "generalization" for propositions, rather than objects (i.e., constituents of propositions): the generalization of a proposition, P(y), is the proposition that P(v) holds for all objects, v. Thus, the generalization of the proposition that Socrates is identical to Socrates is the proposition for all objects, v, that v is identical to v. (To obtain the generalization, P(v), of a proposition, P(y), all occurrences of the constituent, y, must be replaced by occurrences of v.) Given the notion of a generalization, defined for propositions, we can now make sense of the idea that an *object* can be "generalized out" of a collection, C, of propositions in the following way: an object, y, can be generalized out of a collection, C, of propositions if C contains the generalization of a proposition P(y), whenever it contains the proposition P(y) itself. Finally, these defined notions are now applied to the analysis of ontological dependence in the following way: an object, x, depends ontologically on an object, y, according to this method of drawing the constitutive/consequential distinction, just in case y cannot be generalized out of the consequential essence of x, i.e., just in case some proposition P(y) belongs to the consequential essence of x without it being the case that the generalization of P(y) also belongs to the consequential essence of x.

Consider for example the proposition that the number 2 is not a member of Socrates' singleton set. If this proposition belongs to the unrestricted consequential essence of Socrates' singleton set, then, in accordance with the second method of drawing the constitutive/consequential distinction just considered, the "generalizing out" procedure will pass it on into the constitutive essence of Socrates' singleton set as well. Since this proposition is not a logically necessary truth, it does not remain true under all re-interpretations of the non-logical vocabulary. For it is not true in general for every object, v, that v is not a member of Socrates' singleton set, since Socrates, after all, is a member of Socrates' singleton set. The number 2 therefore will not "generalize out" of the proposition that 2 is not a member of Socrates' singleton set and it seems the proposition in question, by the second method of drawing the constitutive/consequential distinction, will therefore wrongly end up in the constitutive essence of Socrates' singleton set with the result that Socrates' singleton set will again turn out to depend ontologically on the number 2 (and, by the same reasoning, on any object other than itself whatsoever), on the assumption that an entity ontologically depends on just those objects that appear as constituents in propositions belonging to its constitutive essence.

Suppose, on the other hand, that the proposition that the number 2 is not a member of Socrates' singleton set is excluded from the unrestricted consequential essence of Socrates' singleton set. Now, it seems, the second method of drawing the constitutive/consequential distinction has really collapsed into the first. For it is difficult to see on what grounds the proposition that the number 2 is not a member of Socrates' singleton set could be excluded from the unrestricted consequential essence of Socrates' singleton set, unless it is excluded on the grounds that this proposition pertains to the essential nature of Socrates' singleton set neither directly nor indirectly, by being logically entailed solely by those propositions that directly pertain to the essential nature of Socrates' singleton set. But if these are in fact at least implicitly the grounds on the basis of which the proposition in question is to be excluded from the unrestricted consequential essence of Socrates' singleton set, then the procedure for determining whether a proposition belongs in an object's unrestricted consequential essence is tacitly defined by reference to an object's constitutive essence. And this is of course just the way in which the first method of drawing the constitutive/consequential distinction proceeds, i.e., by taking as basic constitutive essence and defining unrestricted consequential essence in terms of it by way of logical closure.

In light of these considerations, it thus seems that there is really only one method by which to approach the constitutive/consequential distinction, namely the first one: to take as basic constitutive essence and define consequential essence in terms of it by means of logical closure (restrictedly or unrestrictedly). And while there is nothing in principle wrong with taking as basic constitutive essence, we should note that, in the context of giving an account of ontological dependence in terms of constitutive essence, Fine's first proposed procedure for drawing the constitutive/consequential contrast does not really give us an independent handle on the notion of ontological dependence. Fine himself is well aware of this feature of his account:

> It is, of course, no surprise that dependence can be defined in terms of the objectually constrained form of essential truth; for the notion of dependence is already built into the constraints by which the relevant notion of essential truth is understood. But even without the constraints, a definition could still be given. For we may say that x depends upon y just in case, for some property φ not involving y, it is true in virtue of the nature of x that y φ's and yet not true in virtue of the nature of x that every object φ's; the dependees are the objects which cannot be "generalized out". Thus we do not have, in the notion of dependence, an idea that is genuinely new. (Fine 1995c, p. 243)

Thus, although nothing prevents us from defining a notion of ontological dependence in terms of constitutive essence as proposed above, we should be conscious of the fact that we have not thereby accomplished more than to state what is at bottom a single ontological relationship in two different, but interdefinable, ways, i.e., either by means of a suitably restricted notion of essential truth or by means of a suitably restricted notion of ontological dependence. To illustrate, it helps to return once more to the proposed asymmetry in the relation between Socrates and Socrates' singleton set. Thus, to say that it is a properly constitutive essential truth about Socrates' singleton set that it has Socrates as its sole member (while it is not also a properly constitutive essential truth about Socrates to be the sole member of Socrates' singleton set) is really just another way of saying that Socrates' singleton set ontologically depends on Socrates (while Socrates does not also ontologically depend on Socrates' singleton set); and vice versa. As Fine puts it in the passage just cited: "the notion of dependence is already built into the constraints by which the relevant notion of essential truth is understood"; and, given (ODE), a suitably narrow conception of essence is also already built into the constraints by which the relevant notion of ontological dependence is understood.[9]

[9] Like Fine, Aristotle also recognizes a distinction between what belongs to the essence proper of an object and what merely follows from its essence proper, i.e., the so-called "propria" or "necessary

7.4

According to Fine's essentialist account of ontological dependence, as discussed in the previous sections, an entity, Φ, is ontologically dependent on an entity or entities, Ψ, just in case Ψ is a constituent in Φ's essence, where "essence" here must be understood in some appropriately narrow sense. Fine assumes that, for the purposes at hand, essences can be identified with collections of propositions that are true in virtue of the identity of a particular object or objects. Fine also simultaneously thinks of such collections of propositions that are true in virtue of the identity of an object or objects as real definitions for the object or objects in question. There is not, then, on this approach, much of a distinction between essences and real definitions.

But we may wish to proceed somewhat differently and leave room for a less propositional conception of essences, such as that endorsed by Aristotle for example. For Aristotle, the essence of a kind of thing includes at least its form. (Whether the essence of a kind of thing also includes additional components besides the form, e.g., the matter, is a controversial question which I will not try to address here.) For example, the essence of a living being, in Aristotle's view, encompasses at least its soul, i.e., the form of the living being. But, given Aristotle's association of the soul with certain kinds of powers or capacities [*dynameis*], e.g., the

accidents." But Aristotle's "narrow/wide" distinction for essences does not exactly line up with Fine's. For example, for Aristotle, it is part of the essence of planets that they are heavenly bodies that are near; but it is merely a necessary (but non-essential) feature of planets that they do not twinkle. The latter proposition, in Aristotle's view, states a feature which merely follows from, but is not itself included in, the essence of planets. But the relevant notion of "following from" that is operative in this context, for Aristotle, cannot simply be that of logical consequence. The (explanatorily less basic) proposition that planets are heavenly bodies which do not twinkle is logically entailed by the (explanatorily more basic) proposition that planets are heavenly bodies that are near together with auxiliary premises (e.g., the proposition that heavenly bodies that are near do not twinkle). But the same holds also in the opposite direction: the (explanatorily more basic) proposition that planets are heavenly bodies that are near is also logically entailed by the (explanatorily less basic) proposition that planets are heavenly bodies that do not twinkle together with auxiliary premises (e.g., the proposition that heavenly bodies that do not twinkle are near). Thus, the relation of logical entailment alone (as is brought out in a more contemporary context by Sylvain Bromberger's "flagpole" objection against Hempel's deductive-nomological model of scientific explanation) is not sufficient to capture the asymmetry of scientific explanation. In Aristotle's system, the relevant notion of asymmetric consequence that is operative in his model of scientific explanation is that of *demonstration*, as developed theoretically in his *Posterior Analytics* and (according to my reading of Aristotle) applied practically for example in his biological treatises. A scientific explanation is asymmetric, for Aristotle, because (if accurate) it is the theoretical and/or linguistic reflection of an asymmetric real-world relation of *causal* priority, where causation here of course must be construed along Aristotelian (and not Humean) lines. These issues are explored further in Koslicki 2012.

capacity for growth and nourishment, locomotion, perception and thought, it would be strange to think of the soul of a living being as a collection of propositions. It is perhaps more natural to take real definitions, which Aristotle regards as linguistic entities [*logoi*] of some sort, i.e., formulas or statements of the essence, as collections of propositions or perhaps as only a single proposition, if there is only a single canonical way of stating the essence of a kind of thing.[10]

The basic idea underlying Fine's essentialist approach to ontological dependence can be reformulated in terms of real definitions as follows:

(ODD) *Ontological Dependence – Real Definition:*
An entity, Φ, ontologically depends on an entity (or entities), Ψ, just in case Ψ is a constituent (or are constituents) in a real definition of Φ.[11]

In what follows, I will use the phrase, "*essential dependence*," to stand for the dependence relation defined in (ODD).

A real definition, I will assume for present purposes, has at least the following features. It is expressed by a statement containing a noun-phrase standing for Φ, the entity to be defined (i.e., the *definiendum*), together with a noun phrase standing for Ψ, the entity or entities in terms of which Φ is to be defined (i.e., the *definiens*). Moreover, these two expressions are connected by a relational term of some kind which stands for the definitional relation holding between the definiendum and the definiens in a real definition. A common way of formulating a real definition in English is by way of the "To be Φ is to be Ψ" or the "For something to be Φ is for it to be Ψ" construction. To illustrate, the Aristotelian real definition for human beings can be stated as follows: "To be a human being is to be a rational animal" or "For something to be a human being is for it to be a rational animal." Here, the phrase "a human being," which is embedded in the "To be . . ." construction occurring on the left-hand side of the

[10] In fact, it would be wise, I think, for a proponent of a non-modal conception of essences, such as Fine's, to draw a firm distinction between essence (non-propositionally construed) and real definition (propositionally construed). For it is difficult to see how essences could really do the requisite work of *grounding* the derivative necessary (but non-essential) features of objects in any interesting sense if they are conceived of along quasi-linguistic lines. I will not attempt to defend this claim here, since such a project would exceed the confines of the present context; but see Koslicki forthcoming for further exploration of these issues.

[11] The formulation of (ODD) in the text contains "*a* real definition," rather than "*the* real definition," since I want to leave it open for the time being whether an entity can have more than one real definition. This possibility would obtain if two different propositions (or collections of propositions) could be equally explanatory of the essential nature of the entity in question.

definitional relation stands for the entity, Φ, to be defined, i.e., the species, human being. The phrase, "a rational animal," which is embedded in the "to be ___" construction occurring on the right-hand side of the definitional relation stands for the entities, Ψ, which are doing the defining, i.e., the genus, animal, and the differentiating feature, rationality, which distinguishes the particular species in question from all other species that fall under the same genus.

A real definition, if successful, must at least entail an identity: that is, the two noun phrases flanking the relational expression in a statement expressing a real definition must be at least extensionally equivalent. Assuming that identity-statements, if true, are necessarily true, the two noun phrases flanking the relational expression are not only contingently, but necessarily, extensionally equivalent. And yet a statement expressing a real definition must also accomplish more than simply to offer two different ways of singling out the same entity or entities, since the definiens must also be explanatory of the essential nature of the definiendum. Thus, I take it, a pure identity-statement, such as "Hesperus is Phosphorus," could not be transformed into a good candidate ("To be Hesperus is to be Phosphorus") for a statement expressing a real definition of the planet, Venus, since we do not learn anything about what it is to be this particular planet, Venus, by learning that the two names, "Hesperus" and "Phosphorus," are used to pick out the single object in question. Nor is the fact that Venus appears at a certain position in the evening sky and at a certain position in the morning sky explanatory of the essential nature of Venus.

The approach to definition at work here is perhaps somewhat unfamiliar to those who have been reared on the conception of definition to which Quine famously objects in his critique of the analytic/synthetic distinction (see, e.g., Quine 1948, 1951a). First, as noted above, in contrast to the notion operative in Quine's critique, we are currently assuming a real, as opposed to a nominal, conception of definition: in a real definition, the definiendum as well as the definiens are entities, while in a nominal definition they are expressions belonging to a particular language or concepts belonging to a particular conceptual system. Thus, I assume for example that Aristotle's attempt in the *Posterior Analytics* at defining thunder as a kind of noise in the clouds caused by the extinction of fire is directed at arriving at a scientific understanding of the natural phenomenon, thunder, itself, rather than at the elucidation of the meaning of a word of the Greek (or any other) language or a concept belonging to a particular conceptual system.

Secondly, and relatedly, the present approach does not presuppose that real definitions are in general based on a priori connections between concepts or the meanings of words. For example, we might consider "To be water is to be a chemical substance composed (predominantly) of H_2O-molecules" to be a perfectly good example of a statement expressing a real definition of the chemical substance in question, but the connections between the substance, water, and its molecular and atomic constituents are presumably a posteriori, at least assuming that a Kripke/Putnam-style approach to natural kinds and the semantics of natural kind terms is in its basic outline correct.

Thirdly, according to the approach taken here, one does not automatically succeed in giving a real definition for a certain entity by stating necessary and sufficient conditions which single out the entity or entities in question and distinguish them from all other relevant entities in the vicinity. An example may help to illustrate this point: the conditions, being the successor of the successor of the number 0 and being the predecessor of the number 3, both do the job we expect necessary and sufficient conditions to do, i.e., they single out the number 2 and differentiate it from a certain contrast-class (i.e., the rest of the natural numbers). However, one might reasonably adopt the attitude that the first condition (being the successor of the successor of the number 0) is more explanatory of the essential nature of the number 2 than the second condition (being the predecessor of the number 3), since the first mirrors more closely than the second does the method by which the number 2 is constructed from a basic entity, the number 0, together with a relation that is taken as primitive, i.e., the successor relation.[12]

Similarly, the case involving Socrates and Socrates' singleton set also illustrates the point that real definitions, on the current conception, must accomplish more than to specify necessary and sufficient conditions that single out and delineate the entity to be defined from the rest. For if it is part of the essence of Socrates' singleton set that it has Socrates as its sole member, but not part of the essence of Socrates that he is the sole member of Socrates' singleton set, then we would expect a real definition of Socrates' singleton set to include in its statement of what it is to be the set in question that it has Socrates as its sole member, whereas a real definition of Socrates should not include in its statement of what it is to be Socrates that he is the sole member of Socrates' singleton set. However, if all we require from real definitions is that they provide necessary and sufficient conditions that single out and delineate the entity in question

[12] Thanks to Graeme Forbes for helpful discussion of this point (as well as many others relevant to this project).

from some relevant contrast class, then both of the conditions just cited (i.e., being the set that has Socrates as its sole member and being the entity that is the sole member of Socrates' singleton set) would do equally well in accomplishing their intended task in providing real definitions, respectively, for the entities in question, i.e., Socrates' singleton set and Socrates.[13]

A statement that purports to express a real definition thus is successful, according to the current approach, if it not only uniquely identifies and delineates the entity to be defined, but also states what it is to be the entity in question, i.e., if it is explanatory of the essential nature of the definiendum. In a statement of the form, "To be Φ is to be Ψ," which purports to express a real definition, the same thing is being referred to on either side of the definitional relation, by the phrases "to be Φ" and "to be Ψ," i.e., the essence of the entity to be defined. But in order for a real definition to accomplish its intended job of being explanatory of the essential nature of the entity to be defined, the phrase, "to be Ψ," occurring on the right-hand side of the definitional relation must present a distinct way of referring to the essence of the entity to be defined, Φ; otherwise, no illumination would have been achieved by the alleged real definition in question. Thus, in the statement, "To be a human being is to be a human being," the essence of the entity to be defined (i.e., the species, human being) is being referred to on both sides of the definitional relation; but we have not thereby accomplished a real definition of the

[13] Relatedly, a conception of real definition according to which such propositions or collections of propositions must do more than simply provide necessary and sufficient conditions that single out and differentiate the entity to be defined from some intended contrast class also pits us against a venerable tradition within contemporary metaphysics which has enjoyed popularity among those who take a modal approach to essence (see for example Plantinga 1974, p. 60; Forbes 1985, pp. 146–8; Mackie 2006, p. 19; *et al.*). According to the approach in question, the primary job of essences is to *individuate* the entities whose essences they are across worlds and times at which these entities exist. Such a primarily individuative conception of essence also seems to be at work in E. J. Lowe's approach to ontological dependence (cf., Lowe 1994, 1998, 2005b, 2006a). But, as is already brought out by the cases discussed above (i.e., the relation between the number 0 and the rest of the natural numbers as well as the relation between Socrates and Socrates' singleton set), such a modally inspired and primarily individuative conception of essence and real definition, not surprisingly, will turn out to be not sufficiently fine-grained for our present purposes: for there are many ways in which an entity can be located in every world and at every time at which it exists which cannot plausibly be taken to be explanatory of what it is to be the entity in question. The phrase, "the instance of redness of shade S_n I am actually currently thinking about," for example, arguably uniquely picks out a particular redness trope at every time and in every world in which it exists; but the condition in question should not strike us as being explanatory of the essential nature of the redness trope in question. (This example is a modified version of one which is discussed in Wedgwood 2007, pp. 139ff, with a similar aim.) Thus, essences, on the current picture, must do more than individuate the entities whose essences they are; and real definitions must do more than state conditions which uniquely identify and delineate the entities under consideration at every time and in every world in which they exist.

entity to be defined, since the statement in question does not succeed in stating a condition that is explanatory of the essential nature of, or what it is to be, a human being. In order for a statement that purports to express a real definition to do so, the phrase, "to be Ψ," occurring on the right-hand side of the definitional relation, must reveal the essence of the entity, Φ, in a way in which the phrase, "to be Φ," occurring on the left-hand side of the definitional relation, does not. We will investigate the question of how such a feat might be accomplished in more detail in the next section.

7.5

In light of these observations concerning the notion of real definition, we can now return to our initial list of examples in (i)–(viii) and evaluate these putative cases of ontological dependence in accordance with the schema given in (ODD). When approached through the lense of (ODD), these cases are analyzed as follows:

(i′) Smiles ontologically depend on mouths: mouths are constituents in real definitions of smiles.

(ii′) Sets ontologically depend on their members: the members of sets are constituents in real definitions of sets.

(iii′) Events/states of affairs ontologically depend on their participants: the participants in events/states of affairs are constituents in real definitions of events/states of affairs.

(iv′) Chemical substances ontologically depend on their molecular/atomic constituents: the molecular/atomic constituents of chemical substances are constituents in real definitions of chemical substances.

(v′) Tropes ontologically depend on their "bearers": the "bearers" of tropes are constituents in real definitions of tropes.

(vi′) Aristotelian universals ontologically depend on their "bearers": the "bearers" of Aristotelian universals are constituents in real definitions of Aristotelian universals.

(vii′) Holes ontologically depend on their "hosts": the "hosts" of holes are constituents in real definitions of holes.

(viii′) Boundaries ontologically depend on their "hosts": the "hosts" of boundaries are constituents in real definitions of boundaries.

There are of course no uncontroversial examples of real definitions in philosophy; but, for the sake of concreteness, it helps to have before us some potential candidates in order to illustrate how one might approach the account given in (i′)–(viii′) of the putative dependence relations in question. My concern at present is not so much with the substantive content of these candidate real definitions, but with certain general questions concerning the relation between ontological dependence and real definition which need to be sorted out. Among other things, (i′)–(viii′) in their present formulations, using plural rather than singular expressions, leave open the question of whether real definitions are best construed as applying to entities at the level of kinds or to entities at the level of individuals. (In what follows, I use the terms, "individual" and "particular" interchangeably.) Understood in the former way, as applying to entities at the level of kinds (indicated below by the subscript "$_K$"), rather than to entities at the level of individuals, we can use the following as potential candidates for statements expressing real definitions of the entities at hand:

(SMILE$_K$)	To be a smile is to be a state resulting from an activity of smiling engaged in by a mouth.
(SET$_K$)	To be a set is to be a collection of members that satisfies the axioms of set theory.[14]
(LIGHTNING$_K$)	To be an occurrence of lightning is to be an event in which energy is discharged by electrons (in a certain way).
(WATER$_K$)	To be a quantity of water is to be a quantity of a chemical substance composed (predominantly) of H_2O-molecules.[15]
(TROPE$_K$)	To be a trope is to be a property instance had by some object.

[14] Here, the phrase "that satisfies the axioms of set theory" is meant to be an abbreviation of the actual content of the axioms in question which spell out in detail what kind of collection a set-theoretic collection is.

[15] (LIGHTNING$_K$) and (WATER$_K$) contain occurrences of nouns that are standardly used as mass terms, i.e., "lightning" and "water." I have added the phrases, "occurrence of" and "quantity of," simply to allow me to use singular count noun phrases (i.e., "an occurrence of lightning" and "a quantity of water") or plural count noun phrases (i.e., "occurrences of lightning" or "quantities of water"), so that these cases may be treated in a manner analogous to the remaining cases in (i)–(viii). Just as in these other cases, the statements in question are to be understood as concerning the kind of entity, lightning or water, in question, rather than as statements concerning particular instances of the kind in question.

(UNIVERSAL$_K$)	To be an Aristotelian universal is to be a property present in all objects that are alike in a certain respect.
(HOLE$_K$)	To be a hole is to be an opening present in an object.
(BOUNDARY$_K$)	To be a boundary is to be a demarcation of the interior of an object from its exterior.

The statements in (SMILE$_K$)–(BOUNDARY$_K$) all purport to state what it is to be a certain kind of entity (i.e., a smile, a set, an occurrence of lightning, etc.) in general.[16] But even if we are sympathetic to the idea that (ODD) yields a serviceable general schema by which to approach these putative cases of ontological dependence, it is still possible to dig deeper in our diagnosis of *why* the entities whose real definitions are purportedly stated above are ontologically dependent on the entities which allegedly feature in these real definitions. In what follows, I will suggest that our present range of data as presented by (i)–(viii) calls for the recognition of at least two more fine-grained species of essential dependence, which I will refer to below as "constituent dependence" and "feature dependence."

The first variety of ontological dependence, constituent dependence, has some prima facie plausibility with respect to (SET$_K$), (LIGHTNING$_K$), and (WATER$_K$). In these cases, it is natural to think that the entities that are being defined (i.e., sets, quantities of water, and occurrences of lightning) are complex, in the sense that they have a certain constituent structure, and that the entities in terms of which they are being defined (i.e., members of sets, H_2O-molecules, and electrons) figure as constituents in these complex entities themselves, according to some notion of constituency, and not merely in their real definitions. To characterize cases in which the constituent structure of the real definition in this way mirrors the constituent structure of the complex entity that is being defined, I will employ the term, "*essential constituent*," defined as follows:

(EC) *Essential Constituency:*
An entity, Ψ, is an *essential constituent* of an entity, Φ, just in case (i) Ψ is a constituent in a real definition of Φ; and (ii) Ψ is also a constituent of Φ itself.

[16] It is a difficult and interesting question whether real definitions can be given for individuals as well, what form such real definitions for individuals take, and how they are related to the kind-level statements just listed. Since these issues are well worth exploring in detail, I will reserve discussion of them for a different occasion and confine my attention in what follows to real definitions as applying to entities at the level of kinds.

We can now apply (EC) to the first group of cases in the following way:

(SET_C) A set is a complex entity of a certain sort (i.e., a certain kind of collection) which contains its members as essential constituents.

($LIGHTNING_C$) An occurrence of lightning is a complex entity of a certain sort (i.e., a certain kind of physical event) which contains electrons as essential constituents.

($WATER_C$) A quantity of water is a complex entity of a certain sort (i.e., a quantity of a certain kind of chemical substance) which contains H_2O-molecules as essential constituents.

When interpreting (SET_C)–($WATER_C$), we should bear in mind the following three caveats. First, different notions of constituency will be appropriate in different cases: thus, the sense in which an entity is a constituent of a proposition, operative in (ODD), is presumably quite different from the sense in which for example a set has its members as constituents or the sense in which quantities of water contain H_2O-molecules as constituents.[17] Secondly, we are currently only dealing with real definitions as applying to entities at the level of kinds; thus, I am in the present context leaving open for example the question of whether a particular occurrence of lightning is essentially tied to the *very* electrons which are in fact involved in this event, or whether a particular quantity of water is essentially tied to the *very* H_2O-molecules or the *very* hydrogen and oxygen atoms of which it is in fact composed. Only the respective kind-level claims are directly relevant for our present purposes, i.e., that it is essential to occurrences of lightning in general that electrons figure in them as constituents (according to some notion of constituency) and that it is essential to quantities of water in general that they contain H_2O-molecules as constituents (according to some notion of constituency).[18]

[17] Though tempting, "constituency" cannot be construed along mereological lines across the board. For example, in the case of sets, although the subset relation is formally analogous to the parthood relation of classical mereology, it is not plausible to think of the members of a set as parts of the set. Among other things, parthood is generally taken to be a transitive relation; but set-membership is not a transitive relation, since a member of a member of a set, S, need not itself be a member of S.

[18] The analogous claims for sets is much less controversial. For not only is it a commonly accepted fact about (non-empty) sets in general that they are certain kinds of collections (i.e., set-theoretic collections) of their members; it is also a commonly accepted fact about particular sets that they are essentially tied to the *very* members of which they are in fact composed. But this easy transition from claims about the essences of sets in general to claims about the essences of particular sets is peculiar to sets and should not be taken as representative for the whole group of cases exhibiting constituent dependence.

Thirdly, (SET_C), ($LIGHTNING_C$), and ($WATER_C$) are not to be read as attempting to capture the full content of (SET_K), ($LIGHTNING_K$), and ($WATER_K$). In the case of sets, in order to indicate what it is for a collection to be a set, it must also be said what sort of collection a set-theoretic collection is, i.e., that it is one which has the characteristics detailed by a particular axiom system for set theory. For the very same objects that are members of a given set might also function as essential constituents of other non-set-theoretic collections, e.g., committees or mereological sums, which do not behave in accordance with the axioms of set theory. In the case of lightning, in order to indicate what it is for an event to be an occurrence of lightning, it is not enough to state that certain sorts of objects (i.e., electrons) are essential constituents of such an event; it must also be said (depending on the particular conception of events under consideration) for example what sorts of changes these essential constituents must undergo in order for a physical event to count as an occurrence of lightning, i.e., that energy must be discharged by the electrons that are essential constituents of such events in the particular way that is characteristic of occurrences of lightning. In the case of water, to say what it is for a chemical substance to be water, it is also important for example to indicate that its atomic constituents (hydrogen and oxygen atoms) must be arranged in the form of H_2O-molecules. The molecular arrangement of these atomic constituents itself plays a crucial role in an account of the chemical properties and behavior that are characteristic of water, as contrasted with other chemical substances.

We can now formulate a more fine-grained variety of essential dependence which seems to work well for this first group of cases as follows:

(CD) *Constituent Dependence:*
An entity, Φ, is constituent dependent on an entity (or entities), Ψ, just in case Ψ is an essential constituent (or are essential constituents) of Φ.

(CD) is to be read as a species of ontological dependence, as stated in (ODD): in order for an entity, Φ, to be constituent dependent on an entity (or entities), Ψ, it must be the case not only that Ψ is a constituent (or are constituents) in a real definition of Φ, as required by (ODD), but

also that Φ itself is a complex entity which includes Ψ among its constituents, according to some notion of constituency.

We may think of cases exhibiting the variety of essential dependence described in (CD), in more vivid terms, as involving entities that have the character of *collections* or *constructions*, i.e., entities that are in some way built up from the constituents on which they are ontologically dependent. Sets for example are collections of a specific sort that are constructed from their members by means of the operation of set-formation. Similarly, quantities of water may be thought of as constructed from their atomic and molecular constituents by means of some building operation (e.g., mereological composition). Finally, those who take events or states of affairs to be ontologically dependent on their participants presumably view these entities as well as resulting from an application of an item-generating operation of some sort which takes these participants as building blocks and yields an event or state of affairs as output. (CD) thus provides one parameter in accordance with which entities that have the character of collections or constructions may be categorized as ontologically dependent and hence perhaps as deserving an ontologically derivative status with respect to such notions as substancehood, fundamentality, basicness, priority, and the like.[19]

It is not obvious, however, that the constituency-driven model of real definition just outlined applies equally well to all of the cases considered above; for it is not always natural to think that constituency in a real definition and constituency in the entity being defined itself go hand in hand in the way suggested by (CD). Plenty of philosophers who subscribe to particular conceptions of tropes, Aristotelian universals, holes, or boundaries view these entities as ontologically dependent on their "bearers" or "hosts" in some way, but not in the way described in (CD), i.e., not as being built up or constructed from their "bearers" or "hosts" as constituents, analogously to the way in which a set is built up or constructed from its members. Such philosophers, I take it, would not find the analogues of (SET_C)–($WATER_C$) for tropes, Aristotelian universals, holes, or boundaries congenial to their first-order commitments; rather, if anything, they might in fact favor the negations of these statements, as stated in ($TROPE_{not\text{-}C}$)–($BOUNDARY_{not\text{-}C}$), over their positive counterparts:

[19] Cases of this first kind, in which the defined entity is complex and the real definition reveals its constituent structure, are also dealt with in Johnston 2006. If my observations in this section of the chapter are correct, however, then we ought to allow that not all real definitions fall into the same mold, i.e., of revealing the constituent structure of a complex entity. The role of operations of construction in ontology is also investigated for example in Fine 1991 and Bennett 2011.

($TROPE_{not\text{-}C}$) A trope is ***not*** a complex entity which contains the object in which it is present as an essential constituent.

($UNIVERSAL_{not\text{-}C}$) An Aristotelian universal is ***not*** a complex entity which contains the objects in which it is present as essential constituents.

($HOLE_{not\text{-}C}$) A hole is ***not*** a complex entity which contains the object in which it is present as essential constituent.

($BOUNDARY_{not\text{-}C}$) A boundary is ***not*** a complex entity which contains the object in which it is present as an essential constituent.[20]

To illustrate, according to ($TROPE_{not\text{-}C}$)–($BOUNDARY_{not\text{-}C}$), we ought not to think of a piece of Emmentaler cheese for example as *being* a constituent of the holes it contains or to think of a football field as *being* a constituent of the boundary which demarcates its interior from its exterior. We may point out in favor of these observations that a piece of Emmentaler cheese after all is *bigger* than, and hence occupies regions of space time not occupied by, the holes it contains; similarly, a football field is *bigger* than, and hence occupies regions of space time not occupied by, its boundary, if boundaries are even spatially extended at all.

Trope-theorists, if anything, tend to think that the constituency relation between a trope and its "bearer," if it is applicable to this case at all,

[20] This is not to say that *all* philosophers who subscribe to particular first-order conceptions of the entities under discussion would prefer ($TROPE_{not\text{-}C}$)–($BOUNDARY_{not\text{-}C}$) over their positive counterparts. One might hold for example that tropes and events belong to a single ontological category (see for example Bennett 1988). But this thesis could be interpreted in one of two ways. First, the identification of events with tropes (or tropes with events) could lead one to believe that tropes therefore should be taken to be complex entities that have constituents, if one is also of the opinion that events are complex entities that have constituents. Alternatively, one could also take the attitude that events therefore *lack* a constituent structure, because tropes do and events are to be identified with tropes. A philosopher who adopts the second type of view would not take issue with ($TROPE_{not\text{-}C}$), but instead would object to ($LIGHTNING_C$). (For illustrations of the second type of view, see for example Campbell 1990 and Lowe 2006a.) What matters for present purposes is only that either thesis concerning the nature of tropes (and events) commits one to an interesting and controversial position within first-order metaphysics with which other reasonable philosophers may very well disagree. In order to represent a disagreement of this sort as the substantive dispute that it appears to be, however, we must be able to have recourse to an alternative conception of ontological dependence which does not subsume every case of ontological dependence under the same rubric as the relation that holds between a collection or constructed entity and the constituents from which it is constructed.

points in the opposite direction, i.e., that the tomato *has* its redness trope as a constituent, not that the tomato *is* a constituent of its redness trope. Similarly, in the case of Aristotelian universals: perhaps the most significant difference between those who are Aristotelians about universals and those who are Platonists about universals is that Aristotelians seem to want to say that universals are, in some sense, constituents of the particular objects they characterize, while Platonists place universals in a realm separate from that inhabited by the particulars they characterize. According to such a view, then, if the constituency relation is applicable to the case of Aristotelian universals at all, it would again point in the opposite direction compared to what we observe in the case of (SET_C)–($WATER_C$): according to the Aristotelian, it is not the particular red objects, say, that *are* constituents of the universal, redness; rather, the particular red objects, if anything, *have* the universal, redness, as a constituent.

In the case of holes or boundaries, to speak of constituency at all seems a bit of a stretch.[21] For to think of a hole, which after all marks the *absence* of cheese in a piece of Emmentaler cheese, as being a constituent of a piece of cheese would require quite an unusual notion of constituency, to say the least. Similarly, in the case of boundaries: the boundary around a football field indicates where the football field ends and where the surroundings of the football field begin. But that demarcation, which itself may not be spatially extended at all, presumably should not be thought of as still included in the football field; otherwise, the boundary marking the end of the football field would be pushed out a little further beyond what we initially thought of as its boundary.

Since it is controversial to what extent (if at all) the notion of constituency applies to the cases currently under consideration, it is advisable to look for a different, and more neutral, notion in terms of which to formulate our second more fine-grained variety of essential dependence. To this end, I avail myself of the distinction between an object and its *features*:

($TROPE_F$) A trope corresponds to a certain feature had by an object.

($UNIVERSAL_F$) An Aristotelian universal corresponds to a certain feature shared by some objects.

($HOLE_F$) A hole corresponds to a certain feature had by an object (i.e., an opening).

[21] Though for the case of boundaries see for example Chisholm 1994, p. 505, who offers an account (inspired by Brentano) of boundaries, points, lines, surfaces, and the like according to which these entities do count as constituents of the objects they delineate.

($BOUNDARY_F$) A boundary corresponds to a certain feature had by an object (i.e., a demarcation of its interior from its exterior).

I use the intentionally vague expression, "corresponds to," in such a way as to leave room for different positions concerning the question of how exactly we should approach the relation between the entities to be defined (tropes, Aristotelian universals, holes, and boundaries) and the features had by an object when one of these entities is present in it. For example, one might take the relationship indicated by "corresponds to" in these statements to be simply that of identity: a trope for example, on this conception, simply *is* (numerically identical to) a certain feature had by a particular object; and so on. But one might also take the position that the entities to be defined (tropes, Aristotelian universals, holes, and boundaries) are distinct from, though no doubt tightly linked to, the presence of certain features in the objects in which they reside. For example, whenever a hole is present in an object, the object in question has certain spatial features (i.e., is perforated in a certain way); but, according to this second approach, we are nevertheless to distinguish the spatial features had by the objects in question from the holes that are present in them, perhaps because an attempt at an outright identification of holes with certain spatial features of objects faces difficulties. (For discussion, see for example Lewis and Lewis 1970.)[22]

I will state this new species of ontological dependence, which I call "feature dependence," as follows, where the phrase "corresponds to" is to be construed as leaving room for the sorts of possibilities indicated above:

(FD) *Feature Dependence:*
An entity, Φ, is *feature dependent* on an entity (or entities), Ψ, just in case (i) Ψ is a constituent (are constituents) in a real definition of Φ; (ii) and Φ corresponds to a feature of Ψ.[23]

[22] A further issue on which we may currently remain neutral is whether the presence of tropes, Aristotelian universals, holes, or boundaries in an object is *explanatorily prior to* the presence of the corresponding features in the object in question; or whether instead the reverse is the case and the corresponding features that are present in these objects are in fact explanatorily prior to the presence of tropes, Aristotelian universals, holes, or boundaries in them. I will only note here that, if the latter were the case, I wonder what purpose is served by being committed to tropes, Aristotelian universals, holes, or boundaries in the first place, if they cannot be appealed to in order to explain the presence of the corresponding features in these objects in which they are present.

[23] The notion of inherence is often used to describe the variety of ontological dependence I am calling "feature dependence," at least in cases in which the features in question are accidental to their "bearers." In his classic paper, "Inherence," G. E. L. Owen uses the term "inherence" as a technical term to apply to cases which, in the view of Aristotle's *Categories*, exhibit the relation, being in a subject, as when we accidentally predicate of a tomato for example that it is red. If features may also be essential to their

We may think of cases exhibiting this variety of essential dependence, in more vivid terms, by availing ourselves of the notion of *abstraction*, without supposing that this notion must be given an explicitly epistemic construal. Thus, a tomato's redness trope for example might be thought of as the result of an application of a process of abstraction of some sort which takes the tomato as its starting point and arrives at its redness trope by in some way blocking out all the other features present in the tomato that are not relevant to its color. And while it is of course possible to stake out a position within first-order metaphysics according to which entities which appear to be abstractions of some sort (e.g., tropes, Aristotelian universals, holes, or boundaries) are in fact best understood as constructions of some sort, such a thesis should be regarded as a highly ambitious, controversial, and substantive commitment, and not as one that is either trivially true (perhaps because it straightforwardly follows from a definition) or trivially false (perhaps because its contradiction straightforwardly follows from a definition).[24]

The one remaining case which has yet to be considered is that of smiles. Smiles are tricky entities and, depending on how one conceives of them, they could in principle be assimilated to either of the two paradigms of ontological dependence I have just distinguished, constituent dependence or feature dependence. One way of thinking of smiles would be to regard them as amenable to the constituency-driven model of ontological dependence, perhaps because they are viewed as instances of the category of events or states of affairs, e.g., as comparable to lightning or heat. According to this conception, smiles turn out to be complex entities that are in some way constructed from mouths as their constituents. Alternatively, smiles might also be regarded as amenable to the feature-driven conception of real definition and ontological dependence, perhaps because they are viewed as instances of the category of tropes or Aristotelian universals. On this view, smiles are taken to correspond to features (and perhaps constituents) of the objects in which they are present. According to both models, smiles may be thought of as essentially dependent on mouths, in the sense that mouths figure as constituents in real

"bearers," then Aristotle's notion of being said of a subject (i.e., essentially predicating of something, e.g., Socrates, that it belongs to a certain taxonomic category, e.g., the species, human being, or the genus, animal) may also be subsumed under my notion of "feature dependence."

[24] Similar remarks apply to the reverse position, according to which all entities which appear to be constructions of some sort are in fact best understood as abstractions of some sort. Such a position should also be understood as involving a substantive commitment over which reasonable philosophers may very well meaningfully disagree.

definitions of smiles. But the first conception of smiles has the consequence that smiles are to be viewed as constructed entities of some sort that *have* mouths as constituents, while the second conception might lead one to think that smiles are abstracted entities which, if anything, *are* constituents of mouths. My aim, for present purposes, is not to adjudicate between these two alternative ways of thinking of the relation between smiles and mouths, the constituency-driven model or the feature-driven model, but only to indicate how the two varieties of ontological dependence just distinguished would lead to quite different ways of conceiving of the relationship between smiles and mouths.[25]

7.6

In conclusion, I began by noting that a certain kind of asymmetric dependence holds between smiles and mouths and other candidate pairs of entities; I called this relation "ontological dependence." A plausible account of ontological dependence is proposed in Fine 1995a, according to which this notion is to be understood in terms of a non-modal and properly constrained notion of essence. According to Fine, an entity, Φ, ontologically depends on an entity (or entities), Ψ, just in case Ψ is a constituent (or are constituents) of the essence, narrowly construed, of Φ. I commented above on the possibility of defining the narrower notion of essence ("constitutive essence") that is needed for this account in terms of a wider one ("consequential essence") and concluded that there is no way around taking either a properly constrained conception of essence or a

[25] I do not intend to imply that the two varieties of ontological dependence I distinguish here necessarily exhaust the whole spectrum of relations in the vicinity of ontological dependence that need to be recognized. For one thing, it might turn out to be necessary to recognize further species of ontological dependence, in addition to the ones discussed here. Moreover, it is quite plausible to think that additional relations that are interestingly different from, but also related to, ontological dependence will be needed to give a full account of such notions as substancehood, fundamentality, priority, basicness, non-derivativeness, and the like. For example, several writers (e.g., Correia 2005; Fine 2001, this volume, manuscript; Rosen 2010; Schnieder 2011) have recently focused on a relation they call "grounding" which differs from the relations of ontological dependence I have considered, among other things, in that the relata of the grounding relation are typically taken to be facts or propositions, while the relata of ontological dependence, as I have been construing it, are objects and their characteristics, activities, constituents, and so on. As noted earlier, an Aristotelian non-modal approach to essence also appeals to a grounding relation of some sort in order to explain how the necessary (but non-essential) features of objects are related to basic facts about essences. My only claim for the time being is that, even when we confine ourselves to cases involving relations between objects, their characteristics, activities, constituents, and so on, a distinction between at least two types of ontological dependence is needed; this is of course compatible with there being further relations in the vicinity of what I have been calling ontological dependence which also deserve to be recognized.

properly constrained conception of ontological dependence as basic in an attempt to define the other notion. To make room for a less propositional conception of essence than that assumed by Fine, I urged that we distinguish more firmly between essences, on the one hand, and real definitions, on the other, which state these essences in the form of propositions or collections of propositions.

Even if we are sympathetic to the idea that this approach gives us a serviceable general characterization of ontological dependence along essentialist lines, I have argued above that we nevertheless ought to try to go deeper in our diagnosis of *why*, in a given case, an entity is essentially ontologically dependent on another. In cases of what I have called "constituent dependence" (e.g., the relation between a set and its members), the dependent entity, Φ, is complex and has a certain constituent-structure; and the dependee entity or entities, Ψ, figure not only as constituents in Φ's real definition, but also as constituents in the defined entity, Φ, itself, according to some notion of constituency. We may think of the ontologically dependent entity here as resulting from an application of an operation of *collection* or *construction* of some sort, which takes the constituent entities as building-blocks and constructs the resulting entity from them by means of an item-generation operation of some sort. But this constituency-driven model is not obviously applicable to all cases in which we want to classify an entity as ontologically dependent on another. For, in some cases (e.g., a tomato's redness trope), it may be more natural to think of an entity as essentially dependent on another in the sense of what I have called "feature dependence," according to which the dependent entity corresponds to a feature that is present in a "bearer" or "host." In a case of feature dependence, the ontologically dependent entity may be thought of as the result of an application of a process of *abstraction* of some sort which takes the "bearer" or "host" as its starting point and arrives at the abstracted entity by in some way blocking out all the other features present in this object that are irrelevant to the case at hand. It is useful not to collapse these two varieties of essential dependence into one another, since they yield two potentially very different measures of ontological fundamentality (or substancehood, basicness, primacy, non-derivativeness, priority, and the like). Moreover, reasonably minded philosophers may certainly engage in what appear to be substantive disagreements over which (if either) notion of ontological dependence is appropriate in a given case.

As a number of writers have noted, it is plausible to think that dependence and explanation are related in something like the following way: an explanation, when successful, captures or represents (e.g., by

means of an argument or an answer to a "why"-question) an underlying real-world relation of dependence of some sort which obtains among the phenomena cited in the explanation in question. Thus, a successful causal explanation for example gives expression to (linguistically or otherwise) an underlying real-world relation of causal dependence which obtains between events or whatever the preferred relata of the causal relation are.[26] If this connection between explanation and dependence generalizes, then we would expect relations of ontological dependence to give rise to explanations within the realm of ontology, in the sense that a successful ontological explanation captures or gives expression to an underlying real-world relation of ontological dependence of some sort. If my remarks in this chapter are on the right track, then at least some characteristically ontological explanations take the form of real definitions, i.e., propositions that are explanatory of the essential nature of, or what it is to be, a certain kind of entity. Our grasp of such characteristically ontological explanations is thus advanced by developing a deeper and more fine-grained understanding of what may be accomplished by a real definition.[27]

[26] For remarks along these lines, see for example Audi forthcoming, manuscript c; Correia 2005; Fine 1995a, 2001, this volume, manuscript; Kim 1994; Lowe 1994, 2005b, 2008a; Rosen 2010; Ruben 1990; Schnieder 2006a, 2011; Strevens 2008.

[27] The connection between ontological dependence and explanation is certainly very suggestive and deserves to be worked out in much more detail. If at the end of the day we want to be left with a substantive notion of ontological dependence (as well as related concepts, such as those of priority, primacy, basicness, non-derivativeness, fundamentality, substancehood, and the like), the type of explanation at work here cannot be viewed as one that is to be understood in primarily subjective, pragmatic, or epistemic terms. Although it is very common these days to think of explanation in this way, other approaches to explanation, which are more conducive to a realist understanding of this notion, are available. For example, one might hold that any explanatory connection between a phenomenon, Ψ, and a phenomenon, Φ, can be traced back to there being a *law* connecting Ψ and Φ. And at least some philosophers who have a relatively easy time hearing the explanatory "because" as a highly pragmatic, subjective, epistemic, and/or context-sensitive connective may perhaps find it more difficult to swallow that what counts as a law should similarly be tailored to interests or other occasion-dependent features. Aristotle's famous doctrine of the four causes or explanatory factors also allows for a realist approach to explanation: matter (material cause), form (formal cause), telos (final cause), and source of change (efficient cause), in Aristotle's view, are real and privileged constituents of the world, even though which of these aspects is of particular importance to us, when we ask a specific "why"-question, may of course vary from occasion to occasion.

Bibliography

Achinstein, P. 1975. 'Causation, Transparency, and Emphasis', *Canadian Journal of Philosophy* 5: 1–23

Alexander, H. G. 1956. *The Leibniz-Clarke Correspondence.* Manchester University Press

Allen, R. E. 1970. *Plato's 'Euthyphro' and the Earlier Theory of Forms.* London: Routledge

Armstrong, D. M. 1997. *A World of States of Affairs.* Cambridge: Cambridge University Press

2004. *Truth and Truthmakers.* Cambridge: Cambridge University Press

Audi, P. forthcoming. 'Grounding: Toward a Theory of the In Virtue Of Relation', *Journal of Philosophy*

unpublished manuscript a. 'How Do Properties Account for Causal Powers?'

unpublished manuscript b. 'How to Rule Out Disjunctive Properties'

unpublished manuscript c. 'Non-Causal Determination'

Ayer, A. J. 1959. *Logical Positivism.* New York: The Free Press

Azzouni, J. 2004. *Deflating Existential Consequence: A Case for Nominalism.* Oxford University Press

2007. 'Ontological Commitment in the Vernacular', *Noûs* 41, 2: 204–26

2009. 'Evading Truth Commitments: The Problem Reanalyzed', *Logique & Analyse*: 139–76

2010a. 'Ontology and the Word "Exist": Uneasy Relations', *Philosophia Mathematica* 18, 1: 74–101

2010b. *Talking About Nothing: Numbers, Hallucinations and Fictions.* Oxford University Press

Barker, S. J. 2007. *Global Expressivism.* University of Nottingham ePrints manuscript. 'Alethic Reality and Truth-Making'

2011. 'Faultless Disagreement, Cognitive Expressivism, and Absolute, but Non-Objective Truth', *Proceedings of the Aristotelian Society* 110: 183–99

Barker, S. J. and Jago, M. forthcoming. 'Being Positive About Negative Facts', *Philosophy and Phenomenological Research*

Batchelor, R. 2010. 'Grounds and Consequences', *Grazer Philosophische Studien* 80: 65–77

Baumgarten, A. G. 1757. *Metaphysica.* 4th edn. Magdeburg: Hemmerde

Beebee, H. and Dodd, J. (eds.) 2005. *Truthmakers: The Contemporary Debate.* Oxford: Clarendon Press

Beebee, H., Hitchcock, C., and Menzies, P. (eds.) 2009. *The Oxford Handbook of Causation.* Oxford University Press

Bennett, J. 1988. *Events and Their Names.* Indianapolis: Hackett

2001. *Learning from Six Philosophers.* Oxford University Press

Bennett, K. 2011. 'Construction Area (No Hard Hat Required)', *Philosophical Studies* 154, 1: 79–104

forthcoming. 'By Our Bootstraps', *Philosophical Perspectives*

Bermúdez, J. L. (ed.) 2005. *Thought, Reference, and Experience: Themes from the Philosophy of Gareth Evans.* Oxford: Clarendon Press

Bigelow, J. 1988. *The Reality of Numbers.* Oxford University Press

Bird, A. 2007a. 'The Regress of Pure Powers?', *Philosophical Quarterly* 57: 513–34

2007b. *Nature's Metaphysics: Laws and Properties.* Oxford: Clarendon Press

Blackburn, S. 1987. 'Morals and Modals', in MacDonald and Wright 1986

1993. *Essays in Quasi-Realism.* New York: Oxford University Press

Bolzano, B. 1810. *Beyträge zu einer begründeteren Darstellung der Mathematik.* Prag: Caspar Widtmann

1810–12. 'Aetiologie' (manuscript, posthumously published), in *Bernard Bolzano Gesamtausgabe, Stuttgart*: 1969ff. Volume II A 5, 75–112

1837. *Wissenschaftslehre* (4 vols.). Sulzbach: Seidel

1838. 'Was ist Philosophie?', in *Bernard Bolzano Gesamtausgabe, Stuttgart*: 1969ff. Volume II A 12/3, 13–33.

Bottani, A. and Davies, R. (eds.) 2006. *Modes of Existence.* Frankfurt a. M.: Ontos

Bottani, A., Carrara, M., and Giaretta, P. (eds.) 2002. *Individuals, Essence and Identity: Themes of Analytic Philosophy.* Dordrecht: Kluwer

Bradley, F. H. 1969. *Appearance and Reality: A Metaphysical Essay.* 2nd edn. Oxford University Press

Cameron, R. 2007. 'How to Be a Truthmaker Maximalist', *Noûs* 42, 3: 410–21

2008a. 'Truthmakers and Ontological Commitment: Or, How to Deal with Complex Objects and Mathematical Ontology without Getting into Trouble', *Philosophical Studies* 140, 1: 1–18

2008b. 'Truthmakers, Realism and Ontology', in Le Poidevin 2008, 107–208

forthcoming. 'Truth-Makers', in Glanzberg, M. *Oxford Handbook of Truth.* Oxford University Press

Campbell, K. 1990. *Abstract Particulars.* Oxford: Basil Blackwell

Caputo, S. 2007. 'Truth-making: What it is not and What it Could be', in Monnoyer 2007, 275–311

Carnap, R. 1931. 'Überwindung der Metaphysik durch logische Analyse der Sprache', *Erkenntnis* 2: 219–41

1932. 'The Elimination of Metaphysics through Logical Analysis of Language', in Ayer 1959, 60–81

Chalmers, D., Manley, D., and Wasserman, R. (eds.) 2009. *Metametaphysics: New Essays on the Foundations of Ontology.* Oxford University Press

Chisholm, R. 1994. 'Ontologically Dependent Entities', *Philosophy and Phenomenological Research* 54, 3: 499–507
Clatterbaugh, K. C. 1973. *Leibniz's Doctrine of Individual Accidents.* Wiesbaden: Franz Steiner Verlag
Cohen, R., Hooker, C., Michalos, A., and van Evra, J. (eds.) 1974. *Proceedings of the 1974 Biennial Meeting, Philosophy of Science Association.* Dordrecht: Reidel Publishing
Collins, J., Hall, N., and Paul, L. A. (eds.) 2004. *Causation and Counterfactuals.* Cambridge: MIT Press
Corkum, P. 2008. 'Aristotle on Ontological Dependence', *Phronesis* 53: 65–92
forthcoming. 'Substance and Independence in Aristotle', in Hoeltje, Schnieder, and Steinberg forthcoming
Correia, F. 2004. 'Husserl on Foundation', *Dialectica* 58, 3: 349–67
2005. *Existential Dependence and Cognate Notions.* Munich: Philosophia Verlag
2008. 'Ontological Dependence', *Philosophy Compass* 3: 1013–32
2010. 'Grounding and Truth-Functions', *Logique et Analyse* 53: 251–79
2011. 'From Grounding to Truth-Making: Some Thoughts', in A. Reboul, *Philosophical papers dedicated to Kevin Mulligan* (online)
forthcoming a. 'On the Reduction of Necessity to Essence', *Philosophy and Phenomenological Research*
forthcoming b. 'Metaphysical Grounds and Essence', in Hoeltje, Schnieder, and Steinberg forthcoming
Cover, J. and O'Leary-Hawthorne, J. 1999. *Substance and Individuation in Leibniz.* Cambridge University Press
Craver, C. 2007. *Explaining the Brain.* Oxford University Press
Creath, R. 1990. *Dear Carnap, Dear Van: The Quine-Carnap Correspondence and Related Work.* Berkeley: University of California Press
Crusius, C. 1743. *De usu et limitibus principii rationis determinantis vulgo sufficientis.* Leipzig
Dancy, J. 1993. *Moral Reasons.* Oxford: Blackwell
Dasgupta, S. manuscript. 'On the Plurality of Grounds'
Davidson, D. 1967. 'Causal Relations', in Davidson 1986, 149–62
1977. 'The Method of Truth in Metaphysics', in Davidson 1986, 199–214
1980. 'The Individuation of Events', in Davidson 1986
1984. *Inquiries into Truth and Interpretation.* New York: Oxford University Press
1986. *Essays on Actions and Events.* Oxford University Press
Della Rocca, M. 2003. 'A Rationalist Manifesto: Spinoza and the Principle of Sufficient Reason', *Philosophical Topics* 31: 75–93
2008a. 'Rationalism Run Amok: Representation and the Reality of Affects in Spinoza', in Huenemann 2008, 26–52
2008b. *Spinoza.* New York: Routledge
2010. 'PSR', *Philosophers' Imprint* 10, 1–13
forthcoming. 'Rationalism, Idealism, Monism, and Beyond', in Förster and Melamed forthcoming

deRosset, L. 2010. 'Getting Priority Straight', *Philosophical Studies* 149: 73–97
Dipert, R. R. 1997. 'The Mathematical Structure of the World: The World as Graph', *Journal of Philosophy* 94: 329–58
Divers, J. 2002. *Possible Worlds.* London: Routledge
Dodd, J. 2007. 'Negative Truths and Truthmaker Principles', *Synthese* 156: 383–401
Dorr, C. 2002. The Simplicity of Everything. Ph.D. Dissertation, Princeton University. Online available at http://users.ox.ac.uk/~sfop0257/papers/SimplicityOfEverything.pdf
Field, H. 1972. 'Tarski's Theory of Truth', *Journal of Philosophy* 69, 347–75
1980. *Science Without Numbers: A Defence of Nominalism. Library of Philosophy and Logic.* Oxford: Blackwell
1984. 'Critical Notice of Crispin Wright: Frege's Conception of Numbers as Objects', *Canadian Journal of Philosophy* 14: 637–62. Reprinted in Field 1989, 147–70
1989. *Realism, Mathematics and Modality.* Oxford: Blackwell.
1994. 'Deflationist Views of Meaning and Content', *Mind* 103: 249–85. Reprinted in Field 2001, 332–60
2001. *Truth and the Absence of Fact.* New York: Oxford University Press
Fine, K. 1975. 'Review of *Counterfactuals* by David Lewis', *Mind* 84: 451–8. Reprinted in Fine 2005a
1991. 'The Study of Ontology', *Noûs* 25: 263–94
1994. 'Essence and Modality', *Philosophical Perspectives* 8: 1–16
1995a. 'Ontological Dependence', *Proceedings of the Aristotelian Society* 95: 269–90
1995b. 'Senses of Essence', in Sinnott-Armstrong, Raffman, and Asher 1995, 53–73
1995c. 'The Logic of Essence', *Journal of Philosophical Logic* 24: 241–73
2001 'The Question of Realism', *Philosopher's Imprint* 1, 1: 1–30. Reprinted in Bottani, Carrara, and Giaretta 2002, 3–41
2005a. *Modality and Tense: Philosophical Papers.* Oxford: Clarendon Press
2005b. 'The Varieties of Necessity', in Fine 2005a
2010a. 'Towards a Theory of Part', *Journal of Philosophy* 107, 11, 559–89
2010b. 'Some Puzzles of Ground', *Notre Dame Journal of Formal Logic* 51, 1: 97–118
2012a. 'The Pure Logic of Ground', *Review of Symbolic Logic* 5, 1: 1–25
2012b.'Counterfactuals without Possible Worlds', to appear in *Journal of Philosophy*
manuscript. 'Factualist Semantics'
Forbes, G. 1985. *The Metaphysics of Modality, Clarendon Library of Logic and Philosophy.* Oxford University Press
Förster, E. and Melamed, Y. (eds.) forthcoming. *Spinoza and German Idealism.* Cambridge University Press
Fox, J. F. 1987. 'Truthmaker', *Australasian Journal of Philosophy* 65: 188–207

French, S. and Krause, D. 2006. *Identity in Physics: A Historical, Philosophical, and Formal Analysis.* Oxford: Clarendon Press
Garfinkel, A. 1981. *Forms of Explanation: Rethinking the Questions in Social Theory.* New Haven: Yale University Press
Gasking, D. 1955. 'Causation and Recipes', *Mind* 54: 479–87
Gillet, C. and Loewer, B. (eds.) 2001. *Physicalism and its Discontents.* Cambridge: Cambridge University Press.
Goodman, N. 1951. *The Structure of Appearance.* Indianpolis: Bobbs-Merrill Publishing Company
1954. *Fact, Fiction and Forecast.* Cambridge: Harvard University Press
Hale, R. and Hoffman, A. (eds.) 2010. *Modality: Metaphysics, Logic, and Epistemology.* New York: Oxford University Press
Hall, N. 2000. 'Causation and the Price of Transitivity', *Journal of Philosophy* 97: 198–222
Hall, N. and Paul, L. A. forthcoming. *Causation: A User's Guide.* Oxford University Press
Halpern, J. 2000. 'Axiomatizing Causal Reasoning', *Journal of Artifical Intelligence Research* 12: 317–37
Hawthorne J. 2006. *Metaphysical Essays.* Oxford University Press
Heil, J. 2003. *From a Logical Point of View.* Oxford: Clarendon Press
2004. 'Properties and Powers', *Oxford Studies in Metaphysics* 1: 223–54
Hempel, C. G. 1965. *Aspects of Scientific Explanation.* New York: The Free Press
Henninger, M. G. 1989. *Relations: Medieval Theories 1250–1325.* Oxford: Clarendon Press
Hitchcock, C. R. 1996. 'The Role of Contrast in Causal and Explanatory Claims', *Synthese* 107: 395–419
2001. 'The Intransitivity of Causation Revealed in Equations and Graphs', *Journal of Philosophy* 98: 273–99
Hocutt, M. 1974. 'Aristotle's Four Becauses', *Philosophy* 49, 385–99
Hoeltje, M., Schnieder, B., and Steinberg A. (eds.) forthcoming. *Dependence.* Munich: Philosophia Verlag
Hofweber, T. 2009. 'Ambitious, Yet Modest, Metaphysics', in Chalmers, Manley, and Wasserman 2009, 260–89
Horgan, T. and Potrč, M. 2008. *Austere Realism: Contextual Semantics Meets Minimal Ontology.* Cambridge: MIT Press
Hornsby, J. 2005. 'Truth without Truth-Making Entities', in Beebee and Dodd 2005, 33–47
Horsten, L. 2010. 'Impredicative Identity Criteria', *Philosophy and Phenomenological Research* 80: 411–39
Horwich, P. 2006. 'Red in Truth and Core', *Times Literary Supplement,* 6 January: 26
2008. 'Being and Truth', *Midwest Studies in Philosophy* 32: 258–73
Huenemann, C. (ed.) 2008. *Interpreting Spinoza.* Cambridge University Press
Husserl, E. 1900–1901. *Logische Untersuchungen.* Halle: M. Niemeyer

Jackson, F. 1998. *From Metaphysics to Ethics: A Defence of Conceptual Analysis.* Oxford: Clarendon Press
manuscript. 'Some Reflections on Representationalism'
Jackson, F. and Priest, G. (eds.) 2004. *Lewisian Themes: The Philosophy of David K. Lewis.* Oxford University Press.
Jago, M. 2009. 'The Conjunction and Disjunction Theses', *Mind* 118: 411–15
Jenkins, C. 2011. 'Is Metaphysical Dependence Irreflexive?', *The Monist* 94: 267–76
Johnston, M. 1997. 'Manifest Kinds', *The Journal of Philosophy* 94, 11: 564–83
2006. 'Hylomorphism', *The Journal of Philosophy* 103, 12: 652–98
Kalderon, M. 2007. *Moral Fictionalism.* Oxford University Press
Kant, I. 1755. *Principiorum primorum cognitionis metaphysicae nova dilucidatio.* Translation in Kant, *Theoretical Philosophy 1755–1770.* Ed. and trans. David Walford and Ralf Meerbote. Cambridge University Press, 1992, 1–45
Kim, J. 1974. 'Noncausal Connections', *Noûs* 8: 41–52
1983. 'Supervenience and Supervenient Causation', *Southern Journal of Philosophy* 22: 45–56
1984. 'Concepts of Supervenience', *Philosophy and Phenomenological Research* 45: 153–76
1993. *Supervenience and the Mind: Selected Philosophical Essays.* Cambridge University Press
1994. 'Explanatory Knowledge and Metaphysical Dependence', *Philosophical Issues Vol. 5: Truth and Rationality,* 51–69
Koslicki, K. 2008. *The Structure of Objects.* Oxford University Press
2012. 'Essence, Necessity and Explanation', in Tahko 2012, 187–206
forthcoming. 'Ontological Dependence: An Opinionated Survey', in Hoeltje, Schnieder, and Steinberg forthcoming
Kripke, S. 1980. *Naming and Necessity.* Cambridge: Harvard University Press
Kulstad, M. 1980. 'A Closer Look at Leibniz's Alleged Reduction of Relations', *Southern Journal of Philosophy* 18: 417–32
Künne, W. 2003. *Conceptions of Truth.* Oxford: Clarendon Press
Ladyman, J. 2007. 'On the Identity and Diversity of Objects in a Structure', *Proceedings of the Aristotelian Society* 81: 23–43
Le Poidevin, R. (ed.) 2008. *Being: Contemporary Developments in Metaphysics. Royal Institute of Philosophy Supplement,* vol. 83. Cambridge University Press
Leibniz, G. W. *Leibniz: Philosophical Essays.* Trans. by R. Ariew and D. Garber. Indianapolis: Hackett, 1989
New Essays on Human Understanding. Ed. and trans. P. Remnant and J. Bennett. Cambridge University Press, 1981
De Summa Rerum: Metaphysical Papers, 1675–1676. Ed. and trans. G. H. R. Parkinson. New Haven: Yale University Press, 1992
Die Philosophischen Schriften von Gottfried Wilhelm Leibniz. 7 vols. Ed. C. Berlin: Weidmann, Gerhardt 1875–1890
Gottfried Wilhelm Leibniz: Fragmente zur Logik. Ed. F. Schmidt. Berlin: Akademie Verlag, 1960

Opuscules et Fragments Inédits de Leibniz: Extraits des Manuscrits de la Bibliothèque Royale de Hanovre. Ed. L. Couturat. Reprinted Hildesheim: Olms Verlag, 1903
Philosophical Papers and Letters. Ed. and trans. L. Loemker. Dordrecht: Reidel, 1969
Sämtliche Schriften und Briefe. Darmstadt and Berlin: Berlin Academy, 1923–present
Textes inédits d'après les manuscrits de la Bibliothèque provinciale de Hanovre, vol. II. G. Grua. Paris: Presses Universitaires de France, 1948
Theodicy. Trans. by E. M. Huggard. LaSalle, Illinois: Open Court, 1985
Lepore, E. 1995. 'Quine, Analyticity and Transcendence', *Noûs* 29: 468–80
Lepore, E. and McLaughlin, B. (eds.) 1985. *Actions and Events: Perspectives on the Philosophy of Donald Davidson.* Oxford: Blackwell
Leuenberger, S. 2008. 'Supervenience in Metaphysics', *Philosophy Compass* 3: 749–62
Lewis, D. 1975. 'Language and languages', in *Minnesota Studies in the Philosophy of Science*, vol. VII. Minneapolis: University of Minnesota Press, 3–35
1984. 'Putnam's Paradox', *Australasian Journal of Philosophy* 62, 3: 221–36
1986. *On The Plurality of Worlds.* Oxford: Basil Blackwell
1991. *Parts of Classes.* Oxford: Basil Blackwell
1999a. *Papers on Metaphysics and Epistemology.* Cambridge University Press
1999b. 'New Work for a Theory of Universals', in Lewis 1999a, 8–55
1999c. 'Reduction of Mind', in Lewis 1999a, 291–324
2000. 'Causation as Influence', *Journal of Philosophy* 97: 182–97
2003. 'Things qua Truthmakers' and postscript, in Rodríguez-Pereyra 2003, 25–42
Lewis, D. and Lewis, S. 1970. 'Holes', *Australasian Journal of Philosophy* 48, 2: 206–12
1986. 'Holes', *Philosophical Papers*, vol. I. Oxford University Press, 3–9
Liggins, D. 2008. 'Truthmakers and the Groundedness of Truth', *Proceedings of the Aristotelian Society* 108: 177–96
Locke, J. 1975. *An Essay Concerning Human Understanding.* Oxford: Clarendon Press
Loewer, B. 2001. 'From Physics to Physicalism', in Gillet and Loewer, 37–56
Loux, M. J. and Zimmerman, D. W. (eds.) 2005. *The Oxford Handbook of Metaphysics.* Oxford University Press
Lowe, E. J. 1989a. 'What is a Criterion of Identity?', *Philosophical Quarterly* 39: 1–21
1989b. 'Impredicative Identity Criteria and Davidson's Criterion of Event Identity', *Analysis*: 178–81
1994. 'Ontological Dependency', *Philosophical Papers* 23, 1: 31–48
1995. 'The Metaphysics of Abstract Objects', *Journal of Philosophy* 92: 509–24
1998. *The Possibility of Metaphysics: Substance, Identity, and Time.* Oxford University Press
2002. *A Survey of Metaphysics.* Oxford University Press

2003. 'Individuation', in Loux and Zimmerman 2005.
2005a. 'Identity, Vagueness, and Modality', in Bermúdez 2005
2005b. 'Ontological Dependence', *Stanford Encyclopedia of Philosophy.* Online available at http://plato.stanford.edu/entries/dependence-ontological/ (last revised in 2009)
2006a. *The Four-Category Ontology: A Metaphysical Foundation for Natural Science.* Oxford: Clarendon Press
2006b. 'Powerful Particulars: Review Essay on John Heil's *From an Ontological Point of View*', *Philosophy and Phenomenological Research* 72: 466–79
2007. 'Sortals and the Individuation of Objects', *Mind and Language* 22: 514–33
2009. 'An Essentialist Approach to Truth-Making', in Lowe and Rami 2008, 201–16
2010. 'On the Individuation of Powers', in Marmodoro 2010
Lowe, E. J. and Rami, A. (eds.) 2008. *Truth and Truth-Making.* Durham: Acumen Publishing
MacBride, F. 2005. 'Lewis's Animadversions on the Truthmaker Principle', in Beebee and Dodd 2005, 117–40
MacDonald, G. and Wright, C. (eds.) 1986. *Fact, Science and Value: Essays in Honor of A. J. Ayer's 'Language, Truth and Logic'.* Oxford: Blackwell
Mackie, J. L. 1977. *Ethics: Inventing Right and Wrong.* Harmondsworth: Penguin
Mackie, P. 2006. *How Things Might Have Been: Individuals, Kinds, and Essential Properties.* Oxford: Clarendon Press
Mancosu, P. 1999. 'Bolzano and Cournot on Mathematical Explanation', *Revue d'histoire des sciences* 52, 429–56
Marmodoro, A. (ed.) 2010. *The Metaphysics of Powers: Their Grounding and Their Manifestations.* London and New York: Routledge
Maslen, C. 2004. 'Causes, Contrasts, and the Nontransitivity of Causation', in Collins, Hall, and Paul 2004, 341–57
Mates, B. 1986. *The Philosophy of Leibniz: Metaphysics and Language.* Oxford University Press
McCullough, L. B. 1996. *Leibniz on Individuals and Individuation: The Persistence of Premodern Ideas in Modern Philosophy.* Dordrecht: Kluwer
McDermott, M. 1995. 'Redundant Causation', *British Journal for the Philosophy of Science* 46: 523–44
Melia, J. 1995. 'On What There's Not', *Analysis* 55: 223–9
2000. 'Weaseling Away the Indispensibility Argument', *Mind* 109: 455–80
2003. *Modality.* Chesham: Acumen Press
2005. 'Truth without Truthmakers', in Beebee and Dodd 2005, 67–84
Menzies, P. 2007. 'Causation in Context', in Price and Corry 2007, 191–223
2009. 'Platitudes and Counterexamples', in Beebee, Hitchcock, and Menzies 2009, 341–67
Merricks, T. 2001. *Objects and Persons.* Oxford: Clarendon Press
2007. *Truth and Ontology.* Oxford: Clarendon Press

Molnar, G. 2000. 'Truthmakers and Negative Truths', *Australian Journal of Philosophy* 78: 72–86
2003. *Powers: A Study in Metaphysics.* Oxford University Press
Monnoyer, J.-M. (ed.) 2007. *Metaphysics and Truthmakers.* Frankfurt a. M.: Ontos
Morganti, M. 2009. 'Ontological Priority, Fundamentality and Monism', *Dialectica* 63: 271–88
Mugnai, M. 1992. *Leibniz' Theory of Relations.* Stuttgart: Franz Steiner Verlag
forthcoming. 'Leibniz's Ontology of Relations: A Last Word?', Oxford Studies in Early Modern Philosophy
manuscript. 'Leibniz-Bradley'
Mulligan, K. 2006. 'Facts, Formal Objects and Ontology', in Bottani and Davies 2006, 31–46
Mulligan, K., Simons, P., and Smith, B. 1984. 'Truth-Makers', *Philosophy and Phenomenological Research* 44: 287–321
Mumford, S. (ed.) 2003. *Russell on Metaphysics.* London: Routledge
Nolan, D. P. 2002. *Topics in the Philosophy of Possible Worlds.* London: Routledge
Northcott, R. 2008. 'Causation and Contrast Classes', *Philosophical Studies* 139: 111–23
Oliver, A. 1996. 'The Metaphysics of Properties', *Mind* 105: 1–80
Orilia, F. 2009. 'Bradley's Regress and Ungrounded Dependence Chains', *Dialectica* 63: 333–41
Owen, G. E. L. 1965. 'Inherence', *Phronesis* 10: 97–105
Paul, L. A. 2000. 'Aspect Causation', *Journal of Philosophy* 97: 235–56
Pearl, J. 2000. *Causality: Models, Reasoning and Inference.* Cambridge University Press
Peramatzis, M. 2008. 'Aristotle's Notion of Priority in Nature and Substance', *Oxford Studies in Ancient Philosophy* 35: 187–247
Plantinga, A. 1974. *The Nature of Necessity.* Oxford: Clarendon Press
Plato. 2004. *Laches.* Whitefish: Kessinger Publishing
Price, H. 1992. 'Agency and Causal Symmetry', *Mind* 101: 501–20
Price, H. and Corry, R. (eds.) 2007. *Causation, Physics and the Constitution of Reality: Russell's Republic Revisited.* Oxford University Press
Prior, A. 1971. *Objects of Thought.* Oxford University Press
Putnam, H. 1971. *Philosophy of Logic.* London: George Allen and Unwin
Quine, W. V. O. 1948. 'On What There Is', *Review of Metaphysics* 5: 21–38
1951a. 'Two Dogmas of Empiricism', *Philosophical Review* 60: 20–43
1951b. 'Ontology and Ideology', *Philosophical Studies* 2: 11–15
1960. *Word and Object.* Cambridge: MIT Press
1969a. 'Epistemology naturalized', in Quine 1969d, 69–90
1969b. 'Existence and Quantification', in Quine 1969d, 91–113
1969c. 'Speaking of Objects', in Quine 1969d, 1–25
1969d. *Ontological Relativity and Other Essays.* New York: Columbia University Press

Raven M. 2009. Ontology, From a Fundamentalist Point of View. Ph.D., New York University
forthcoming. 'In Defence of Ground', *Australasian Journal of Philosophy*
Rayo, A. 2008. 'On Specifying Truth-Conditions', *Philosophical Review* 117: 385–443
Read, S. 2000. 'Truthmakers and the Disjunction Thesis', *Mind* 109: 67–79
Restall, G. 1995. *What Truthmakers Can Do for You. Automated Reasoning Project.* Canberra: Australian National University
1996. 'Truthmakers, Entailment and Necessity', *Australasian Journal of Philosophy* 74: 331–40
Rodríguez-Pereyra, G. 2002. *Resemblance Nominalism: A Solution to the Problem of Universals.* Oxford: Clarendon Press
(ed.) 2003. *Real Metaphysics.* London and New York: Routledge
2003. 'Resemblance Nominalism and Counterparts: Reply to Bird', *Analysis* 63: 229–37
2005. 'Why Truthmakers', in Beebee and Dodd 2005, 17–31
2006a. 'Truthmakers', *Philosophy Compass* 1 and 2: 186–200
2006b. 'Truthmaking, Entailment, and the Conjunction Thesis', *Mind* 115: 957–82
Rosen, G. 1990. 'Modal Fictionalism', *Mind* 99: 327–54
2010. 'Metaphysical Dependence: Grounding and Reduction', in Hale and Hoffman 2010, 109–36
Ross, W. D. (ed.) 1954. *The Works of Aristotle,* vol. VIII: Metaphysica. Oxford: Clarendon Press
Ruben, D. 1990. *Explaining Explanation.* London and New York: Routledge
Russell, B. 1910. 'Some Explanations in Reply to Mr. Bradley', *Mind* 75: 373–8
1918. *The Philosophy of Logical Atomism.* Reprinted with an introduction by D. Pears 1985. La Salle: Open Court
1919. *Introduction to Mathematical Philosophy.* London: Allen and Unwin
1992. *A Critical Exposition of the Philosophy of Leibniz.* Rev. edn. London: Routledge
2003. 'Analytic Realism', in Mumford 2003, 91–6
Salmon, W. C. 1984. *Scientific Explanation and the Causal Structure of the World.* Princeton University Press
1989. *Four Decades of Scientific Explanation.* Minneapolis: University of Minnesota Press
Sartorio, C. 2006. 'On Causing Something to Happen in a Certain Way Without Causing it to Happen', *Philosophical Studies* 129: 119–36.
Schaffer, J. 2004. 'Quiddistic Knowledge', in Jackson and Priest 2004, 210–30
2005. 'Contrastive Causation', *Philosophical Review* 114: 327–58
2009a. 'Spacetime the One Substance', *Philosophical Studies* 145: 131–48
2009b. 'On What Grounds What', in Chalmers, Manley, and Wasserman 2009, 347–83
2010a. 'Monism: The Priority of the Whole', *Philosophical Review* 119, 1: 31–76
2010b. 'The Internal Relatedness of All Things', *Mind* 119: 341–76

2010c. 'Contrastive Causation in the Law', *Legal Theory* 16: 259–97
forthcoming. 'Causal Contextualisms: Contrast, Default, and Model', in M. Blaauw (ed.), *Contrastivism in Philosophy*. Routledge
manuscript. 'Structural Equation Models of Ground'
Schaffner, K. 1976. 'Reductionism in Biology: Prospects and Problems', in Cohen, Hooker, Michalos, and van Evra 1974, 613–32
Schnieder, B. 2006a. 'A Certain Kind of Trinity: Dependence, Substance, Explanation', *Philosophical Studies* 129: 393–419
2006b. 'Troubles with Truth-Making: Necessitation and Projection', *Erkenntnis* 64: 61–74
2006c. 'Truth-Making Without Truth-Makers', *Synthese* 152: 21–46
2010. 'A Puzzle about "Because"', *Logique & Analyse* 211: 317–43
2011. 'A Logic for "Because"', *The Review of Symbolic Logic* 4: 445–65
forthcoming. 'Bolzano on Causation and Grounding', *Journal of the History of Philosophy*
Schopenhauer, A. 1813. *Über die vierfache Wurzel das Satzes vom zureichenden Grunde*. Rudolstadt: Hof- Buch- und Kunsthandlung
Sharvy, R. 1972. 'Euthyphro 9d–11b: Analysis and Definition in Plato and Others', *Noûs* 6: 119–37
Shoemaker, S. 1998. 'Causal and Metaphysical Necessity', *Pacific Philosophical Quarterly* 79: 59–77
Sider, T. 2007. 'Against Monism', *Analysis* 67: 1–7
2008. 'Monism and Statespace Structure', *Royal Institute of Philosophy Supplements* 83: 129–50
2009. 'Ontological Realism', in Chalmers, Manley, and Wasserman 2009, 384–423
2011. *Writing the Book of the World*. Oxford University Press
Simons, P. 1982. 'Three Essays in Formal Ontology', in Smith 1982, 111–260
1987. *Parts: A Study in Ontology*. Oxford: Clarendon Press
2005. 'Negatives, Numbers and Necessity: Some Worries about Armstrong's Version of Truthmaking', *Australasian Journal of Philosophy* 83: 253–61
Sinnott-Armstrong, W., Raffman, D., and Asher, N. 1995. *Modality, Morality, and Belief: Essays in Honor of Ruth Barcan Marcus*. New York: Cambridge University Press
Skiles, A. manuscript. 'Getting Grounded'
Sklar, L. 1967. 'Types of Inter-Theoretic Reduction', *British Journal for the Philosophy of Science* 18: 109–24
Smith, B. (ed.) 1982. *Parts and Moments: Studies in Logic and Formal Ontology*. Munich: Philosophia Verlag
1999. 'Truthmaker Realism', *Australasian Journal of Philosophy* 77: 274–91
Smith, B. and Mulligan, K. 1982. 'Pieces of a Theory', in Smith 1982, 15–109
Sorensen, R. 2009. 'Nothingness', *Stanford Encyclopedia of Philosophy*. Online available at http://plato.stanford.edu/entries/nothingness/
Spinoza, B. *Spinoza Opera*. Ed. C. Gebhardt. Heidelberg: Carl Winter, 1925

Spinoza: The Letters. Trans. by S. Shirley. Indianapolis: Hackett, 1995
The Collected Works of Spinoza, vol. 1. Ed. and trans. E. Curley. Princeton University Press, 1985
Strevens, M. 2008. *Depth: An Account of Scientific Explanation*. Cambridge: Harvard University Press
Tahko, T. (ed.) 2012. *Contemporary Aristotelian Metaphysics*. Cambridge University Press.
Tatzel, A. 2002. 'Bolzano's Theory of Ground and Consequence', *Notre Dame Journal of Symbolic Logic* 43: 1–25
Taylor, R. 1955. 'Disputes about Synonymy', *The Philosophical Review* 63: 517–29
Terese. 2003. *Term Rewriting Systems*. Cambridge: Cambridge Tracts in Computer Science
Thomasson, A. L. 2006. 'Metaphysical Arguments Against Ordinary Objects', *Philosophical Quarterly* 56: 340–59
Trogdon, K. forthcoming. 'Grounding – An Overview', in Hoeltje, Schnieder, and Steinberg forthcoming
Van Fraassen, B. 1969. 'Facts and Tautological Entailments', *Journal of Philosophy* 66: 477–87
1980. *The Scientific Image*. Oxford University Press
Van Inwagen, P. 1990. *Material Beings*. Ithaca and London: Cornell University Press
2008. *Metaphysics*. 3rd edn. Boulder: Westview
Wedgwood, R. 2007. *The Nature of Normativity*. Oxford: Clarendon Press
Whitcomb, D. 2011. 'Grounding and Omniscience', in *Oxford Studies in Philosophy of Religion* 4
Williams, J. R. G. 2005. The Inscrutability of Reference. Ph.D., University of St Andrews
2007. 'Eligibility and Inscrutability', *Philosophical Review* 116, 3: 361–99
2008. 'The Price of Inscrutability', *Noûs* 42, 4: 600–41
2010. 'Fundamental and Derivative Truths', *Mind* 119: 103–41
Williamson, T. 1999. 'Truthmakers and the Converse Barcan Formula', *Dialectica* 53, 253–270
2000. *Knowledge and its Limits*. Oxford: Clarendon Press
Wilson, J. manuscript. 'The Multiplicity of Grounding'
Woodward, J. 2003. *Making Things Happen: A Theory of Causal Explanation*. Oxford University Press
Yablo, S. 2001. 'Go figure: A Path Through Fictionalism', *Midwest Studies in Philosophy* 25: 72–102