Truth, Grounding & Dependence

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Truth, Grounding & Dependence

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LUND UNIVERSITY

DOCTORAL DISSERTATION

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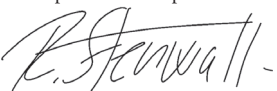
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Abstract The subjects of this thesis are (as indicated by the title) truth, grounding and dependence. The thesis consists of an introduction and five free-standing essays. The purpose of the introduction is not merely to summarize the papers, but to provide a general background to the discussions in the essays. The introduction is divided into four chapters, each of which splits into a number of sections and/or subsections. Chapter 1. concerns the notion of ontological dependence. I start by making a distinction between two different types of ontological dependence and discuss how well these notions deal with a number of philosophical issues. I then go on to consider the role that ontological dependence plays in hierarchies of natural kinds. In Chapter 2., I discuss a related notion, namely that of grounding. I sketch the theoretical framework by specifying the logical form of grounding statements and a set of structural principles that govern grounding. The chapter ends with a brief discussion on some philosophical applications of grounding. Chapter 3. deals with the notion of truthmaking and how it squares with the grounding framework developed in the previous chapter. I present the reader with the so-called Truthmaker Principle, and provide answers to a number of questions that it raises. The fourth and final chapter summarizes the five papers.

The six essays are thematically divided into three categories. Paper I deals with the notion of ontological dependence in hierarchies of natural kinds. Paper II concerns the notion of grounding and resemblance orderings among powers. Papers III, IV and V discuss various aspects of truthmaker theory.

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Truth, Grounding & Dependence

Robin Stenwall

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I.   **"Aspect Kinds"**

Robin Stenwall

Originally published in Persson, J & Ylikoski, P. (ed.) *Rethinking Explanation*. Series: *Boston Studies in the Philosophy of Science* 252 (2007), pp. 193-203.

II.   **"Nomological Resemblance"**

Robin Stenwall

Originally published *in Metaphysica* 14 (2013), pp. 31-46.

III.   **"Causal Truthmaking"**

Robin Stenwall

Originally published in *Metaphysica* 11 (2010), pp. 211-22.

IV.   **"Against Truthmaker Necessitarianism"**

Robin Stenwall

Accepted for publication in *Logique et Analyse*.

V.   **"Truthmaker Internalism and the Mind-Dependence of Propositions"**

Robin Stenwall

Submitted manuscript.

Acknowledgements

Preamble

The thesis is a contemporary investigation into matters concerning ontological dependence, grounding and truthmaking. Those who were expecting an opinionated sketch of the central notions will have to wait. The preamble is dedicated to a brief comment on one of the aims of the thesis, as well as a presupposition.

C. B. Martin once wrote that:

> My aim is to make do with things, properties and relations that make up and are the constituents of situations or states of affairs, all of which would be first-order (1996: 60).

Although not easily argued for, I agree with many Australian-minded philosophers that this is the optimal position in ontology. Like Martin and Armstrong I am a factualist in that I believe in the existence of facts or states of affairs where these are understood as things having properties and/or standing in relations. I also agree with Martin that we should strive towards an ontology that is only committed to facts of the first-order. Simply put, we should only commit ourselves to states of affairs that do not have states of affairs as constituents. Armstrong, however, begs to differ. He thinks that higher-order states of affairs are required in two rather different sorts of cases. First of all, he says, they are needed in order to provide truthmakers for negative and general truths. For what make such truths true, according to Armstrong, are totality states of affairs: for example, the state of affairs that a certain mereological fusion of first-order states of affairs are *all* the first-order states of affairs. Secondly, he thinks that higher-order states of affairs are also needed to ground laws of nature, understood as states of affairs contingently linking states-of-affairs-types (i.e. universals). An aim of the present thesis is to argue that there is no need to appeal to higher-order states of affairs. Three of my papers address this issue. In paper IV called "Against Truthmaker Necessitarianism" (*forthcoming* in *Logique et Analyse*), I provide reasons for thinking that we can make do without totality facts in accounting for general truths if we give up the requirement that truthmakers necessitate the truth of the propositions they make true. Paper III called "Causal Truthmaking" (2010) addresses the problem of finding plausible truthmakers for negative truths. Here I develop a theory according to which negative truths are grounded in causal facts of the first order. Once we allow for such truthmakers, we can do without higher-order totality facts in providing

grounds for negative truths. In paper II called "Nomological Resemblance" (2013), I argue from a dispositional essentialist perspective that higher-order properties and states of affairs are also redundant in providing grounds for laws of nature and unity among determinate properties.

The kind of factualism vindicated here should be compatible with a naturalistic ontology according to which everything that exists has its place within the causal web of our spatio-temporal world. Abstract entities like possible worlds, uninstantiated universals, sets and numbers have traditionally been understood by naturalists to fall outside the scope of what can properly be said to exist. They do not seem to have any spatial or temporal location, and appear causally inert (but see Maddy 1990). This, however, does not rule out talk about such entities. Indeed, throughout the thesis we will have reason to talk about abstract entities. It should be noted, however, that such talk is not taken to reflect the ontology, but is used merely for illustrative purposes. My naturalistic bias is perhaps most apparent in paper V "Truthmaker Internalism and the Mind-Dependence of Propositions" (*submitted*). In the paper I argue that traditional conceptions of propositions are incompatible with naturalism, and that naturalists should rather conceive of propositions (if their existence is admitted) as mind-dependent entities. I go on to examine Armstrong's naturalistic view, according to which talk about propositions reduces to talk about intentionally equivalent mental state tokens, and show that if this view is accepted, then we have to give up the idea that truthmaking is an internal relation.

This ends my preamble. The other aims and presuppositions of the thesis will be presented in due course. The thesis consists of an introductory discussion and five free-standing papers. The purpose of the introductory discussion is not merely to summarize the papers, but to provide a general theoretical background. The introduction is divided into four chapters, each of which splits up into a number of sections and subsections. Chapter 1. is dedicated to the notion of ontological dependence. I start by making a distinction between two different types of ontological dependence and discuss how well these notions deal with a number of philosophical issues. I then go on to consider the role that ontological dependence plays in hierarchies of natural kinds. In Chapter 2., I discuss a related notion, namely that of grounding. I sketch the theoretical framework by specifying the logical form of grounding statements and a set of structural principles that govern grounding. The chapter ends with a brief discussion on some philosophical applications of grounding. Chapter 3. concerns the notion of truthmaking, and how it squares with the grounding framework developed in the previous chapter. I present the reader with the so-called *Truthmaker Principle*, and provide answers to a number of questions that it raises. The fourth and final chapter summarizes the five papers.

1. Ontological Dependence

'Ontological dependence' is a term used in contemporary metaphysics to pick out a family of fundamental relations linking entities. The guiding thought behind the use of the term is that certain entities require for their ontological profile the being of certain other entities. There are, of course, many ways in which something may be said to depend on something else. The term 'logical dependence' has been used to denote the kind of dependence that holds between the truth-values of complex truth-functional propositions and their constitutive atomic propositions. For example, the truth value of $\langle P \wedge Q \rangle$ is said to depend logically on the truth value of both $\langle P \rangle$ and $\langle Q \rangle$ in that the former cannot be true unless the latter are.[1] Similarly, the term 'causal dependence' can be used to pick out the kind of dependence that holds between a cause and its effect. That dependence has been explained in various ways. In counterfactual theories of causation it is customary to conceive of effects as causally dependent on their causes in the sense that were the cause not to occur, the effect would not occur either. When talking about ontological dependence, however, we do not have either of these notions in mind. What we mean to denote with the term 'ontological dependence' is a family of more or less well-delineated relations with a distinctly metaphysical character. Thus, it has been argued that events are ontologically dependent upon their participants, tropes upon their bearers, holes upon their hosts, subordinate kinds upon their superordinate kinds, and sets upon their members. Although, most philosophers agree that all of these cases involve ontological dependence, it remains controversial whether there is a single notion at play here or many. The present chapter discusses two of the most important notions of ontological dependence. It asks whether, and to what extent, these notions improve our understanding of the philosophical issues with which they are entangled. The chapter ends with a brief discussion on the role of ontological dependence in hierarchical structures of natural kinds.

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[1] I adopt the custom of letting '$\langle P \rangle$' stand for 'the proposition that P'.

1.1. Dependent Entities

An ontologically dependent entity is one whose very being depends on the being of one or more other entities. Two things might be meant with the term 'being'. We may identify the being of an entity with its *existence* (i.e. with its being real); or we may identify the being of an entity with its *identity* or *essence* (i.e. with its being what it is). Correspondingly, there is a distinction to be drawn between the notions of *existential* and *essential dependence*. An existentially dependent entity is one whose existence requires that a certain condition is met, whereas an essentially dependent entity is one where the requirement pertains to the nature or identity of the entity in question (Correia 2008: 1014). Traditionally, requirements for existence and requirements for identity have been understood to amount to one and the same thing, and so existential and essential dependence, on the traditional view, collapse into one another. More recently, however, this understanding has been questioned. It has been claimed that there are instances of existential dependence that are not instances of essential dependence. The following two subsections are devoted to a discussion of these notions and their interrelatedness.

1.1.1. Existential Dependence

Dependency claims (whether causal, logical or ontological) usually take the following form:

(D)   x cannot be F unless y is G,

where 'x' and 'y' are placeholders for definite terms, 'F' and 'G' are placeholders for monadic predicates, and the exact modal force of the locution varies depending on the kind of dependence at hand. Consequently, it is natural to think of *existential* dependency claims as having the form:

(ExD)   x cannot exist unless y exists,

where the modal locution is taken to express metaphysical modality, rather than, say, natural or logical modality. If we let the sentential operator '□' stand for metaphysical necessity, the monadic predicate 'E' for existence and the sentential connective '⊃' for material implication, we can render (ExD) thus:

(ExD$_R$) $\Box(Ex \supset Ey)$.

The subscript '$_R$' is meant to indicate that (ExD$_R$) expresses *rigid* necessitation in that there are no possible worlds where x exists, but y does not. At first glance, this would seem to capture the intuitive notion of ontological dependence. For example, when it is said that the assassination of Archduke Franz Ferdinand is ontologically dependent upon the Archduke himself, (ExD$_R$) explicates this in terms of the fact that there are no possible worlds where the assassination takes place, but Franz Ferdinand does not exist: i.e. the assassination could not have occurred had Franz Ferdinand not existed to be assassinated in the first place. Similarly, it could be argued that the table in front of me ontologically depends on the particular wooden block it is made of in that there are no possible worlds in which the former exists, but the latter does not (Kripke 1980: 113-14).

Notice that (ExD$_R$) depicts a relation holding between *specific* entities. However, a given entity might be *generically* dependent on the existence of entities of a certain kind, rather than rigidly dependent on the existence of a particular entity. An example here, provided by Peter Simons (1987: p. 297), is that of a man who cannot exist for an instant unless the pressure at his epidermis is above a certain minimum. In this sense he is existentially dependent on matter which exerts such pressure. However, it is immaterial which parcel of matter actually presses down on his epidermis.[2] We can express this kind of generic existential dependence of particular entities on things of sort G with the following schema:

$$(ExD_{G1}) \quad \Box(Ex \supset \exists yGy),$$

read as 'the existence of x necessitates the existence of some G'.[3] Similarly, we are able to express what it means for Fs to be generically existentially dependent on Gs as:

$$(ExD_{G2}) \quad \Box\forall x\Box(Fx \supset \Box(Ex \supset \exists yGy)).$$

This is to be read 'necessarily, every F is necessarily such that it necessitates the existence of some G'. In this sense humans are generically existentially dependent on some matter or other exerting a force on their epidermis (Simons 1987: 297).

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[2] Assuming, at any rate, that anything capable of withstanding zero pressure without special equipment would not be a man, and hence that the dependence involved here is not merely causal.

[3] (ExD$_{G1}$) may also be put to use to characterize the divide between Aristotelianism and Platonism about universals. For some universal P, Aristotelians claim that:

> Necessarily, P only exists if something instantiates P.

Platonists deny this. The universal P, they claim, can exist without instantiation.

Neat as $(ExD_R) - (ExD_{G2})$ are, they are not without problems. Consider Socrates and the set whose sole member is Socrates: i.e. {Socrates}. In every possible world where the former exists, the latter also exists, and similarly in the other direction. According to (ExD_R), this means that Socrates and {Socrates} will rigidly necessitate one another. However, while it seems perfectly in order to say that the being of {Socrates} depends on Socrates, we would not want to affirm the converse—that the being of the philosopher depends on the singleton set. Intuitively, ontological dependence is asymmetrical. For any x and y, if x is ontologically dependent upon y, then y is not ontologically dependent upon x. An analysis of ontological dependence that proceeds in terms of rigid necessitation is unfit to convey this intuition, since necessitation is reflexive, and hence, non-asymmetric. Secondly, suppose that there are necessary existents. If we define ontological dependence in terms of rigid necessitation, every entity will depend for its being upon every necessary existent. Yet this seems wrong. For we would not want to say that the being of Socrates depends on the being of, say, the empty set $\varnothing$ (assuming that the empty set exists necessarily).[4]

It would, of course, be easy enough to modify the present account by imposing a general ban on the dependee being a necessary existent.[5] But this would have the disadvantage of precluding anything from depending for its existence upon necessary existents. We would be unable, for example, to express the kind of ontological dependence that the singleton set consisting of the empty set (i.e. {$\varnothing$}) confers on its member. Nor does it help to insist that the existence of the dependee be *relevantly* necessitated by the existence of the dependent entity. This relevance logic cannot be understood apart from the modal notion invoked in $(ExD_R) - (ExD_{G2})$. Furthermore, implementation of relevance logic here would simply miss the target, as nothing in the logic of the judgments in question would prohibit the existence of Socrates from relevantly necessitating the existence of the singleton set consisting of Socrates.

In light of these difficulties, an increasingly popular idea since Kit Fine's (1995) paper is that ontological dependence should be understood through the requirement of identity or essence, rather than that of existence.

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[4] A similar problem faces (ExD_{G1}). Borrowing an example from Correia (2008: 1027), let us suppose that there is the universal intelligence. Now, assuming that God exists necessarily and cannot fail to be intelligent, Aristotelianism with respect to intelligence must be true. The problem is that the divide between Aristotelianism and Platonism about intelligence is ruled out, not by the nature of the universal in question, but by a necessary existent that cannot fail to be intelligent.

[5] These (somewhat controversial) examples are used merely for illustrative purposes. One might for naturalistic reasons plausibly deny that there are sets or platonic universals. But the legitimacy of an account of ontological dependence should not be made contingent on one ontology as opposed to another.

1.1.2. Essential Dependence

An essentially dependent entity is, as already mentioned, one which would not be what it is had a condition of a certain sort not been met. Following Fine (1995), let us use the sentential operator '$\square_x$' for 'x is essentially such that'. By substituting '$\square_x$' for '$\square$' in (ExD_R) we can now define rigid essential dependence as:

$$(EsD_R) \quad \square_x(Ex \supset Ey),$$

read as 'x is essentially such that it exists only if y does'. Similarly, we can use the indexed sentential operator to define the generic counterparts of (EsD_R). Thus for example, we could define generic essential dependence as:

$$(EsD_{G1}) \quad \square_x(Ex \supset \exists yGy).$$

This is to be read 'x is essentially such that it exists only if something is a G'. We can then proceed in a similar fashion when defining what it means for Fs to be generically essentially dependent upon Gs.[6]

Once this alternative conception of ontological dependence is accepted, all of the previous difficulties disappear. Thus, by accepting (EsD_R), we are no longer committed to the view that Socrates depends for his being on {Socrates}, since there is nothing in the nature or identity of Socrates which requires that he exists only if his singleton exists. Similarly, the fact that $\varnothing$ is a necessary existent does not pertain to Socrates' identity, and so, according to (EsD_R), there is no longer the demand that the philosopher be ontologically dependent upon the empty set. This is to be contrasted with the fact that the identity of {$\varnothing$} *does* require that it exists only if the empty set exists, which, according to the essentialist, makes {$\varnothing$} ontologically dependent upon $\varnothing$ (just as it ought to be). The essentialist account appears to provide us, therefore, with an extensionally correct definition of ontological dependence without obliging us to ban necessary existents or resort to non-classical logic.[7]

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[6] Notice that the essential dependence defined here is a notion both of essential dependence and of existential dependence. This should be contrasted with the kind of existentially 'neutral' account vindicated by Fine (1995). Fine's account complicates matters further by referring to a distinction between constitutive and consequential essence. I do not have space here to pursue the details of Fine's theory.

[7] We are also able to re-characterize the divide between Aristotelianism and Platonism in terms of (EsD_{G1}). For while Aristotelians about universal P claim that:

P is essentially such that it exists only if something instantiates P,

According to the traditional conception of essence, a thing's identity or nature is nothing more than that which constitutes its objective reality. On this view, to say of a certain thing that it is essentially such and such is just to say that necessarily, if the thing exists, then it is such and such. Consequently, a quest for essential dependence will be seen as a quest for existential dependence, and *vice versa*. It is widely agreed that rigid essential necessitation entails rigid existential necessitation in that it is impossible for (EsD$_R$) to be true and (ExD$_R$) false. However, as the above examples serve to illustrate, the converse fails to hold. There are clear-cut cases of existential dependence that are not cases of essential dependence. Further examples illustrating this asymmetry can be produced.

Consider Socrates and his life. In every possible world in which the philosopher exists, there is also some temporally extended event or process that is his life. Now, assume that the lives Socrates has in these various worlds are numerically identical and at best qualitatively different. If this is so, Socrates rigidly necessitates his life. Intuitively, however, we do not want to say that Socrates is ontologically dependent upon his life. If anything, the order of dependence is the reverse. By adopting the essentialist account we are able to track this asymmetry. For although it is part of the identity of Socrates' life that it is the life of Socrates, facts about Socrates' life do not pertain to the identity or nature of Socrates himself.[8] Or consider Socrates and the type *human being*. Socrates, we may assume, cannot exist without being of that type, nor can the type have a token without existing. According to the existentialist account, the existence of the former rigidly necessitates the existence of the latter. But then, suppose we endorse a view according to which types are mere abstractions from their tokens, so that facts about a type do not pertain to what its tokens are. This is fully compatible with Socrates rigidly necessitating the existence of the type *human being*, yet it rules out the former being ontologically dependent upon the latter. Now, if we identify the being of an entity with what it is (rather than with its existence), we are able to account for this failure of dependence. For given that types are mere abstractions, there will be nothing in the nature or identity of a token which requires that it exists only if the type to which it belongs also exists (Fine 1995: 187-89).

By identifying the being of an entity with what it is (its identity) or its nature, rather than with its existence, we are thus able to achieve a better fit with our intuitive understanding of what it is for an entity to depend on some other entity. Moreover,

Platonists deny this. This removes the previous problem. It makes perfect sense to claim that even if God is a necessary existent that cannot fail to be intelligent, nothing in the nature or identity of *intelligence* requires that it exists only if something instantiates it.

[8] The example is due to Lowe (1998: 143-45).

since the existentialist conception identifies ontological dependence with a modal requirement for existence, it should be rejected in favor of the essentialist view.

1.2. Ontological Dependence between Natural Kinds

As a final note on the notion of ontological dependence, I consider the role it plays in natural kind hierarchies. It is commonly believed that natural kinds stand in species-genus relations to one another, thus forming hierarchical structures. It is also widely thought that subordinate species are ontologically dependent upon their superordinate kinds. Brian Ellis, for example, who thinks that ontological dependence is a matter of existential necessitation, argues that since subordinate species rigidly necessitate the existence of their superordinate kinds, it follows that the former are ontologically dependent upon the latter (2001: 63-67).[9] Advocates of the essentialist view might similarly argue that subordinate species are essentially such that they exist only if their corresponding superordinate kinds exist. Thus, for example, the kind *German cockroach* may be said to be existentially dependent upon the superordinate kind *insect* in that there are no possible worlds in which members of the former kind exist but not members of the latter. Similarly, one could argue that each member of the kind German cockroach is essentially such that it exists only if there are insects. Notice, however, that regardless of which notion is adopted, the dependence fails in the other direction: neither the identity nor the existence of members of the kind *insect* requires German cockroaches to exist. There may nonetheless be a *generic* sense in which superordinate kinds depend on their subordinate species. For although the natural kind *insect* is neither existentially nor essentially dependent upon the existence of members of the kind *German cockroach* (or any other species of insect for that matter), the very being of the kind *insect* would seem to require at least one of its subordinates to exist.

At this stage it is of interest to ask whether there is a *sui generis* sense in which subordinates are ontologically dependent upon their superordinates, or whether the dependence reduces to some other kind of ontological dependence. In paper I 'Aspect Kinds' (2007), I argue reduction along the following lines. Suppose we adopt an essentialist view of natural kinds according to which all members of superordinate kinds and their subordinate members share a certain set of essential properties which make them into the members of the particular kinds to which they belong (cf. Fales 1990:

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[9] Ellis conception of ontological dependence is somewhat non-standard. He says that "As are ontologically dependent upon Bs iff the existence of As entails the existence of Bs, but the existence of Bs do not entail the existence of As", where As are said to entail the existence of Bs iff As cannot exist unless Bs exist (2001: 64). See also paper I for a discussion on some of the philosophical implications of Ellis' theory.

175-76 and Ellis 2001: 77). Subordinate kinds will then have a certain set of essential properties that are not common to all members of the corresponding superordinate kind and which distinguishes them from other kinds. Thus, let both K' and K'' be species of K. The set of essential properties had by K will then be a subset of the set of essential properties had by K' and K'' respectively. For K' and K'' to be species of K is for K' and K'' to share some subset of essential properties which by itself constitutes the essence of K. For K' and K'' to be distinct species of K is for this subset to be a proper subset of the set of essential properties associated with K' and the set of essential properties associated with K''; and for K' to have some essential properties which K'' does not have, and *vice versa* (cf. Fales 1990: 176). Since the set of properties associated with K, K' and K'' are essential to their respective properties, and since sets have their members essentially, it follows that both K' and K'' will be ontologically dependent upon K. For the set of essential properties had by K' and K'' includes as a subset the essential properties of K, and that set could not lose any of its property members without K' and K'' ceasing to exist or be the kinds of things they are. It follows from this that species are both existentially and essentially dependent upon their superordinates by virtue of the set of essential properties they possess.[10]

Of course, this only accounts for the fact that subordinates are rigidly dependent upon their superordinates. It does not explain the fact (if it is a fact) that superordinates are generically dependent upon their subordinates. Why is it that a superordinate like the natural kind *insect* seems to require for its being that a specific subordinate falls under it? It is difficult to see how an answer to this question could possibly trade on the ontological dependence holding between a set and its members. Perhaps the generic dependence going from superordinates to their subordinate kinds is a primitive which admits of no further reduction. Or perhaps the sets of properties associated with superordinates are somehow metaphysically or nomologically insufficient for independent being (cf. Fales 1990: 176-78). The planned scope of this thesis does not permit detailed discussion of this matter. It is worth noting, however, that the second option shows some promise. For assuming that, as, for example Ellis (2002) argues, there is a tight connection between laws of nature and natural kinds inasmuch as laws are grounded in the essential properties of natural kinds, it seems highly unlikely that every set of essential properties corresponds to a superordinate kind which can be separately instantiated. Higher-level superordinate kinds and their essential properties must form a coherent and integrated set of natural laws. There are, of course, sets of essential properties—e.g. the union of the sets of essential properties associated with isotopes uranium-235 and chlorine-35—which do not form an

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[10] In paper II "Nomological Resemblance" (2013), I argue that if the identities of properties are exhausted by their causal powers, we are able to do without determinable properties altogether. It is an interesting question whether the present view is able to do the same with respect to superordinate kinds, but I will not discuss this matter here. For discussion, see (Gillett & Rives 2005: 490-93).

integrated whole, and so cannot be had by any natural kind. But in addition, we may assume, there are sets of essential properties which, though shared by subordinate species, do not correspond to superordinate kinds that are instantiable separately from these. The being of superordinate kinds will only be possible when they have subordinate species. This being so would explain why superordinate kinds are generically dependent upon their species.

2. Grounding

The above notion of ontological dependence trades on the idea that certain entities require—either for their existence or for their identity—the being of certain other entities. But this is not the only way in which we talk about dependence. Sometimes we are more interested in the type of dependence that holds (or fails to hold) solely between facts and the ontological grounds in virtue of which those facts obtain. Thus, for example, we may talk about objects having their functional properties *in virtue of* their physical properties, their normative or aesthetic properties *in virtue of* their natural properties, or their determinable properties *in virtue of* their determinate properties. Let us refer to this kind of dependence as *grounding* to properly distinguish it from the kind of ontological dependence discussed previously.

Although they are related, the two notions should not be confused with one another. Ontological dependence is neutral with respect to its relata. It may relate material objects, substances, properties, kinds, sets and so forth—in short, almost anything which can be thought of as an existing entity. Grounding, by contrast, is usually thought to hold solely between facts. It would thus be a mistake to talk about *objects* or *substances* standing in the grounding relation to one another. To be sure, we sometimes talk about a statue being grounded in the clay that constitutes it. But it is far from obvious that this is genuine grounding-talk, rather than talk expressing ontological dependence in the sense discussed in the previous chapter (Audi 2012: 103). Moreover, grounding is intimately connected with the notion of metaphysical explanation, in that ontological grounds are assumed to non-causally explain the facts they ground. The fact that the statue has the physical properties it has does not cause the fact that it has the aesthetic properties that it has. Rather, the fact that it has those aesthetic properties is thought to be grounded in the fact that it has the physical properties, and hence it is assumed that the former fact can be explained in terms of the latter.

This is to be contrasted with the kind of ontological dependence discussed earlier. Neither the existentialist nor the essentialist account requires the dependent entity to be metaphysically explained by that upon which it depends (whatever that may mean). This is hardly surprising. If there is nothing more to ontological dependence than a modal or essential requirement for being, we would not in general expect the dependent entity to be explained by its dependee. Again, consider the assassination of Archduke Franz Ferdinand. Existentialists and essentialists agree that the assassination

is ontologically dependent upon the Archduke himself. However, the being of Archduke does not metaphysically explain the being of the assassination (or *vice versa*).[11]

Some examples can be used to illustrate the notion of grounding further. Each of the following cases helps to bring out the central importance of grounding in contemporary metaphysics, although it should be added that it is perfectly possible to reject any of these cases while at the same time accepting the general theory of grounding.[12]

- *Dispositional facts are grounded in categorical facts* (Prior, Pargetter and Jackson 1982). A certain glass is fragile in virtue of the arrangement of the molecules that make up the glass, together with the relevant laws of nature. These make up the categorical grounds that serve to explain the fact that the glass is disposed to break upon being struck.

- *Mental facts are grounded in physical facts.* It is not just that you are feeling pain, and that purely by accident it also happens to be the case that there is a certain neural activity in your somatosensory cortex. We should rather say that the former obtains in virtue of the latter—that the mental fact (i.e. your sensation of pain) is grounded in a certain neurophysiological state of your brain.

- *Normative facts are grounded in natural facts.* There are no brute normative facts that are not ultimately to be explained in terms of natural facts. If it is a fact that you ought to keep your promise, this fact must be grounded in some natural fact which provides a reason to act in accordance with the claim. One of the central aims of normative naturalism is to identify the various ways in which normative facts can be said to obtain in virtue of natural facts.

- *Legal facts are grounded in social facts* (Hart 1961). Laws are not ultimately grounded in threats to use force, or in pre-institutional moral facts, but in social practices among officials. If it is against the law to be fat in Japan, there must be some non-legal facts in the form of official rules (or norms) in virtue of which this is so, and it must be possible to explain the legislation in question in terms of the latter.

- *Aesthetic facts are grounded in non-aesthetic facts.* The fact that Venus de Milo is beautiful is not primitive, but a fact grounded in the physical properties of the statue, such as its size, shape and color. This is what explains its beauty.

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[11] The exact nature of the link between grounding and metaphysical explanation will be discussed in greater detail in section 2.2.3. For now I will assume that grounding relations are explanatory.
[12] Examples are due to Rosen (2010: 110-11).

I take it that each of these claims makes sense, and that philosophical disciplines dealing with questions of grounding have an interest in identifying the underlying patterns of dependence. By taking the notion of grounding seriously we put ourselves in a position to consider a large range of hypotheses and analyses that might otherwise be unavailable to us. We can, for example, frame naturalism as the thesis that every fact (modal, moral, aesthetic, intentional etc.) is ultimately grounded in natural facts. Similarly, we can seek to develop an account of the normative notion of meaning in which it is claimed that semantic facts ultimately obtain in virtue of some constellation or other of normative facts (Kripke 1982).

It is true that a number of concerns arise about the grounding idiom. First of all, we do not know how to define what it is for one fact to obtain in virtue of, or be grounded in another. This is not to deny that such a definition will be provided. Perhaps it will be, perhaps it will not. However, assuming that grounding is indeed a primitive notion admitting of no further analysis, it might be suggested that such notions are somehow unintelligible or obscure.[13] But this is a misconception. The primitiveness of a notion does not imply that it is elusive. Some of the most useful philosophical notions do not lend themselves to be defined in more basic terms, yet we are justified in considering them valuable tools to be put to use in rigorous philosophical exposition. Consider notions such as metaphysical necessity and possibility. Eschewing modal realism, we do not know how to define these in more basic non-modal terms (although we do know how to define them in terms of each other).[14] Despite this, metaphysical necessity and possibility are frequently utilized in meta-

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[13] Philosophical theories rely heavily on the primitives to which they appeal. These primitives are typically used to provide solutions to problems at the stage of theory development at which it is thought that explanation ends. Thus, for example, depending on whether one subscribes to a substance-attribute theory or a bundle theory of particulars, one might try to put a stop to Bradley's regress by either taking instantiation to be a non-relational primitive (Armstrong 1978) or by postulating that compresence is a primitive relation between universals (Russell 1940). In each case the threat of an ensuing regress is thought to be avoided by postulating a fundamental relation which is incapable of further analysis and which sustains the metaphysics in question.

Most theorists take grounding to be a primitive for a similar reason. Suppose the fact that you have a headache is grounded in the fact that there is a such-and-such neural activity in your somatosensory cortex. Is the fact that the latter grounds the former itself grounded in some further fact? Suppose it is. Besides the fact that it remains unclear what kind of fact could play this role (Trogdon 2013), one might reasonably ask if the fact that it is grounded is in turn itself grounded in some further fact, and so on *ad infinitum*. If the answer is yes, an ensuing 'vicious' regress may develop here that is analogous to Bradley's regress. To overcome this difficulty, it is often claimed that grounding is primitive in the sense of being constitutive of our fundamental ontology.

[14] It might be argued that David Lewis' (1986) modal realism succeeds in reducing modality by identifying a possible world with a maximal mereological sum of spatio-temporally related things. Lewis excepted, however, most contemporary philosophers find modal realism implausible and rely on some theory of modality that does not involve commitment to 'concrete' possible worlds of the same ontological status as our world (e.g. linguistic ersatzism, combinatorialism and fictionalism). Theodore Sider (2003) argues that this cannot be done without assuming modality in the *definiens*.

physics, semantics, ethics, philosophy of mind, philosophy of science and elsewhere, with great success. What is more, just as we are able to render modal notions clearer and less obscure by specifying some of the structural and logical principles that govern them, the same is true of grounding.[15]

Secondly, and perhaps more importantly, it could be argued that even if grounding is taken to be a primitive notion, it is dispensable. We can manage with 'safer' notions like entailment, supervenience, composition and conceptual priority—notions for which we possess elaborate theories. If this is correct, then, for all intents and purposes, we can do without the notion of grounding altogether. I think it is fair to say, however, that it is not.[16] Take the view that normative facts are ultimately grounded in natural facts. In relation to this, one might ask what it is for the normative to be grounded in the natural. It is widely agreed that this question cannot be answered either by claiming that normative facts are composed of natural facts, or by saying that there is some *a priori* connection between the normative and the natural. Nor are we better off making reference to entailment and supervenience. As already indicated, we know there is a tight connection between explanation and grounding.[17] But, as is also well known, there is no corresponding connection between explanation on the one hand, and entailment or supervenience, on the other.[18] Consequently, it would appear that grounding has a philosophical role to play that is not threatened by the availability of allegedly 'safer' notions.

A related point is made by Gideon Rosen (2010). He asks us to consider the debate over legal positivism. Some philosophers of law believe that legal facts are wholly grounded in social facts, whereas others believe that moral facts play a role in making the legal facts what they are. Framed as a supervenience claim, the anti-positivist position is that legal facts supervene on social and moral facts taken together. The positivist, on the other hand, asserts that legal facts supervene on social facts alone. But of course, this latter assertion is not incompatible with the anti-positivist stance. As Rosen points out, the anti-positivist "may think that whenever two worlds are alike in social respects—whenever they involve the same actions, habits and responses of human beings—they must also agree in moral respects, since *the moral facts themselves supervene on the social facts broadly conceived*" (2010: 113-14). If this is the anti-positivist's view, he and the positivist will accept the same supervenience claims; yet

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[15] See section 2.2.
[16] However, see Wilson (2014).
[17] See section 2.2. for a detailed discussion.
[18] This is not to deny that these notions can be explained. Most of us expect there to be an explanation of why it is, say, that the mental supervenes on the physical simply because an appeal to unexplainable supervenience thesis seems mysterious. What I am denying here is a far more controversial claim, namely that supervenience and entailment are in and of themselves explanatory relations (cf. Lepore and Loewer (1989) and Horgan (1993)).

they will remain in disagreement over whether moral facts have a role to play in grounding legal facts.

Having said that, it might turn out that the grounding notion is ultimately confused or simply incoherent. But I think that a sufficiently strong case has been made here for its intelligibility and potential usefulness, and that it warrants further attention. I shall go about this task as follows. In the next section, I discuss the logical form of grounding statements. I then proceed to articulate the structural principles that govern grounding. I conclude the chapter by discussing some philosophical applications of grounding.

2.1. The Logical Form of Grounding Statements

First, some preliminaries. Grounding, I take it, is a relation that holds (or fails to hold) between facts; and facts are best understood as things' having properties and standing in relations. When I say that *a* is F in virtue of *b's being G*, I take this to be a shorthand for the claim that the fact that *a* is F obtains in virtue of (or is grounded in) the fact that *b* is G. Consequently, *a's being F* also picks out the fact that *a* is F, even when it is not in the guise of a fact.[19] Thus conceived, facts are not true propositions, but obtaining states of affairs. Like Armstrong (1997), I take states of affairs to be particulars instantiating properties or standing in relations, where instantiation is a non-relational tie between particulars and 'immanent' properties or relations (see section 3.1.2 for a more detailed discussion). Even so, I will assume that there is a difference between sparse and abundant properties (and relations), and that this difference is reflected in the ontology. Sparse properties and relations, I take it, are monadic universals in the case of properties and polyadic universals in the case of relations. Abundant properties and relations, on the other hand, are not universals, but they may nonetheless be truly predicated of particulars. It will not be assumed, therefore, that every predicate corresponds to a universal. But it will be assumed, without further argument, that each state of affairs involving abundant properties (what Armstrong calls 'second-class states of affairs') is grounded in states of affairs solely involving sparse properties.

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[19] This is not to say that every use of 'in virtue of' expresses grounding. Sometimes we use the idiom to express synonymy or causation—as when, for example, we say that someone is a bachelor in virtue of being an unmarried man, or that the glass broke in virtue of its being struck. However, these are not genuine instances of grounding. What we have in mind when we talk about grounding is a non-causal dependency relation that obtains (or fails to obtain) between worldly inhabitants independently of language use and whether we are aware of the relation or not.

The relational view is to be contrasted with an increasingly popular view according to which grounding vocabulary revolves around the sentential connective 'because', as in 'Venus de Milo is beautiful because it is F, G and H'. Since 'because' is a connective, rather than a relational expression, there is no reason to think that what it expresses is a relation. The thought behind this is the Wittgensteinian idea that connectives do not represent things in the world, and so need not be thought of as relational predicates that take facts as arguments to make sentences.[20]

Which of these views is to be preferred? The question is rather complex. When a certain logical form of grounding expressions is adopted, it is possible—granted certain assumptions about facts and language—to define another notion of grounding with a different logical form (Correia 2010). Thus, for example, an advocate of the relational view is able to define the relational expression 'in virtue of' as:

The fact that p obtains in virtue of the fact that q $\equiv_{df}$ p *because* q

Similarly, an advocate of the operational view can define the sentential operator 'because' as:

p because q $\equiv_{df}$ the fact that p obtains *in virtue of* the fact that q.

If these definitions are to be plausible, however, we will need to relax the notion of what constitutes a fact touched on above and adopt a view according to which it is a fact that p if and only if 'p' is true. Since 'because' and 'in virtue of' can then be used to express the very same thing, the question becomes: which of these notions of grounding is more basic? Those who subscribe to the operational view usually do so on the basis of ontological neutrality. It should be possible, they insist, to state truths about grounding without committing to states of affairs (see e.g. Correia 2010 and Fine 2012). Defenders of the relational view, by contrast, argue that commitment to a grounding relation is inescapable, and that the relational view is therefore to be preferred (see e.g. Rodriguez-Pereyra 2005). In the following, I will opt for the latter view.

Suppose, in accordance with the operational view, that the basic form of a grounding claim is 'p because q', where 'because' is a connective linking sentences 'p' and 'q'. We know that true instances of 'p because q' entail both 'p' and 'q', since 'p because q' cannot be true if 'p' is false or 'q' is false. It cannot be true that Venus de Milo is beautiful because it is F, G and H, if the statue either is not beautiful or lacks

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[20] It is important to notice that the operational view does not take the relata of the grounding relation to be sentences. This would be a version of the first view, i.e. the view on which the best understanding of grounding is one according to which the notion introduces a relation, albeit one that holds between sentences rather than facts.

F, G and H. However, unlike textbook truth-functional statements like 'p and q' and 'p or q', 'p because q' is not a complete truth-function of 'p' and 'q'. Together, the fact that Venus de Milo is beautiful and the fact that it is F, G and H do not entail that the statue is beautiful *because* it is F, G and H. Given this, something in addition to the truth of 'Venus the Milo is beautiful' and 'Venus de Milo is F, G and H' is required to make it the case that Venus de Milo is beautiful because it is F, G and H. And since it is not a primitive fact that the former fact is grounded in the latter, there must be something to account for this. This challenge cannot be met by providing a semantics for 'because'. This would, at best, give us the truth conditions dictating when grounding instances of 'p because q' come out true. What we need to know, however, is not what these instances mean, but what in our world makes them state truths about grounds.

There are, to my knowledge, only two ways to go about solving this problem. One is to postulate the existence of a state of affairs which, assuming that both p and q are facts, make it the case that the latter grounds the former. This is analogous to the way some theorists deal with causation. Hugh Mellor (1995), for example, takes the basic form of a causal report to be 'E because C', where E is the stated effect and C is the stated cause. But since 'because' is a non-truth-functional connective, something is needed to make instances of 'E because C' state causal truths. Mellor's solution is to rely on states of affairs (or, as he calls them, 'facta') which make the cause C raise the chance of the effect E.[21] Given that something similar could be said about true grounding reports of the form 'p because q', there is no need to postulate the existence of a relation that obtains between the facts stated by 'p' and 'q'—the underlying states of affairs do all the work. Unfortunately, for the operational view, however, it is unclear what states of affairs could possibly play this role. According to Mellor, the states of affairs that add causation to the world are various atomic facts (e.g. things' having determinate mass) which together with the laws of nature (e.g. Newton's Law of Motion) make the stated cause raise the chance of the stated effect. But there are no corresponding states of affairs to account for the fact that Venus de Milo's beauty is grounded in her physical properties.

The only option left is to hold that grounding is a relation. Being a relation, it must relate something (Rodriguez-Pereyra 2005: 26). And, as already stated, I take facts *qua* states of affairs to be primary relata of grounding. According to this view, what makes it the case that Venus de Milo is beautiful because it is F, G and H is that there is a relation holding between Venus de Milo's being beautiful and Venus de Milo's being F, G and H, such that the former fact is grounded in the latter. I will take the liberty of expressing this relation by using the idioms 'in virtue of' (or 'because of') and 'grounded in'.

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[21] See section 3.3.5 for a more detailed presentation of Mellor's theory of causation.

2.2. The Structural Principles Governing Grounding

Having argued that grounding is a relation, we need to examine some of the structural principles that governs it. (In doing so, I shall be concerned with full grounding, as opposed to partial grounding, unless otherwise noted).[22] Quite what these governing principles are will depend on how tightly connected grounding is to explanation. One school of thought has it that grounding facts and metaphysical explanation facts are one and the same facts, and hence, that grounding is identical to the relation of metaphysical explanation. The relevant notion of explanation at play here is ontic (rather than epistemic) in character—that is to say, the explanatory link involved is independent of our explanatory interests and theories. The alternative view has its roots in David-Hillel Ruben's (1990) and Jaegwon Kim's (1994) idea that what makes explanation possible is the presence of certain determinative or dependency relations between entities. Applying this idea to grounding, Gonzalo Rodriguez-Pereyra states that "Explanation is not and does not account for grounding". On the contrary, he says, "grounding is what makes possible and 'grounds' explanation" (2005: 28). The idea is that facts about what grounds what constitute the very foundation on which metaphysical explanations depend. Grounding, on this view, is not itself an explanatory relation, but rather that which explanations track. If this is correct, then metaphysical explanation and grounding proper are distinct relations. This leaves open whether the notion of explanation at issue is ontic or epistemic in character. In the latter case, whether a fact counts as a candidate *explanans* will depend on our explanatory interests and theories, so that whether some fact explains another is in part contingent on these factors.

It is important to make this distinction between (what I call) the tracking view and the explanatory view of grounding, since it enables us to state two different sets of structural principles depending on which view is adopted. For present purposes, I will write [p] for the fact that p, when this is uncontroversial. When the enclosed sentence has an internal syntactic structure, I shall assume that the stated fact has constituents corresponding to the relevant symbols. Thus, for example, [*a* is F] will be a fact containing the property F and the particular *a* as constituents. I shall write [p] ← Δ for the fact that p is *thinly grounded* in Δ, where Δ is a plurality of facts, and where the plurality in question is allowed to have a single member. This notion of grounding corresponds to the tracking view, according to which grounding itself is not explanatory but backs, or underwrites, metaphysical explanations. I will assume 'thin' grounding is factive in the sense that [p] ← Δ only if both [p] and Δ exist. To distin-

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[22] Intuitively, a fact [q] (i.e. the fact that q) serves as a mere partial ground for some other fact [p], when [q] is one of several facts that jointly serve to ground [p]. For further discussion on the distinction, see Audi (2012); Rosen (2010) and Dancy (2004).

guish this notion from the explanatory view of grounding, I shall write $[p] \Leftarrow \Delta$ for the fact that p is *thickly grounded* in Δ (or the fact that p obtains *in virtue of* Δ, which helps to emphasize the explanatory link between [p] and Δ). Moreover, I will assume that the relevant notion of explanation is ontic, and hence, that $[p] \Leftarrow \Delta$ is factive in the above sense.[23]

With these preparations accomplished, let us consider some of the logical properties of the notion of grounding as this is understood within the 'thick' explanatory view—i.e. the view according to which grounding and metaphysical explanation are one and the same relation. It should come as no surprise that grounding, thus understood, exhibits the following properties:

Asymmetry:	If $[p] \Leftarrow [q], \Delta$ then it is not the case that $[q] \Leftarrow [p], \nabla$
Irreflexivity:	It is not the case that $[p] \Leftarrow [p], \Delta$
Transitivity:	If $[p] \Leftarrow [q], \Delta$ and $[q] \Leftarrow \nabla$, then $[p] \Leftarrow [q], \Delta, \nabla,$

where Δ and ∇ are arbitrary pluralities of facts.[24] The intuition behind the first two claims is clear: no fact is such that it explains the fact it is explained by, and since asymmetric relations are necessarily irreflexive, it follows that no fact is such that it explains itself. The idea is that just as causal facts need to be causally prior to the facts they explain, grounding facts need to be ontologically prior, in a certain explanatory order, to the facts they ground, so that if [p] is grounded in [q], then [q] must in some sense be more fundamental than [p] (see e.g. Rosen 2010: 116). And since the relation *being more fundamental than* is both asymmetric and irreflexive, it follows that the same holds true of grounding in the 'thick' sense. Thus, if [q] thickly grounds [p], then [p] cannot function as a ground for [q], nor can [p] be identical to [q].[25]

The transitivity of grounding is less obvious. However, *being more fundamental than* is transitive, and given this it is far from outlandish to assume that grounding in the 'thick' sense is as well. Moreover, the assumption has a formal benefit, as transitivity, together with asymmetry and irreflexivity, imposes a strict partial ordering on the set of facts in its domain (Cameron (2008a), Rosen (2010) and Schaffer (2010)). This is useful in establishing a hierarchical structure in which, say, physical facts ground chemical facts, which in turn ground biological facts, and so forth (cf. Correia 2012: 25).

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[23] It is important to bear in mind that 'thin' and 'thick' grounding are logically independent concepts in that if $[p] \Leftarrow \Delta$, it does not follow that $[p] \leftarrow \Delta$, and similarly in the other direction.
[24] See also (Rosen 2010).
[25] Jonathan Lowe (1998: 145) challenges the irreflexivity of 'thick' grounding by arguing that 'self-explanatory states of affairs' are epistemically possible. As far as I can see, Lowe's 'argument' is nothing more than a denial of the intuitive claim that explanation is irreflexive. I believe the intuitive claim is clearly correct.

What other structural principles apply to the 'thick' notion of grounding? It is generally thought that grounding is *well-founded* in that every grounded fact ultimately depends on basic facts, which in turn depend on nothing. Jonathan Schaffer, for example, says that "if one thing exists only *in virtue of* another, then there must be something from which the reality of the derivative entities ultimately derives" (2010: 37). If there were no such ultimate facts, he continues, "being would be infinitely deferred, never achieved" (2010: 62). I think, however, that this is too quick. Whether or not grounding is well-founded is a substantive question. As noted by Rosen, it could turn out "that the facts about atoms are grounded in facts about quarks and electrons, which in turn are grounded in facts about 'hyperquarks' and 'hyperelectrons', and so on *ad infinitum*" (cf. Rosen 2010: 116). There is really nothing in the notion of an explanatory relation which requires explanatory chains to terminate. What is required is merely that the grounding facts are ontologically prior to the facts they ground. Without such a requirement there is no guarantee that the order of explanation runs from anterior facts to posterior facts.

If grounding is an explanatory relation, it ought to exhibit *non-monotonicity*: i.e. it should meet the requirement that if [p] is grounded in [q], then it is not true that [p] is also grounded in [q] and [r], for some arbitrary [r]. Thus, for example, if [Venus de Milo is beautiful] obtains in virtue of [Venus de Milo is F, G and H], it does not follow that [Venus de Milo is beautiful] also obtains in virtue of the plurality consisting of [Venus de Milo is F, G and H] and, say, [Socrates is white]. In other words, if [p] is grounded in Δ, then every fact in Δ plays some role in grounding [p]. Without this requirement, every fact would play some role in grounding every other fact. This cannot be accepted if grounding is an explanatory notion, since every fact in a plurality of facts that explains some other fact must be relevant to the fact explained. Adding irrelevant facts defeats the initial explanation.

We should also conceive of 'thick' grounding as *hyperintensional*. Explanations require us to distinguish between entities (or propositions, statements, etc.) that exist (or are true) in exactly the same set of possible worlds. The same seems to be true of grounding in the 'thick' sense. The fact that {Socrates} exists, we may assume, is grounded in (or obtains *in virtue of*) the fact that Socrates exists. [Socrates exists] and [{Socrates} exists], however, are intensionally equivalent in that they obtain in exactly the same set of worlds. So if grounding is intensional, replacing the *explanans* [Socrates exists] with the *explanandum* [{Socrates} exists] and *vice versa*, should not make any difference to the explanation at hand. But, of course, it does. It is simply not the case that [Socrates exists] is grounded in the fact that {Socrates} exists: the order of explanation is the exact opposite.

When it comes to the logical properties of 'thin' grounding, matters are less straightforward, as we do not have the formal properties of explanation to guide us in our characterization. Yet I think that we can shed some light on this notion, and thus give it some contours. The first thing to ask is whether the 'thin' notion of grounding

induces a strict partial ordering on the set of entities in its range. In other words, are the following true?

Asymmetry: If [p] ← [q], Δ then it is not the case that [q] ← [p], ∇

Irreflexivity: It is not the case that [p] ← [p], Δ

Transitivity: If [p] ← [q], Δ and [q] ← ∇, then [p] ← [q], Δ, ∇.

Starting with irreflexivity, we have some reason to think that 'thin' grounding fails in this respect. For the sake of the argument, suppose that there are second-order facts and consider the second-order fact [some fact or other obtains] (call it 'F'). Any obtaining fact grounds F. And since F itself is a fact that obtains, it follows that F grounds itself (Bliss and Trogdon 2014, see also Fine 2010). Of course, F does not metaphysically explain why F obtains (or what it is for F to obtain), so this cannot be an instance of 'thick' grounding. Yet there seems to be a 'thin' sense in which F can be said to be grounded in itself. Similarly, a token physicalist could argue that the token state of S's being in brain state ϕ is identical to the token state of S's being in pain, and yet insist that the latter state is grounded in the former (Jenkins 2011).[26] Given the irreflexivity of explanation, the notion of grounding at work here cannot be 'thick'. Despite this, it would appear that there is a 'thin' sense in which the mental state token is grounded in the brain state token.

If this is correct and 'thin' grounding fails to be irreflexive, then we would also expect it not to exhibit asymmetry. And indeed there seems to be reason to think that asymmetry fails. Let C be [D exists] and D be [C exists]. Since the former fact is the fact that [C exists] and the latter, the fact that [D exists], it follows that C grounds D, and *vice versa* (Rodriguez-Pereyra, *forthcoming*). Again, since explanation is asymmetric, this cannot be an instance of 'thick' grounding, yet there appears to be a 'thin' sense in which we can say that C is grounded in D, and D is grounded in C.

We have examples of transitive relations displaying neither asymmtericality nor irreflexivity (e.g. equivalence relations), so the fact, if it is one, that 'thin' grounding is neither asymmetric nor irreflexive does not show that it is not transitive. We still need to settle the independent question whether the tracking view of grounding is committed to transitivity or not. Schaffer (2012) thinks transitivity fails. He asks us to consider the set S = {*a*, *b*, *c*} and the three facts (i) [*c* is a member of S], (ii) [S has exactly three members] and (iii) [S has finitely many members]. Intuitively, (iii) is grounded in (ii) and (ii) is grounded in (i), yet it would seem that (iii) is not grounded in (i) (Schaffer 2012: 127-28). As Kelly Trogdon (2013) points out, it could be argued that this counterexample equivocates on full and merely partial grounding—that while

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[26] For criticism of Jenkin's view, see Rodriguez-Pereyra (*forthcoming*).

(iii) is fully grounded in (ii), (ii) is merely partially grounded in (i). There is an easy fix to this, however, since disjunctive facts (if there are such facts) are grounded in whatever it is that grounds each of their disjuncts. So we could replace (iii) with (iii*) [S has finitely many members or Socrates is white]. In this case, (iii*) is merely partially grounded in (ii), (ii) is merely partially grounded in (i), and yet (iii*) is not grounded (not even partially) in (i).

Of course, this only goes to show that partial grounding is non-transitive, which is hardly surprising. What we need to know is whether transitivity fails with respect to full grounding. Rodriguez-Pereyra (*forthcoming*) thinks that Schaffer's example fails to establish non-transitivity, irrespective of whether there is a distinction to be drawn between partial and full grounding. Shaffer, he argues, is committed to thinking that one fact's being counterfactually necessary for another fact is both a necessary and sufficient condition for the former being a ground for the latter, where a fact [p] is said to be counterfactually necessary for a fact [q] if and only if, had [p] not obtained, [q] would not have obtained either. But this would seem to conflict with the idea that (iii) is grounded in (ii), since [S has exactly three members] is not counterfactually necessary for [S has finitely many members]. Besides, Rodriguez-Pereyra continues, it does not seem correct that say that [S has exactly three members] is grounded in [c is a member of S], since the identity of S's members has nothing to do with the fact that S has exactly three of them. What grounds the fact that S has exactly three members, he says, is the fact that there is something, something else, and a third thing such that none of them is identical with either of the others, all three are members of S, and nothing else is (Rodriguez-Pereyra, *forthcoming*).[27]

Quite how the alleged non-transitivity of the tracking view of grounding should be handled has no bearing on the arguments to follow, so I shall move on at this point. There is, however, an issue that we need to address before we move on. What are we to make of the claim, made earlier, that grounding depicts a relation of ontological priority because grounding facts must be more fundamental than the facts they ground? The relation *being more fundamental than* induces a strict partial ordering over the set of entities in its range. Assuming then, that grounding depicts ontological priority, it follows that it is not only transitive, but also asymmetric and irreflexive.

How should we respond to this? Well, suppose that ontological priority is indeed asymmetric, irreflexive and transitive. To reach the conclusion that the same holds true of 'thin' grounding, we also need to establish that the tracking view is committed to the claim that grounding facts are more fundamental than the facts they ground. But this view is far from obviously correct. As far as I can see, we only

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[27] Rodriguez-Pereyra thinks that 'thin' grounding is non-transitive. His argument for thinking so, however, trades on the assumption that grounding should be characterized as a non-causal generic relation of *being F in virtue of*, rather than a relation between facts. For further details, see Rodriguez-Pereyra (*forthcoming*).

have reason to think that grounding depicts ontological priority if grounds need to explain what they ground. If, however, as in the case of the tracking view, there is no requirement for ontological grounds to also explain the facts they ground, there seems to be no reason why we should hold on to the claim that grounds need to be more fundamental than the grounded. Of course, it may be that I am wrong about this. Perhaps there are independent reasons for thinking that grounding relations (whether explanatory or not) must take us from what is anterior to what is posterior. If so, we should infer that 'thin' grounding induces a strict partial ordering. If, on the other hand, there are no such reasons and ontological priority is not essentially an explanatory notion, then I cannot see why we should not be persuaded by the above examples that there is also a 'thin' sense in which grounding is neither asymmetric nor irreflexive.

Leaving the logical properties of 'thin' grounding behind, let us turn our attention to some of its other structural properties—more specifically, to the question whether 'thin' grounding exhibits monotonicity. As was previously argued, the explanatory nature of 'thick' grounding secures its status as a non-monotonic relation. But what about the 'thin' notion of grounding according to which grounding proper is not an explanatory relation? Is it also non-monotonic? I cannot see any reason why it should be. Again, suppose it to be the case that [Venus de Milo is beautiful] is grounded in [Venus de Milo is F, G and H]. If the notion of grounding invoked here is 'thin', it does not seem to follow that it is not the case that [Venus de Milo is beautiful] is also grounded in the plurality consisting of [Venus de Milo is F, G and H] and, say, [{Socrates} exists]. For why should we think that if some fact provides a 'thin' ground for another fact, then the rest of facts, which involve it as a member, are not also grounds for the corresponding grounded fact? After all, on the tracking view there is no requirement that if [p] is grounded in Δ, then every fact in Δ plays some role in grounding [p].[28] This is not to deny that we usually aim at pluralities of grounds where each member plays a role in grounding the corresponding fact. To be sure, it might even seem rather odd to claim that [p] is grounded in Δ, when Δ includes facts that are irrelevant to [p]. But on the tracking view, this is fully compatible with grounding proper being monotonic, as the alleged oddity can be accounted for by our explanatory interests. Besides, language use (whether odd or familiar) is a poor guide in metaphysics and most certainly should never be accepted as the sole reason either to affirm or deny a substantive claim.

Last, but not least, we turn to the question whether 'thin' grounding should be conceived of as intensional or hyperintensional. As already noted, explanations are hyperintensional in that they require us to distinguish between entities (or proposi-

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[28] As a matter of fact, the monotonicity of grounding was thought uncontroversial before the explanatory view became the orthodoxy (see Mulligan, Simons and Smith (1984: 316), Fine (1995) and Armstrong (2004: 17-18)).

tions, statements, etc.) that exist (or are true) in exactly the same set of possible worlds. But on the tracking view grounding proper is not an explanatory relation, and hence we are not entitled to draw conclusions about the modal character of 'thin' grounding on the basis of claims about the nature of explanation. Even so, I think it would be a mistake to give up on hyperintensionality. Once we think of grounding as intensional rather than hyperintensional, we face consequences which appear to be unacceptable whether or not we take grounding to be an explanatory notion. Take the problem created by facts that exist necessarily. Suppose you are a realist with respect to numbers. Suppose, furthermore, that you think (as most realists do) that numbers are necessary existents, and therefore that [2 is even] obtains in every possible world. Now, assuming that there are substantive grounds for facts that exist necessarily, and that grounding is merely intensional, it follows that, whatever it is, the substantive fact that grounds [2 is even] will also necessarily act as a ground for every other fact that exists necessarily. But it is inherently implausible to think that the grounds for [2 is even] also ground, say, [{∅} exists]. Whatever the grounds are for [2 is even], it is clear that the grounds for [{∅} exists] (e.g. [∅ exists]) are not suited to play that role. To avoid trivializing grounds for necessary facts, then, we should accept that 'thin' grounding is hyperintensional.

2.3. Philosophical Applications of Grounding

Let me end this chapter with by discussing wider philosophical applications of the notion of grounding. First, I shall consider non-reductive physicalism about the mental and the sense in which such theorists can understand the physical to be ontologically prior to the mental. I will then look at a recent proposal by Rosen (2010) explaining how to analyze intrinsicality in terms of grounding. The chapter closes with a brief discussion of Aristotelian ontology and fundamentality.

2.3.1. Non-reductive Physicalism

Let us suppose that non-reductive physicalism is committed to the idea that the physical enjoys ontological priority over the mental. What does this claim amount to? The idea that ontological priority can be framed in terms of purely modal notions such as metaphysical necessity or supervenience is familiar. So let property P metaphysically necessitate property Q just in case it is metaphysically necessary that if P is instantiated, then so is Q. We might then, in accordance with Bliss and Trogdon (2014), say that the physical is ontologically prior to the mental if and only if:

(i)   for any mental property M, if M is instantiated, then there is some in-
        stantiated physical property P that metaphysically necessitates M, yet

(ii)   it is not the case that, for any physical property P, if P is instantiated,
        then there is some instantiated mental property M that metaphysically
        necessitates P.

Do these propositions capture the relevant sense in which the physical is prior to the mental? It would appear not. Bliss and Trogdon ask us to consider a parallel thesis they call 'non-reductive phenomenalism about the mathematical', which says that the mental enjoys ontological priority with respect to the mathematical. It is clear, they say, that if the relevant notion of ontological priority at issue here is that explained by (i) and (ii), few would accept non-reductive phenomenalism about the mathematical. But now, suppose that the mental is prior to the mathematical just in case for any mathematical property P, if P is instantiated, there is some mental property M instantiated such that M metaphysically necessitates P, yet it is not the case that, for any mental property M, if M is instantiated, then there is some mathematical property P instantiated such that P metaphysically necessitates M. Since mathematical properties are necessarily instantiated, we are committed to the right-hand side of the bicondi-tional above. However, it is clear that the mental is not ontologically prior to the mathematical in the same sense that the non-reductive physicalist holds the physical to be prior to the mental. This asymmetry seems to suggest that the notion of onto-logical priority at issue in non-reductive physicalism cannot be understood in terms of modal notions like metaphysical necessitation (Bliss & Trogdon 2014).

To overcome this difficulty, we might try to replace the purely modal characteriza-tion of non-reductive physicalism with one that proceeds in terms of a hyperinten-sional notion like grounding. A suggestion of this sort, made by Bliss and Trogdon (2014) is that the physical is ontologically prior to the mental if and only if:

(i*)   for any mental property M, if M is instantiated, then there is some phys-
        ical property P such that the fact that M is instantiated is grounded in
        the fact that P is instantiated, yet

(ii*)   it is not the case that, for any physical property P, if P is instantiated,
        then there is some mental property M such that the fact that P is instan-
        tiated is grounded in the fact that M is instantiated.

By replacing (i) – (ii) with (i*) – (ii*), we can account for the aforementioned asym-metry between non-reductive physicalism about the mental and non-reductive phe-nomenalism about the mathematical. For, although mental facts are plausibly grounded in physical facts, it is quite implausible to hold that mental facts serve as grounds for mathematical facts.

2.3.2. Intrinsic Properties

It is customary in metaphysics to draw a distinction between extrinsic and intrinsic properties. Intuitively, a property F is intrinsic if and only if, necessarily, for any x, x has F solely in virtue of the way that x is in itself and in its parts, and a property is extrinsic if and only if it is not intrinsic—although a thing may have its extrinsic properties in virtue of the way some larger whole is of which that thing is a part (cf. Lewis 1983: 111-12). It is well known that theories seeking to account for this intuitive distinction in modal terms fail to capture it (Marshall 2012). However, Rosen (2010) believes that by pressing grounding into service we can make the intuitive distinction explicit while avoiding the difficulties associated with the modal accounts. F is an intrinsic property, he says, if and only if, necessarily, for any x:

> if x is F is grounded by a fact containing a constituent y, then y is part of x; and

> if x is not-F is grounded by a fact containing y, then y is part of x (Rosen 2010: 112).[29]

An advantage here is that Rosen's proposal avoids wrongly classifying necessary properties as intrinsic. Being such that there is the singleton set {∅} is extrinsic on this view, since its ascription to, say, Socrates is grounded by (we may assume) [∅ exists], which has a constituent part not had by Socrates.

2.3.3. Aristotelian Ontology

Jonathan Schaffer (2009) makes a distinction between Quinean and Aristotelian ontology. The task of the former, he holds, is to say what exists, whereas the task of the latter is to say what is ontologically real, i.e. what the ultimate constituents of reality are. The question whether there are sets, numbers, tables or democracies is peripheral for the Aristotelian, but it is central for the Quinean. The substantial question, according to the Aristotelian, is not whether there are such things at all—of course there are. It is rather whether these things are part of our fundamental ontology. In metaphysics we are very rarely in disagreement over what exists. The disagreements usually concern what is fundamentally real. But what exactly is it to be fundamentally real?

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[29] The last clause ensures that the property a thing has when there are no things distinct from it (i.e. its so-called *loneliness*) is not deemed an intrinsic property. Notice also that the antecedent of the clause presupposes a view of facts according to which there are negative facts. Rosen does this by adopting a view on which facts are structured out of objects, properties, connectives and quantifies in the same way sentences are structured out of names, predicates and operator expressions. For an attempt to analyse intrinsicality in terms of grounding without resort to negative facts, see Bader (2013).

One suggestion, put forth by Rosen (2010), is that a fact is fundamental (or brute) if it does not obtain in virtue of other facts, i.e. if it is not grounded in other facts. Correspondingly, a thing is said to be fundamental if it is a constituent of a fundamental fact. The task of the Aristotelian is then to list the fundamental things. When the Aristotelian does not allow for tables in her fundamental ontology, all she means is that the various facts concerning the table are ultimately grounded in facts which do not have the table itself as a constituent (e.g. facts involving elementary particles).

3. Truthmaking

The idea that truths are *made* true, while still considered controversial by some, has become commonplace in contemporary metaphysics. Its appeal lies in its promises to explain how, in general, 'truth depends on being': that is, how what is true depends on what exists. The present chapter considers in detail what this talk of 'dependence' and 'making true' amounts to. I shall address questions of precise formulation shortly. For now, it suffices to note that the *Truthmaker Principle* states that the members of a certain class of true propositions have 'truthmakers'. This is to say no more than that some entity or other makes true propositions true, but it immediately gives rise to the following questions:

(Q1) What motivates the truthmaker principle?

(Q2) What is it for a proposition to be made true by something?

(Q3) Does the truthmaker principle cover all truths, or should it be restricted in some way?

(Q4) What kinds of entity are fit to serve as truthmakers?

I will assume that propositions are the basic truthbearers, and that anything else that might be called a truthbearer (e.g. statements, sentences, beliefs etc.) is only so called because it has a suitable relationship to propositions (Armstrong 2004: 12). We will eventually have to talk about the ontological nature of propositions. But for now, I will merely assume that they are inherently representational entities.

I will present separate discussions of each of the above questions, with the exception of (Q4), to which we will need to turn at intervals over the next three sections.

3.1. (Q1) What Motivates the Truthmaker Principle?

The seminal paper 'Truth-Makers' (1984) by Kevin Mulligan, Peter Simons and Barry Smith started what can only be described as an industry of modern metaphysics, *Truthmaker Theory*—an industry that does not appear to have slowed down since the time of the papers' original publication, but on the contrary seems to gain increas-

ing momentum as time passes. Still it would be unfair to the greats of philosophy to give all the credit here to Mulligan, Simons and Smith. For although these three writes are largely responsible for the fact that much of contemporary metaphysics centers on the notion of truthmaking, their inspiration can be traced back to Aristotle:

> [I]f there is a man, the statement whereby we say that there is a man is true, and reciprocally – since if the statement whereby we say that there is a man is true, there is a man. And whereas the true statement is in no way the cause of the actual thing's existence, the actual thing does seem in some way the cause of the statement's being true: it is because the actual thing exists or does not exist that the statement is called true or false (1984: 22).

Similar ideas can be seen surfacing in the works of the Rationalists during the seventeenth century—for example, in Leibniz's famous 'Discourse on Metaphysics' from 1688, where he states: "it is evident that every true predication has some basis in the nature of things,…" (1960: 416). And the idea of truthmaking also gets an airing in Bertrand Russell's *The Philosophy of Logical Atomism*, issued in 1918, where throughout he insists that each truth is made true by what he calls a 'fact'. Similarly, Russell's Oxonian contemporary J.L. Austin states that "When a statement is true, there is, *of course*, a state of affairs that makes it true" (1979: 123). Alongside these, a comprehensive list of important writers on this topic would have to include the likes of C. B. Martin (Armstrong 2004: 1-3), Kit Fine (1982: 69), John Fox (1987) and last but certainly not least, the towering figure in contemporary truthmaker theory, David Armstrong (1997: 113-38 and 2004).

What unifies such a diverse group of philosophers is the intuition that truth is grounded. This intuition is made fully explicit in the following passage by Rodriguez-Pereyra:

> [T]ruth is not primitive. If a certain proposition is true, then it owes its truth to something else: its truth is not a […] brute, ultimate fact. The truth of a proposition thus depends on what reality, and in particular its subject matter, is like. What reality is like is anterior to the truth of the proposition, it gives rise to the truth of the proposition and thereby accounts for it (2005: 21).

The boundaries of the class of propositions of which this is true will be examined later. For now, I will simply assume, like Rodriguez-Pereyra, that the groundedness of truth covers at least "the members of an important class of synthetic true propositions, including inessential predications" (Rodriguez-Pereyra 2005: 18). Whenever a proposition of that class is true, it is not just true, but depends for its truth on what reality is like. To take an example, consider the proposition that the sun exists. The proposition is true; but its truth is not some brute, ultimate fact. It would be strange, to say the least, to say that by sheer coincidence the sun is in the sky and it happens to

be true that the sun exists. We should rather say that the sun *makes* it true that the sun exists, or that it is *in virtue of* the sun that the truth predicate applies to the proposition that the sun exists. Truth and reality are inextricably linked: what is true depends on what is real. Such is the truthmaker intuition. The claim is then that the truthmaker principle is the best way to capture that intuition. This is the primary motivation behind truthmaker theory. To better appreciate this motivation, let us turn to see how the truthmaker principle can be used in philosophical arguments.

3.1.1. The Truthmaker Principle in Action

A historically important application of the truthmaker principle has been in opposing various reductionist theories which represented certain propositions as true while concurrently lacking the ontological resources to ground those truths (see Armstrong 2004: 1-3). Once such theory is phenomenalism, the view according to which propositions seemingly about material objects reduce to conjunctions of counterfactuals about experiences (see e.g. Mill 1865; and Russell 1914). Thus suppose that $\langle P \rangle$ is a true proposition concerning some material object a. Suppose also that $\langle C_1 \wedge C_2,...C_n \rangle$ is the conjunction of counterfactuals which form the phenomenalist analysis of $\langle P \rangle$. Then $\langle P \rangle$ entails $\langle C_1 \wedge C_2,...C_n \rangle$, and so each constituent counterfactual is true. The truthmaker theorists' challenge is to provide truthmakers for these counterfactuals; and it is difficult to see how the phenomenalist can meet this challenge. She cannot arguably resort to states of affairs involving a. For to posit the existence of such states of affairs would be to give up the most central tenet of phenomenalism, namely that material objects are nothing more than the permanent possibility of experience. Nor can she bring in the mental properties of the mind, since that would be to abandon phenomenalism in favor of idealism. But if neither material objects nor the mind can serve as ontological grounds for the truth of $\langle C_1 \wedge C_2,...C_n \rangle$, it is difficult to see what could. Our phenomenalist has been exposed as an 'ontological cheater': as someone who posits truths without the ontological grounding required to account for those truths (cf. Sider 2001: 40). She insists that counterfactuals about experience are true (since phenomenalism is not an error-theory), yet she refuses to accept anything *in virtue of which* they are true—they are true, period.

 A similar charge can be made against Ryleanism about dispositions, the view according to which dispositional attributions should not be read as assigning dispositional properties to objects, but rather as counterfactuals (or conjunctions thereof) about how the objects would behave had they been subjected to certain stimuli. To illustrate: suppose that a certain vase is fragile. That could be true even if the vase never manifests its fragility: the vase might never be struck, and never shatter. Yet it remains true (or so we may assume) that *had* the vase been struck, it *would* have shattered. And according to Ryleanism, this is all there is to the fragility of the vase. Truthmaker theory challenges this view of dispositions by requiring a truthmaker for

⟨had the vase been struck, it would have shattered⟩. How might the Rylean meet this challenge? A plausible truthmaker candidates for counterfactuals applying to objects with unmanifested dispositions are states of affairs involving dispositional properties. However, this answer is not open to the Rylean, who denies that there are such properties. To posit that the vase instantiates fragility would be to abandon Ryleanism in favor of some sort of realism about dispositions. So the question remains: what in the world makes it true that had the vase been struck, it would have shattered? Insofar as the Rylean has no answer, the truthmaker principle has stumbled upon a discrepancy between theory and ontology. As it turns out, then, the Rylean must expand her ontology to also include truthmakers for counterfactuals about the unmanifested dispositions of material objects.

More recently, truthmaker theorists have staged a similar attack on presentism, the view that only present things exist (Sider 2001: 35 – 42). Consider the proposition that there were Neanderthals. Most of us would argue that what makes this true is past Neanderthals. But this route is not open to the presentist: for according to her, either something exists now or it does not exist at all. So whatever makes ⟨there were Neanderthals⟩ true, it cannot be the existence of past Neanderthals. It has to be something in the present. It is difficult to see what this could be. The presentist might try to invoke present states of affairs bearing an appropriate relation to the past (e.g. archeological findings) to underwrite the truth of the proposition that there were Neanderthals. But although such states of affairs would provide some evidence for the truth of the proposition in question, they would not *make* it true. Moreover, it might be that there are worlds with different pasts but duplicate presents, in which case the states of affairs that presently pertain to Neanderthals would underdetermine the truth of the proposition that there were Neanderthals (cf. Schaffer 2008a: 315). If that is correct, then there seems to be no way for the presentist to meet the challenge posed by the truthmaker theorist.

In each of these cases the truthmaker theorist's complaint is that we should not accept truths unless we have the ontological resources required to ground those truths. How compelling is this complaint in the cases we have touched upon? A little reflection suggests that the answer is, not very compelling at all. This is because an accused cheater with a reckless ontological attitude could quite easily provide truthmakers for the truths in question (indeed for any given truth) and thereby meet the challenge thrown down by the truthmaker theorist. Thus a phenomenalist might argue that what makes it true that had I looked in the closet, I would have seen my old tennis racquet is the fact, or state of affairs, *the world's being such that had I looked in the closet, I would have seen my old tennis racquet*. Likewise, a Rylean might say that what makes ⟨had the vase been struck, it would have shattered⟩ true is *the world's being such that had the vase been struck it would have shattered*, and a presentist might insist that what makes ⟨there were Neanderthals⟩ true is *the world's being such that there were Neanderthals*. In general, whenever it is tough finding a truthmaker for a truth ⟨P⟩, one can posit the existence of the fact, or state of affairs, *the worlds being*

such that P. After all, it is impossible both for that state of affairs to exist and for the corresponding proposition to be false.[30]

Admittedly, this move does look rather *ad hoc*, and there is a suspicion that states of affairs like *the world's being such that had I been married to Queen Elizabeth II, I would have been royal* have been gerrymandered into existence.[31] But serious the point here is that the truthmaker principle does not by itself prohibit such artificial states of affairs from entering the ontology. It merely says that truths have truthmakers: it says nothing about which entities are acceptable as truthmakers and which are not. For the truthmaker theorist's objection to phenomenalism, Ryleanism and presentism to succeed we need, then, an additional principle restricting the entities that are fit to serve as truthmakers. This is worrying, for it makes the whole business of attacking philosophical theories through ontological cheater exposés seem empty and question-begging. Trenton Merricks captures this worry in the following argument against the truthmaker principle (here referred to as 'Truthmaker'):

> To catch certain cheaters, Truthmaker must deem some properties to be suspicious. So a fully articulated Truthmaker would tell us which properties are suspicious and which are not. […] A full account of which properties are suspicious is itself a full-blown metaphysics. Thus a fully articulated Truthmaker is not a neutral litmus test that competing theories must pass to be taken seriously. Instead, it is one of the competitors (2007: 37).

The message is clear: if the truthmaker principle is to be used to catch ontological cheaters, we must be told which entities are acceptable as truthmakers and which are not. One cannot convince a presentist to become an eternalist merely by requiring truthmakers for the past and the future. One also needs to ensure that the presentist cannot invoke any old entity to do the truthmaking job. The truthmaker principle might be rearticulated to allow only for, say, states of affairs involving sparse properties. But then the more fully articulated principle would fail to provide us with an independent reason to reject presentism. Rather, the rejection would already have been built into the truthmaker principle itself.

But there is a division of labor here. If the truthmaker principle (as originally articulated) does not suffice to catch ontological cheaters on its own, the same can be said of the principle of restriction that limits the kinds of entity that are fit to serve as truthmakers. To convince an accused cheater that her truthmaker commitments are

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[30] The traditional definition of truthmaking has it that T makes ⟨P⟩ true if and only if T exists and T *necessitates* the truth of ⟨P⟩, where T necessitates the truth of ⟨P⟩ if and only if it is impossible for T to exist and for ⟨P⟩ to be false. Ultimately, I think that the traditional definition is defective and that necessitation is neither necessary nor sufficient for truthmaking (see 3.2.). The definition is used here merely for illustrative purposes.

[31] Although, see Zimmerman (2008: 218)

unacceptable, we must convince her that she *has* such commitments. After all, our presentist might accept truths about the past and the future, and yet deny that this commits her to entities that *make* them true. Such a presentist would be unmoved by the accusation that her truthmaker commitments are unacceptable: she would simply deny that she has any such commitments to begin with. To catch ontological cheaters we therefore need both principles: the truthmaker principle to tease out an admission that truths require entities that make them true, and a restriction principle to limit the entities fit to serve as truthmakers. Neither principle suffices on its own (Cameron 2008b: 115). For example, we will need the presentist to admit the existence of a truthmaker for ⟨there were Neanderthals⟩, to accept that only certain kinds of entity can serve as a truthmaker for that truth, and to agree, lastly, that the only entities up for the job are past Neanderthals. Only thus can we oblige the presentist to give up her view and adopt eternalism. The same, *mutatis mutandis*, goes for phenomenalism and Ryleanism.

    What this shows is that the truthmaker principle is neither empty nor question-begging, but plays an important role pinpointing what is unsatisfactory about various dubious ontologies: namely, that they hold certain (synthetic) propositions to be true while simultaneously lacking the (acceptable) ontological resources required to ground those truths.

3.1.2. Grounding Truth without Truthmakers?

Thus far I have simply assumed that the truthmaker principle is the best way to account for the intuition that truth is grounded. This assumption, however, is not uncontentious. Some theorists argue that the groundedness of truth provides insufficient justification for the claim that truths have *entities* which make them true. The notion that truth is grounded in reality, they argue, is compatible with propositions owing their truth not only to *what* exists but also to *how* it is—which properties things instantiate and in what relations they stand. This objection is best illustrated by considering what grounds the truth of inessential predications. For a large number of truths it is easy to find (ontologically acceptable) entities that make them true. Thus what makes true singular existential propositions and identity propositions are the particulars referred to by the individual constants that figure in those propositions (Simons 1992: 163). All it takes for both ⟨a exists⟩ and ⟨a = a⟩ to be true is that *a* exists. But not every truth is of one of these forms. Some truths are of the form ⟨a is F⟩, where *a* is not necessarily an F. What makes these true? According to Armstrong (1997: 115), it cannot be either the particular *a* or the property F, since either could exist and it not be true that *a* is F. Nor can it be the pair of *a* and F, since this too could exist and it fail to be true that *a* is F (as would the case where *a* exists and is not F, but *b* is). This strongly suggests that whatever makes it true that *a* is F must involve both *a* and F, but in some such way that they are unified. Armstrong concludes that the obvious

candidate allowing us to meet this need is the state of affairs *a's being F*. Only then would we have an entity whose mere existence guarantees the truth of the proposition that *a* is F (see 3.2.for criticism of this argument).

But it is by no means clear that we must account for the groundedness of truth by appeal to such exotic entities as states of affairs. Someone who accepts that the truth of a proposition is a function of reality is not thereby obliged to accept that propositions owe their truth solely to what exists. Tarski-style theories of truth explain how propositions come to be true without positing truthmakers: the proposition expressed by the sentence 'F*a*' is true if and only if the particular referred to by '*a*' satisfies the predicate 'F'. This account gives us no reason to assume that the world must contain the state of affairs *a's being F*. Armstrong, who is well aware of this position, responds that it renders it 'obscure' how predicates come to apply to particulars in the first place, and that "a convincing account of the semantics of 'applies' cannot be given without appeal to the properties and/or relations of the object *a*" (1980: 445). If this is correct, then 'F' applies to *a* because the property picked out by the predicate is instantiated by *a*. For the sake of argument, let us grant this. Does it follow that we are committed to the existence of an entity whose mere existence guarantees that *a* is F? Julian Dodd does not think so: "[t]o accept that *a* instantiates F is not necessarily to accept that there exists an entity in addition to *a* and F: *a's being F*" (1999: 154; see also Lewis 2001). We still need to be told why the instantiation of a property by a particular must *itself* be treated as an entity. Until we are, the truthmaker principle will remain under-motivated, and hence be of little use in efforts to catch ontological cheaters.[32]

To this one might reply that although talk about particulars instantiating properties does not automatically commit us to entities which are *particulars-instantiating-properties*, further thought reveals that this commitment is the only way of understanding how particulars come to instantiate properties. We cannot hope to explain the unity *a's being F* by introducing an instantiation relation I holding between *a* and F. That move would give rise to a vicious regress: there would need to be something that unifies *a*, F and I, and if at this stage we were to introduce another instantiation relation I* holding between these three entities, the same unity problem would arise at the next stage, and so on *ad infinitum*. But what if, rather than thinking of the particulars and properties as distinct entities which need to be brought together to form states of affairs, we think of the states of affairs themselves as basic ontological unities, and their constituents (i.e. the particulars and properties) as mere abstractions from these unities? This view has been defended most prominently by Armstrong. In a defense of states of affairs, he states that:

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[32] See Liggins (2008: 186) for similar criticism.

> while we can *distinguish* the particularity of a particular from its properties, nevertheless the two 'factors' are too intimately together to speak of a *relation* between them. The thisness and the nature are incapable of existing apart from each other. Bare particulars are vicious abstractions … from what may be called states of affairs: this-of-a-certain-nature (1980: 446).

The suggestion seems to be that it is a mistake to think that there is a problem of how particulars and properties can be 'brought together' to form states of affairs. This mistake reflects inverted ontological priorities. Specifically, it results from a misguided effort to *begin* with the particulars and properties conceived of as independent building blocks, and *then* seek the glue that will hold them together (Linsky 1992: 267). Armstrong makes the same point when he states that "[i]t is often convenient to talk about instantiation, but states of affairs come first" (1997: 118). There is no ontological distinction to be drawn here between the particularity of a particular (its thisness or *haecceity*) and its properties (nature). If *a* is F, we do not have two distinct entities somehow 'glued together', but a single entity, a state of affairs, which exhibits two aspects or 'factors'. We can talk about particulars 'instantiating' properties, but we should not expect such talk to mirror the ontology. Strictly speaking, there is no instantiation relation over and above the states of affairs. Nor is the 'instantiation' of a property by a particular a constituent of the state of affairs—rather, it *is* the state of affairs itself (Armstrong 1997: 119; see also Ramsey 1990).

If this is correct, a commitment to truthmaker entities is unavoidable. Once we accept that inessential predications of the form '*a* is F' are made true by particulars having properties, we must (on pain of regress) conceive of particulars-having-properties as ontologically basic unities. Now you may not be convinced that an appeal to states of affairs helps. Perhaps you agree with Dodd that "the stipulation that there is a unified entity with *a* and F as constituents does nothing to explain how there could be such a thing" (1999: 155).[33] However, even if this is correct, there is—as we shall now see—no escaping a commitment to truthmakers if one accepts that truth is grounded in reality.

3.1.3. Rodriguez-Pereyra on Why We Need Truthmakers

In his much-discussed paper 'Why Truthmakers' (2005), Rodriguez-Pereyra argues that the truthmaker principle is a consequence of our thoughts about truth, and that this is so whether or not we are realists about properties. Schematically, the argument runs as follows (Rodriguez-Pereyra 2005: 25).

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[33] See also Devitt (1980) for similar criticism.

(i)   Truth is grounded.
(ii) Grounding is a relation.
(iii) Relations link entities.
(iv) Therefore, truth is grounded in entities.

This provides us with the missing link between the truthmaker intuition that truth is grounded, on the one hand, and the truthmaker principle stating that truths are grounded by entities, i.e. truthmakers, on the other. The idea is simple. True propositions are grounded, and for something to be grounded is for it to be a *relatum* of the grounding relation. Since the relata of any given relation are entities, it follows that the grounding relation links entities to true propositions. So, true propositions are grounded in entities: truths have truthmakers.

The argument is valid, so anyone who does not accept its conclusion would have to deny one or more of premises (i), (ii) or (iii). I argued for (i) at the beginning of this section, and I will not seek to support it further now. This leaves (ii) and (iii). Of these, (iii) is self-evident (but not undisputed). Nothing relates anything to nothing (Mellor 1995: 256). So for any relation *R*, if *R* obtains, there are some things for *R* to relate, which means that relations link entities. But what about premise (ii), the claim that grounding is a relation? Is it also true? The following argument suggests it is (see also 2.1). Take any (synthetic) proposition that P. Assuming ⟨P⟩ is true, its truth is not some brute, inexplicable fact. Truth is grounded in the world, in that the truth of a proposition is a function of what the world is like. This being so, there must be something about the world that grounds the truth of ⟨P⟩. That is to say, there must be some way the world is in virtue of which the truth predicate applies to ⟨P⟩. But then that something (i.e. the way the world is) must be related to ⟨P⟩—otherwise ⟨P⟩ could not be true *in virtue of* it. And, as already argued in 2.1., this is a relation. Therefore grounding is a relation (Rodriguez-Pereyra 2005: 30 – 31).

By combining this result with (i) and (iii), we arrive at the conclusion that truth must be grounded in entities: truths must have truthmakers. Yet some theorists remain unconvinced.[34] They continue to think that all we need to secure the claim that truth is grounded is the following schema:

(TG)   ⟨P⟩ is true because P,

and that this can be understood, or explained, without invoking truthmakers. The word 'because' is most naturally read as a sentential connective, as opposed to a relational predicate. As a result of this, there is no reason to assume that what instances of (TG) express (when true) is a relation of any kind. Nor need we assume that the sen-

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[34] See especially Jennifer Hornsby (2005) and Dodd (2007).

tences following the 'because' refer to entities. For as Dodd points out, "[s]entences themselves do not refer, although some of their parts do" (2007: 397).

However, further reflection reveals that this line of reasoning is unsound. As was noted in the previous chapter, there are only two ways in which true statements of the form 'p because q' can be grounded. Either we can understand their truth to be grounded in some fact or state of affairs which makes q raise the chance of p, or we can take their truth to be grounded in the relation they express. However, since the first option is absurd with respect to grounding, we should opt for the latter. Of course, it is possible that I am overlooking other ways to ground the truth of statements of the form 'p because q'. Even so, I do not think that we should accept (TG). There are many instances of (TG) that come out false, even when the scope of the schema is restricted to synthetic truths. The reason for this is that the world may stand in the way that ⟨P⟩ describes it as standing (i.e. P), and it nevertheless be true that what ⟨P⟩ says is the case is not what grounds the truth of ⟨P⟩. To borrow an example from Mellor (*manuscript*), consider the proposition that a rainbow of a certain brightness and extent is visible above the horizon. In order for this to be true because things are as the proposition says they are, there would have to exist rainbows. But there are no such things. The phenomena of rainbows are optical illusions that arise as a result of water-drops refracting light, reflecting it internally and then refracting it back at angles that depend on its wavelength and hence its color. These facts, not rainbows, are the grounds for truths about the shapes and colors of rainbows. Similar remarks can be made about propositions recording what is visible in a plane mirror from various positions in front of it. For these propositions to be true because the world stands in the way the propositions describes it as standing there would have to be such things as mirror images. But, like rainbows, mirror images do not exist.[35] What makes images appear in a mirror is not light transmitting from objects behind the mirror, but light from objects in front of the mirror being reflected by the mirror. To be sure, assuming that truth is grounded, the world has to be some way for such propositions as these to be true. But we cannot hope to read off what that way is from the surface structure of the sentences stated on the right-hand side of the correspond-

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[35] As Mellor points out "if rainbows are to be entities, they will need more than the unproblematic properties of being multi-colored, arc-shaped and in definitive directions from where they appear. They will also need to be at no definite distance from those places. For while they may seem to be where some rain is falling, they will also move sideways with the place from which they appear, as if they were as far away as the sun". Mirror images are even worse. "As with rainbows", Mellor continues, "they are photographically verifiable truths about what is visible in a plane mirror from various positions in front of it. These truths appear to be about mirror images, entities behind the mirror with definite locations, shapes and colours, but also with no solitidy (since they can exist and move about inside walls) and no inertial mass (since they can be moved faster than the speed of light by rotating the mirror). No physics, ancient or modern, makes sense of entities with such attributes" (*manuscript*).

ing instances of (TG). In each of the above cases the grounds for the truth of ⟨P⟩ lie at a deeper level of reality than its being the case that P.

Given that (TG) is the only alternative to the groundedness of truth, it would thus appear that Rodriguez-Pereyra's argument is sound. It is not possible to claim that truth is grounded in how things are without claiming that truth is grounded in whether things are.

3.2. (Q2) What is it for a Proposition to be Made True?

In view of the fact that I have argued that the primary role of truthmakers is to ground truth, it should come as no surprise that I take truthmaking to be a matter of grounding truth. More specifically, I take truthmaking to be the relation holding between true propositions and that which grounds the truth of those propositions. As a first approximation, for any entity T and proposition ⟨P⟩:

(TM-G)   T makes ⟨P⟩ true if and only if ⟨P⟩ is true in virtue of T.

Anyone who thinks that propositions are made true will accept (TM-G). Now, as argued in the previous chapter, grounding is a relation between facts. So at the point the task is to explain how truthmaking thus understood can be made to fit talk about *facts* being grounded. Well, recall that *a is F in virtue of b's being G* is just a shorthand for the claim that the fact that *a* is F obtains in virtue of (or is grounded) in the fact that *b* is G (see 2.1.). From this it follows that, whenever some entity acts as a truthmaker for some proposition, that entity is something *in virtue of which* the corresponding fact that the proposition is true obtains (or exists). We can thus fit talk about grounding the truth of propositions with talk about facts by taking truthmaking to be the relation holding between alethic facts (i.e. facts about propositions being true) and that *in virtue of which* those facts obtain (Rodriguez-Pereyra, *forthcoming*). So take some entity T such that T makes ⟨P⟩ true. Since ⟨P⟩ is true in virtue of T, it follows that T is an entity *in virtue of which* the fact that ⟨P⟩ is true obtains. Expressed in terms of grounding, we obtain the outcome that [⟨P⟩ is true] is grounded in T. And since the relevant notion of grounding at play here is 'thick', it follows that [⟨P⟩ is true] ⇐ T.[36]

So much for the alethic facts. What about the entities that are said to ground those facts? Since grounding is a relation holding solely between facts, and truthmaking is a matter of grounding alethic facts, a natural move here would be to affirm:

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[36] I will assume that it is ontologically innocent to talk about alethic facts as long as we take truth to be an abundant property.

(TM-G1) T makes ⟨P⟩ true if and only if [⟨P⟩ is true] ⟸ [T exists].

This is an elegant solution, but unfortunately it has at least three controversial consequences. First of all, many propositions are thought to be made true by entities of different ontological categories. As already argued, what makes singular existential propositions true, and identity propositions true, are the particulars referred to by the individual constants in those propositions. So the truthmaker for ⟨Socrates exists⟩ appear to be Socrates himself, rather than the fact that Socrates exists. Similarly, it might be argued that the fact that ⟨there are properties⟩ is true is grounded by any property—say, the property of *being white* (or *whiteness*)—rather than the fact that the relevant property exists. Secondly, to account for instances of making true, (TM-G1) requires us to recognize *existence* as a property. After all, if we take facts to be things' having properties or standing in relations, then [Socrates exists] would have to involve Socrates having the property of *being existent*. But many would baulk at the idea that existence is a genuine property (cf. Armstrong 2004: 6 and Audi 2012: 103). This is not to say that we cannot conceive of 'exists' as a predicate corresponding to an abundant property. However, since the idea of truthmaker theory is to provide grounds for alethic facts, we should expect such grounds to involve only sparse properties. Thirdly, (TM-G1) involves commitment to gratuitous facts (Griffith 2014). Predications, we have seen, are made true by facts or states of affairs of the form [*a* is F] (alt. *a's being F*). But according to (TM-G1), this is false. What grounds [⟨*a* is F⟩ is true] is not [*a* is F], but rather the somewhat gratuitous [[*a* is F] exists]. However, it is difficult to see what possible reason we could have for recognizing the fact of some fact existing.

It would seem, then, that (TM-G1) has some undesirable implications. However, I think that we should agree with Griffith (2014) that these drawbacks are not decisive against (TM-G1) as an analysis of truthmaking. True, the drawbacks are unwelcome, but they are so for general metaphysical reasons, not because they are incompatible with truthmaking.

Another option is to simply say:

(TM-G2) T makes ⟨P⟩ true if and only if [⟨P⟩ is true] ⟸ T.

Since (TM-G2) allows grounds to be a particular or property/relation, and since neither of these are facts, it would appear that by accepting (TM-G2) we are obliged either to change our initial conception of grounding as a relation holding solely between facts or to separate truthmaking from grounding by allowing for instances of *making true* that are not instances of *grounding*. However, these consequences are conditional on a certain (and in my opinion implausible) reading of what particulars and properties/relations are. If we understand particulars to be what Armstrong calls 'thin' particulars, and properties and relations to be what he has dubbed 'unsaturated

state-of-affairs-types', then (TM-G2) does indeed pose a threat to our understanding of truthmaking *qua* grounding. The 'thin' particular is the "thing taken in abstraction from all its properties" (Armstrong 1978: 114), it is "the particularity of a particular" (2004: 105). Such 'entities' are not facts or states of affairs themselves, but mere aspects of them (see 3.1.2.). It is difficult to see how particulars thus conceived could possibly ground facts because, as Trogdon points out, they do not "have the right kind of structure to be the *explanans* of anything" (2013). The same line of complaint can be raised against properties/relations *qua* state-of-affairs-types. A property or relation thus understood is a gutted state of affairs: "it is everything that is left in the state of affairs after the particular particulars involved in the state of affairs have been abstracted away in thought" (Armstrong 1997: 28-29). So if *a's being F* and *a's having R to b* are the states of affairs in question, the corresponding unsaturated state-of-affairs-types are _*'s being F* and _*'s having R to* _ (1997: 28). But again, these are not proper states of affairs, but mere aspects of them. Such 'entities' seem especially ill-suited to act as grounds for alethic facts.

But nothing in the logic of the situation demands that '*a*' and 'F' in ⟨*a* exists⟩ and ⟨F exists⟩ denote a 'thin' particular and an unsaturated state-of-affairs-type, respectively. As a matter of fact, if states of affairs are basic ontological unities, as argued in 3.1.2., there are no such entities for these terms to denote. The only particulars we can refer to are 'thick' particulars, and the only properties/relations we can refer to are ('un-gutted') state-of-affairs-types (Rissler 2006). Of course, both of these belong to the category of states of affairs. In the case of 'thick' particulars they are the states of affairs consisting ('thin') particulars having all of their non-relational properties; and in the case of properties/relations, they are the states of affairs that exemplify the properties and relations in question. Consequently, if (as we are assuming) states of affairs are fundamental ontological unities, then (TM-G2) is fully compatible with our understanding of truthmaking as the grounding of alethic facts.

In what follows I will assume that (TM-G2) is the correct analysis of truthmaking in terms of grounding, and since I have already laid down the set of principles governing grounding, I will not specify the relation further. There are those who think that notions like 'grounding' and 'in virtue of' are simply not clear or precise enough to serve as *definientia* in an analysis of truthmaking. Given this, we should look more closely at some alternative views seeking to analyze (TM-G) in terms of notions that we allegedly have a better grasp of.

3.2.1. Some Attempts at Analyzing (TM-G) in Modal Terms

Initial attempts to define truthmaking proceeded in terms of entailment (Fox 1987: 189). Thus:

(TM-E)   T makes ⟨P⟩ true if and only if T exists and ⟨T exists⟩ entails ⟨P⟩.

A proposition is said to entail another if and only if it is impossible for the former to be true and the latter to be false. The impossibility is metaphysical, so in the present context we are talking about the truth of ⟨T exists⟩ metaphysically necessitating the truth of ⟨P⟩. Since ⟨T exists⟩ is true if and only if T exists, another way of formulating (TM-E) is:

(TM-N)   T makes ⟨P⟩ true if and only if T exists and T necessitates the truth of ⟨P⟩.[37]

Armstrong prefers (TM-N) to (TM-E) because the former makes explicit the idea that "the truthmaking term of the truthmaker relation is a portion of reality, and, in general at least, portions of reality are not propositions" (2004: 5-6). Since this is almost universally agreed, and given also that (TM-N) is entailed by (TM-E), I will focus attention on (TM-N).

It is well-known that (TM-N) fails to account for the groundedness of truth. Instead of providing us with a substantial account of what it is for truthmaker to ground truth, it often generates empty formalities.

(1)   Truthmaking imposes a *strict partial ordering* on the set of entities in its range. The guiding intuition behind truthmaker theory is that the truth of a proposition is not primitive, but depends in a non-trivial way on an antecedently existing reality. The truthmaking part of the truthmaking relation must therefore be more fundamental than the alethic part. And since *being more fundamental than* is a strict partial ordering, truthmaking (like 'thick' grounding) must exhibit *asymmetry*, *irreflexivity*, and *transitivity*. Necessitation in the simple sense discussed here is a modal relation between what holds at a set of possible worlds and what holds at a superset of those worlds (Schaffer 2008b: 309). This means it exhibits the same logical properties as set inclusion, i.e. *reflexivity*, *non-asymmetry* and *transitivity*. Truthmaking cannot exhibit these features as it relates worldly facts to facts about propositions being true.

(2)   Truthmaking is a *hyperintensional* relation. Intuitively, even among necessary truths and existents, there are substantive questions about what makes what true. Any plausible notion of making true should therefore be fine-grained enough to properly distinguish between entities that make necessary truths true from those that do not. Necessitation, by contrast, is an *intensional* rela-

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[37] The definition is found in Restall (1996: 332).

tion that cannot distinguish entities or propositions that exist or are true in exactly the same set of possible worlds. For any entity T and necessary truth ⟨P⟩, the existence of T necessitates the truth of ⟨P⟩ in that it is impossible for T to exist and ⟨P⟩ to be false. Since T is any arbitrary entity and ⟨P⟩ is any arbitrary necessary truth, this generalizes to the claim that every existent makes every necessary truth true. But this is absurd. Whatever makes it true that, say, 5 + 7 = 12 or that Mark Twain = Samuel Clemens, not any old entity will do. While Socrates makes it true that Socrates exists, it is intrinsically implausible that Socrates also makes true ⟨5 + 7 = 12⟩. The reason for this is simple. The truth of ⟨5 + 7 = 12⟩ is not grounded in Socrates. Grounding is a hyperintensional relation, and the mere fact that it is impossible for Socrates to exist and ⟨5 + 7 = 12⟩ is false does not establish that the former grounds the truth of the latter.

(3) Truthmaking is a *non-monotonic* relation. If ⟨P⟩ is true in virtue of T, it does not follow that ⟨P⟩ is also true in virtue of the plurality consisting of T and X (for some arbitrary X). Plato makes it true that Plato exists. But it does not follow—nor would it be true—that ⟨Plato exists⟩ is made true by Plato and, say, my vinyl collection. Truthmaking is the relation we invoke to explain the truth of propositions by reference to the existence of that which grounds their truth. But as was noted earlier, every fact in a plurality of fact that explains some other fact must be relevant to the fact explained. My vinyl collection is of no relevance to the truth of the proposition that Socrates exists, and hence it is not a part of that in virtue of which it is true that Socrates exists (Rodriguez-Pereyra 2006: 972). This is to be contrasted with necessitation which is a strictly *monotonic* relation and, as such, indefeasible in view of irrelevant additions. The plurality consisting of Socrates and my vinyl collection necessitates the truth of the proposition that Socrates exists. ⟨Socrates exists⟩ is not true *in virtue of* Socrates and my vinyl collection, but it would be if grounding were a matter of necessitation—so grounding is not a matter of that.

Some philosophers think that these problems arise, not because necessitation is inadequate to capture the groundedness of truth, but because (TG-N) fails to take into account the fact that what is made true must—in some sense—be *about* that which makes it true. These writers usually add to (TM-N) a relevance constraint roughly along the following lines:

(TM-N$_R$) T makes ⟨P⟩ true if and only if; (i) T exists; (ii) T necessitates the truth of ⟨P⟩; and (iii) ⟨P⟩ is about T.[38]

Intuitively, (TM-N$_R$) makes sense. Consider the alethic fact that ⟨Socrates exists⟩ is true. This fact necessitates ⟨Socrates exists⟩'s being true (and *vice versa*), but it does not make it true. The reason for this is simply that the proposition is about Socrates and not about its own truth. Similarly, ⟨5 + 7 = 12⟩ is not about everything but about numbers, and ⟨Plato exists⟩ is about Plato and not the plurality consisting of Plato and my vinyl collection.

Ultimately, however, (TM-N$_R$) fails to convince. Notions like 'aboutness' and 'directedness' are famous for being no less difficult to pin down than 'grounding'. Barry Smith's analysis of 'aboutness' in terms of 'projection' is flawed (Gregory 2001), and our intuitions concerning which truths are about which entities are vague at best. Trenton Merricks, for example, thinks that ⟨there are no Hobbits⟩ lacks a subject matter (2007). It is not about something. Jonathan Schaffer (2008b) suggests it is about the absence of Hobbits. Surely, we would expect a bit more intuitive transparency and straightforwardness from a notion which allegedly plays such a central role in truthmaker theory. I would like to think that the notion of 'grounding' fares better in this respect (see 2.). More importantly, however, there are many truths which are not about that which grounds their truth. In the previous section we saw that truths about rainbows and mirror images are not grounded in the existence of their subject matter, which does not exist, and it often requires extensive empirical research to settle what grounds the truth of a particular proposition. Moreover, what is determined *a posteriori* to be a truthmaker may, and often does, exhibit a complexity that is quite different from that of the proposition it makes true (Cf. MacBride 2013). Propositions like ⟨the average family has 2.1 children⟩, ⟨there is a water shortage in Spain⟩ and ⟨there is a dark shadow over New York⟩ appear to be about the average family, a water shortage and a dark shadow, but presumably, we would not want to admit any of these entities into our ontology. The facts that ground, and hence, explain the corresponding alethic facts lie at a deeper and much more complex level than the aboutness of the propositional representations appears to suggest. Of course, one might object that when we engage in investigations that reveal the underlying grounding facts, we will be also able to see what these propositions really are about. Perhaps truths about what, seemingly, are rainbows are really about the underlying optical phenomena that give rise to the illusion of rainbows. Be that as it may, however, in order to define the concept of aboutness one would then have, independently, to presuppose some notion of 'ground' or 'grounding', and it is clear that such a concept has no role to play in a reductive analysis of (TM-G).

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[38] See e.g. Smith (1999) and Merricks (2007).

It might be said that there are less problematic relevance constraints to be added to (TM-N), but I think the quest to identify a relevance constraint of this sort would be futile. For even if we agree that there are ways to amend (TM-N) that avoids the problems presented in (1) – (3), it is far from clear that (TM-N) merits, or would reward, amendment. The first thing to notice is that there is really nothing to be said in support of (TM-N). The only author, to my knowledge, to have provided an argument in favor of the idea that truthmaking reduces to, and implies, necessitation is Armstrong. Here is his argument by *reductio*:

> Suppose that a suggested truthmaker T for a certain truth *p* fails to necessitate that truth. There will then be at least the possibility that T should exist and yet the proposition *p* not be true. This strongly suggests that there ought to be some further condition that must be satisfied in order for *p* to be true. This condition must either be the existence of some further entity, U, or a further truth, *q*. In the first of these cases, T + U would appear to be the true and necessitating truthmaker for *p*. (If U does not necessitate, then the same question raised about T can be raised again about U.) In the second case, *q* either has a truthmaker, V, or it does not. Given that *q* has a truthmaker, then the T + U case is reproduced (2004: 6-7).

According to (TM-N) necessitation is both necessary and sufficient for truthmaking. But notice that Armstrong's argument presupposes both that anything which fails to necessitate the truth of a proposition cannot be a truthmaker for that proposition and that anything which necessitates the truth of a proposition must be a truthmaker for that proposition. This is just another way of saying that necessitation is both a necessary and a sufficient condition for *making true*, which is exactly what the argument is meant to establish (MacBride 2013).

What is more, in paper IV "Against Truthmaker Necessitarianism" (2015), I argue that there is really no reason to think that the role of truthmakers in providing ontological grounds for the truth of propositions cannot be performed equally well by entities that merely contingently make those propositions true. Truthmaking is a matter of explaining truth, and there could not be an explanation of truth if the link between ground and the grounded is a purely accidental relation. But a relation that is not purely accidental need not be metaphysically necessary. If causal determinism is correct, a cause must suffice for its effect. But it does not follow from this that causes must necessitate their effects. It takes laws of nature to link causes to their effects, and if those laws are contingent, then deterministic causes will not necessitate their effects. Thus, recall Armstrong's sufficiency argument for the existence of states of affairs from subsection 3.1.2. This relies on the assumption that a truthmaker must necessitate the truth of the proposition(s) it makes true. The conclusion reached is that the only entities fit to make contingent predications true are states of affairs. So consider

⟨Socrates is white⟩ and assume that it is made true by the state of affairs *Socrates's being white*. If Armstrong is correct, the necessity that the state of affairs confers on the truth of ⟨Socrates is white⟩ is a consequence of its truthmaking abilities. But why should we accept this? For the sake of argument, suppose, contrary to Armstrong, that the transworld identity of states of affairs does not supervene on their structural composition. There will then be worlds where the state of affairs *Socrates's being white* obtains and is constituted by Socrates and, say, redness. In that case, *Socrates's being white* will not necessitate the truth of ⟨Socrates is white⟩. Yet it is hard to see why this lack of necessitation by *Socrates's being white* would deprive that fact the status of being a ground for the truth of ⟨Socrates is white⟩.[39] Why should it? As long as the state of affairs suffices to determine that Socrates is white in the actual world, there are no non-question-begging reasons to take any other-worldly inhabitants into account.[40]

This is not to deny that truths are grounded in the existence of facts or states of affairs. The truth of ⟨Socrates is white⟩ should be conceived of as grounded in *Socrates's being white*, rather than in Socrates himself. But, as I argue in paper IV, this has everything to do with the fact that Socrates *is* white and nothing to do with *Socrates's being white* necessitating the truth of ⟨Socrates is white⟩. Suppose, for the purpose of a *reductio*, that the truth of the proposition that Socrates is white is grounded in 'thick' Socrates. Socrates thus understood is not only white; he is also of a determinate mass, shape and so forth.[41] So if Socrates serves to ground the truth of ⟨Socrates is white⟩, he would also serve to ground the truth of various other non-relational predications. But this is wrong. For what grounds the truth of the proposition that Socrates is white is not what grounds the truth of the proposition that he weighs 80 kg. What grounds the truth of ⟨Socrates is white⟩ is the fact that Socrates *is* white, and what grounds the truth of ⟨Socrates weighs 80 kg⟩ is the fact that he *is* a mass of 80 kg (cf. Rodriguez-Pereyra 2005: 23). But these facts are states of affairs rooted in 'thick' Socrates (Moreland 1998: 257). They are the states of affairs of ('thin') Socrates instanti-

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[39] Merricks (2007: 21-22) and Schaffer (2008b: 12) provide a similar argument. Suppose that I am contingently sitting and that what makes ⟨I am sitting⟩ true is the existence of a contingently sitting me. In that case, my existence does not necessitate the truth of ⟨I am sitting⟩. Yet it would seem that anyone who postulates the existence of a contingently sitting me has postulated reality enough to ground the truth of the proposition in question.

[40] As a matter of fact, indeterministic phenomena need not be determined by that which explains them. In paper IV I consider a case where it seems plausible to conclude that nothing determines the truth of a certain counterfactual, yet the counterfactual is grounded in that upon which its truth depends.

[41] What does it mean to say of a 'thick' particular like Socrates that it has properties? 'Thick' particulars are states of affairs: it would seem that the properties they have must be second-degree properties. Such properties, however, give rise to second degree states of affairs, which differ from the first-degree states of affairs discussed here. There is an easy fix to this, however, for as J. P. Moreland points out "when a [thick particular] has a property, that property is "seated within" and, thus, an expression of the "inner nature" of the thick particular itself" (1998: 257).

ating the property of *being white* and the property of *having a mass of 80 kg*, respectively. Thus, to say that what grounds the truth of ⟨Socrates is white⟩ is the fact that Socrates is white is just to say that ⟨Socrates is white⟩ is true in virtue of *Socrates's being white*.

So much for the idea that *making true* is a matter of necessitation. The role of truthmakers is to ground truth, and truthmaking *qua* grounding neither reduces to, nor implies, necessitation. Any attempt to provide a substantive analysis of (TM-G) in terms of (TM-N)—no matter how the latter is amended—is therefore bound to be unsuccessful.

3.2.2. Essentialism

Some philosophers attempt to avoid the problems connected with (TM-N) by appealing to the notion of *essence*—a notion which, as argued in 1.1.2., is more fine-grained and discriminating than necessitation. As a first approximation to the analysis of (TM-G), Jonathan Lowe (2009: 209) suggests the following:

(TM-I)   T makes ⟨P⟩ true if and only if it is part of the essence of ⟨P⟩ that it is true if T exists.

Now, it is important to notice that the present analysis differs from the essentialist analysis of ontological dependence in that the second part of the biconditional does not state that it is part of the essence of ⟨P⟩ that it is true *only* if T exists. The analysis, therefore, does not say that true propositions are ontologically dependent upon that which makes them true (Lowe 2009: 213). Rather, the purpose of appealing to the notion of *essence* in (TM-I) is that, allegedly, this enables us to discriminate between legitimate and illegitimate truthmakers by restricting the scope of potential truthmakers for propositions. Thus, for example, it is plausible to maintain that it is not part of the essence or identity of a necessary truth like ⟨5 + 7 = 12⟩ that it is true if Socrates exists. Nor does it seem to be a part of the essence of ⟨Socrates exists⟩ that it is true if [⟨Socrates exists⟩ is true] exists. What about ⟨Plato exists⟩? Is it a part of the essence of this proposition that it is true if the plurality consisting of Plato and my vinyl collection exists? It is not clear, reading Lowe, what he would say. However, he understands the essence of propositions to be determined by what they are about (2009: 255), and since ⟨Plato exists⟩ is not about Plato and my vinyl collection, it is probably safe to assume he would deny that it is part of the essence of the proposition in question that it is true if the plurality consisting of Plato and my vinyl collection exists.

Of course, this also means that (TM-I) faces the same difficulties as (TM-N$_R$). So anyone who rejects a relevance constraint couched in terms of aboutness for the reasons given above should also reject the essentialist view. Even more alarmingly, (TM-I) is committed to an ontology of propositions that is not only platonic, but also

mysterious in that we are required to buy into the whole myth of "self-interpreting" propositions—that is, propositions which, as Fraser MacBride puts it, "mean what they do irrespective of what speakers or thinkers ever do with the signs or judgments that express them" (2013). For if truthmakers are implicated in the essence of the propositions they make true, then those propositions must be incapable of meaning anything other than what they do, and they must do so by virtue of their intrinsic nature. This, I maintain, is hardly an attractive implication, as it immediately rules out a whole range of naturalistic ontologies. In point of fact, the implication is already implicit in (TM-N) if we take necessitation to be an internal relation. However, this only deepens the problems for the naturalist. As I argue in paper V "Truthmaker Internalism and the Mind-Dependence of Propositions" (2015), naturalists are committed to a conception of propositions—if their existence is admitted—as mind-dependent entities: entities that cannot exist or be truth-apt in the absence of minds. If the claim that truthmaking is an internal necessitating relation is even to get off the ground we must therefore take the fundamental truthmaking relation to obtain between truthmakers and representational mental state tokens possessing a 'self-directed' form of intentionality. But, as I argue in my article, such states are not internally related to whatever it is that makes them true. And since there are no naturalistic representations that are "self-directed" and internally related to their truthmaker(s), it would appear that neither (TM-I) nor (TM-N) can be made to square with naturalism. This is to be contrasted with the grounding conception of truthmaking. Grounding neither reduces to, nor implies, necessitation, so there is no clash between truthmaking *qua* grounding and naturalism. Whatever grounds the truth of a representational mental state token could be externally related to that token (or to the fact that the representational token is true).

This concludes my discussion of what it is for propositions to be made true. We have seen that the various attempts to analyze (TM-G) in terms of notions of which we allegedly have a good grasp fail. Does this mean that notions like 'grounding' and 'in virtue of' are primitive and admit of no further analysis? Of course not. It may be simply that the correct analysis is there for the asking, but has eluded us so far. In strictness, the only conclusion we can draw from an exposition like this is that if there is an analysis to be had, it appears to be extremely hard to penetrate.

3.3. (Q3) Does the Truthmaker Principle Cover all Truths?

One of the more interesting disagreements among truthmaker theorists concerns the range of truths that the Truthmaker Principles covers. The debate usually centers on the validity of *Truthmaker Maximalism*, i.e. the principle that all true propositions,

without exception, have a truthmaker. Those who deny maximalism do so either because they deny that truths have truthmakers or because they believe that we can restrict the Truthmaker Principle to a sub-set of truths without thereby having to give up the idea that truth is grounded. I am a maximalist. I agree with those, like Julian Dodd, who argues that "[t]o posit exceptions to the claim that every truth has a truthmaker is to cut oneself adrift from the motivation for being a truthmaker theorist in the first place" (2007: 395). In what follows I will give my reasons for thinking that Dodd is right. I will also meet a number of objections to Truthmaker Maximalism, and discuss what I take to be plausible grounds for various kinds of alethic fact.

3.3.1. Why Truthmaker Maximalism?

Truthmaker theory is a theory about what grounds facts about propositions being true. Some truthmaker theorists go even further, claiming that truthmaker theory also concerns *what it is* for propositions to be true. In this guise, truthmaking becomes constitutive of truth, since for any proposition ⟨P⟩ to be true is for ⟨P⟩ to be made true. Maximalism then has to be upheld, as truthmaker theory thus conceived could not possibly be the kind of theory that can apply only in a restricted domain (Cameron 2008c: 412). I think that we should agree over this. However, I do not think that we need to go as far as to claim that truthmaker theory is a theory of truth in order to secure commitment to maximalism. For if it is correct that truthmaker theory concerns the grounds for alethic facts, we would expect maximalism to be true anyway. The reason for this is simple. Alethic facts are non-self-sufficient entities. As such, their ontological profile requires the existence of some prior fact, or plurality of facts, in virtue of which they obtain. And these, we have already seen, are the entities which ground the truth of the propositions involved in the alethic facts, i.e. their truthmakers. If we restrict the groundedness of truth to cover some but not all truths, we will also have to give up our hope of ever having a unified theory of truthmaking: some truths will be made true, the rest will simply be true (or true by some other means yet to be specified).

   To this one might object that maximalism is an exaggeration. For one might wonder whether necessary truths require truthmakers. After all, necessary truths are true however the world is, and so, would appear to be true independently of anything in the world. We have already seen that metaphysically necessary truths of the form ⟨a = a⟩ can be understood to be made true by a, and it is also reasonable to assume that whatever makes ⟨P⟩ true also makes true the logical truth ⟨P ∨ ~P⟩. Matters become murkier when considering analytic truths that are true solely in virtue of the meanings of the terms in which they are expressed. Are the alethic facts in which they are included self-sufficient entities or do they obtain by virtue of being grounded in the meanings of the sentences expressed by the constituent propositions (Armstrong 2004: 109-11)? I will leave this matter for someone else to decide. Since I shall only

be concerned with truthmakers for contingent synthetic truths, the question whether analytic truths fall outside the scope of the truthmaker principle has no bearing on the discussion to follow. But even if we restrict the truthmaker principle to only cover synthetic truths, we are not left with a meek metaphysical thesis. We are still required to provide truthmakers for negative and general truths—both of whose eligibility to be made true have been questioned.

3.3.2. Grounding and Entailment

To set the stage for the question what makes general and negative truths true, allow me to briefly mention a principle with an important role to play in truthmaker theory, the so-called *Entailment Principle*. This states that:

(EP)   if T makes ⟨P⟩ true and ⟨P⟩ entails ⟨Q⟩, then T makes ⟨Q⟩ true,

where, on the classical view of entailment, ⟨P⟩ entails ⟨Q⟩ if and only if it is impossible for ⟨P⟩ to be true and ⟨Q⟩ false.

(EP) is a valuable tool in truthmaker theory. In logical atomism, for example, the truth value of a truth-functional complex is explained in terms of its logical structure and the truth or falsify of its atomic propositions. This has led some philosophers to argue that true truth-functions do not need their own truthmakers: all it takes to fix the truth value of a truth-functional complex is to fix the truth value of its simpler constituents. A prominent advocate of this position is Mellor. He says:

> Some […] truths need no truthmakers, notably true truth-functions, whose truth follows from the truth values of their constituents. We may *say* of course that 'P&Q' and 'P∨Q' are "made true by the truth of 'P' and 'Q'; but this is just the entailment of one proposition by others, not the "cross-categorial" link between propositions and other entities that concerns us here. That is what true truth-functions do not need and therefore, I claim, do not have (2003: 213).

The idea is that if the truth of a complex proposition is a function of its constituent atomic propositions, it is to the truthmakers of these latter propositions only that we must turn when outlining a theory of the basic structure of the world. In the passage, Mellor can be read as taking this to imply that truth-functional complexes do not have truthmakers, period. This would be mistaken. Rather, the claim is that there is no need to postulate anything *in addition to* what make the constituent propositions true. Thus, there is no need to postulate, say, the existence of a conjunctive entity that makes ⟨P ∧ Q⟩ true: the conjunction is true simply in virtue of there being a truthmaker for *each* conjunct. Nor do we need a disjunctive entity that makes ⟨P ∨ Q⟩ true: it suffices that there is a truthmaker for *either* disjunct. Similar reasoning sug-

gests that existential generalizations do not require their own separate truthmakers. If *a's being F* makes true ⟨a is F⟩, then by (EP), *a's being F* also makes true ⟨∃x F(x)⟩.

Attractive as (EP) might be in its ontological economy, it still has some undesirable consequences. Since every necessary truth is entailed by every truth and every entity makes some truth true, one consequence is that everything makes every necessary truth true.[42] But this means, among other things, that the truthmaker for ⟨Socrates exists⟩ also serves as a truthmaker for all the truths of logic and mathematics, which, as already argued, is absurd. Worse still, (EP) leads to the result that everything makes every truth true, whether necessary or contingent. All we have to assume is that a truthmaker for a disjunction must make either disjunct true.[43] But apart from the absurdity of making Socrates the ontological basis for all truths, this trivializes the metaphysical project of finding ontological grounds for any given truth.

Various strategies to avoid these problems have been devised. Some theorists accept (EP) in its classical form but deny that a truthmaker for a disjunction must make one or other disjunct true (Read 2000: 75). This avoids the second problem, but not the first: everything would still be a truthmaker for every necessary truth. Besides, even if we somehow learn to live with this implication, we must (on pain of 'trivialization') accept truthmakers for disjunctions that fail to make either disjunct true. This undermines the entire atomistic project of grounding the truth of truth-functional complexes in the truthmakers for their constituent propositions.

A more promising strategy for present purposes, and one favored by Armstrong (2004: 10-11), is substituting some sort of relevant entailment for classical entailment in (EP), thus rendering $\Box Q \supset \Box(P \supset Q)$ invalid. This enables us to avoid trivializing truthmaker theory without having to accept 'separate' truthmakers for disjunctions. The problem here is that there are several systems of relevant logic, each one validating different entailments. To make (EP) precise one must specify what system of logic the notion of entailment in (EP) belongs to, and as Rodriguez-Pereyra (2006: 975) notes there is no guarantee that any of these systems will have a notion that conforms with our conception of what makes what true. The guarantee is unavailable because the systems are not concerned with the groundedness of truth. Rather, they are concerned with how the notion of entailment functions in rational inference. But truthmaking *qua* grounding is an ontological relation, not a semantic one. This is why (EP), expressed in terms of relevant entailment, fails to identify rightful truthmakers.

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[42] Proof: Take any entity T and necessary truth ⟨Q⟩. By assumption, there is some ⟨P⟩ such that T makes ⟨P⟩ true. Since ⟨Q⟩ is necessary and so entailed by ⟨P⟩, it follows from (EP) that T makes ⟨Q⟩ true, QED (Restall 1996: 333).

[43] Proof: Let T be any entity and ⟨Q⟩ any truth. By assumption, T makes some ⟨P⟩ true. Since ⟨Q ∨ ~Q⟩ is a necessary truth and so entailed by ⟨P⟩, it follows from (EP) that T makes ⟨Q ∨ ~Q⟩ true. Given that a truthmaker for a disjunction is also a truthmaker for either disjunct, we obtain the result that T makes ⟨Q⟩ true or T makes ⟨~Q⟩ true. However, nothing makes ⟨~Q⟩ true, because ⟨~Q⟩ is false. So T makes ⟨Q⟩ true, QED (Restall 1996: 333).

No system of relevant logic warrants an entailment from ⟨Socrates is white⟩ to ⟨Socrates is colored⟩, yet we would expect these propositions to share the same truthmaker.

Another strategy—offered by Frank Jackson and admired by Armstrong—is to hold on to classical entailment while narrowing the scope of (EP). The most natural suggestion is to restrict the principle to *contingent* truths. However, this will not do—at least, assuming that a truthmaker for a conjunction is a truthmaker for each conjunct. For then, everything would still make every necessary truth true.[44] In response to this, Armstrong recommends on behalf of Jackson that we restrict (EP) to '*purely* contingent' truths, i.e. truths which do not contain any necessary component at 'any level of analysis' (2004: 11-12). This amounts to saying that when a proposition is a conjunction of a contingent truth and a necessary truth its entailment of the necessary truth is not allowed in (EP). Rather *ad hoc*, admittedly, but perhaps the restriction can be accepted as a mere technical (stipulative) refinement.

There is, however, a general objection to (EP), and this threatens to undermine all three versions of the principle. In any reasonable sense of 'entailment', conjunctions entail their conjuncts regardless of whether they are (purely) contingent or not. A consequence of (EP), in any of its versions, is thus that whenever a plurality of entities make a conjunction true, they make true each conjunct. Now, suppose that ⟨Socrates exists⟩ and ⟨Plato exists⟩ are made true by Socrates and Plato respectively, and thus that together they are what makes ⟨Socrates exists and Plato exists⟩ true. Since the conjunction entails ⟨Socrates exists⟩, it follows from (EP) that Socrates and Plato together are the truthmaker for ⟨Socrates exists⟩. But one may plausibly deny this on the grounds that a truthmaker is an entity *in virtue of which* a proposition is true, and that ⟨Socrates exists⟩ is *not* true in virtue of Socrates and Plato taken together: it is true simply in virtue of Socrates (Rodriguez-Pereyra 2006: 972).

The idea here is that truthmaking is a non-monotonic relation in that if ⟨P⟩ is true in virtue of T, it need not follow that ⟨P⟩ is true also in virtue of T and X, for some arbitrary X. For X to be a part of something in virtue of which ⟨P⟩ is true, X must play some role in making ⟨P⟩ true. This, of course, is a direct consequence of taking truthmaking to be a matter of grounding truth in the 'thick' sense depicted by (TM-G). For, as we saw in 2.2., grounding thus understood is non-monotonic, so the fact that 'thickly' ground facts about conjunctions being true (whatever they are) need not be what 'thickly' grounds facts about the constitutive conjuncts being true. Consequently, if we equate truthmaking with the grounding of truth in the 'thick' sense, (EP) has to go. This does not mean that (EP) in its restricted form is useless. We are still able to apply the principle to a large set of truths. For example, we would still

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[44] Proof: Let T be any entity and ⟨Q⟩ be any necessary truth. By assumption, there is some contingent ⟨P⟩ such that T makes ⟨P⟩ true. Since ⟨P⟩ entails ⟨P ∧ Q⟩ and the conjunction is contingent, it follows from (EP) in its restricted form that T makes ⟨P ∧ Q⟩ true. Given that a truthmaker for a conjunction is a truthmaker for each conjunct, T makes ⟨Q⟩ true, QED (Restall 1996: 334).

expect the truthmaker for ⟨P⟩ to make ⟨P ∨ Q⟩ true as well, and the truthmaker for ⟨a is F⟩ to make it true that something is an F. Another point in relation to this is that nothing of what has been said excludes that there is a 'thin' sense in which facts about conjunctions being true also ground the corresponding facts about the constitutive conjuncts being true. On the tracking view grounding proper is not an explanatory relation, and because of this there is no requirement for every member of a plurality of facts to play a role in grounding the corresponding grounded fact. We will have reason to return to the issue of whether 'thin' grounding distributes across entailment when discussing grounds for negative truths.

3.3.3. Grounds for General Truths

What are the grounds for facts about laws of nature being true? Why is it true that any two bodies attract one another with a force inversely proportional to the square of their distance and proportional to their masses? A natural suggestion is to say that the generalization is true simply in virtue of its being a law of nature that bodies attract one another in accordance with Newton's Law of Gravity. Not everyone is convinced, however. Humeans insist that the alethic fact obtains, not in virtue of its being a fact of the matter that bodies must attract one another in this way, but rather in virtue of the fact that every body happens to attract every other body in the manner specified by the law (Lewis 1973: 72-77). In paper II "Nomological Resemblance", I argue in favor of an anti-Humean position according to which laws of nature are grounded in the dispositional essences of natural properties. On this view, alethic facts about law-like generalizations are grounded in things having properties, which by virtue of their essence are directed toward a certain type of manifestation in response to a certain type of stimulus. Thus, what grounds the truth of the above generalization is the fact that each and every massive body (in virtue of being massive) has the power to attract other masses, with a certain force, in response to those masses being at a certain distance from one another.

Of course, not all generalizations describe law-like regularities. In addition, there are accidental regularities:, i.e. regularities that hold, not because they must, but because things happen to be a certain way. Can anything general be said about the grounding of general accidental truths?

Consider Russell's classic argument for the claim that there must be general facts "separate and distinct from all the atomic facts" (1956: 236). He showed that the complete list of all mortal men fail to entail that all men are mortal.[45] The list will only make it the case that all men are mortal in circumstances that obtain in the actu-

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[45] For the sake of argument, I will assume that ⟨all men are mortal⟩ states an accidental regularity.

al world where there are no men in addition to the ones listed. In other possible worlds in which all of these men exist, there will be some man that is not mortal, thus rendering it false that all men are mortal. According to Armstrong, we should therefore supplement the individual facts about each man being mortal with whatever makes it true that nothing is a man other than the ones listed. Because this is a contingent fact, we also need higher-order states of affairs, namely the totality fact that these are all the men there are (1997: 198). Such a totality fact consists in a binary relation T of totality that obtains between a mereological aggregate, on the one hand, and a property, on the other. The aggregate is said to total the property just in case no other thing possesses the property in question. Thus, suppose that $a, b…n$ is the complete list of men. The aggregate A of the complete list of men bears the totality relation T to the property of *being a man* if and only if there are no men other than $a, b,…n$. Since A bears T to the property of *being a man* (T(A, *being a man*)), there can be no men other than those included in A. What makes it true that all men are mortal, then, is the conjunction of the state of affairs consisting of *a's being a mortal man*, *b's being a mortal man,… n being a mortal man* taken together with the higher-order fact T(A, *being a man*) guaranteeing that there are no men in addition to *a, b, …n.* By the same token we are able to do without negative states of affairs in accounting for the truth of negative predications. All we need, to make it true that, say, Socrates is not blue, is the mereological sum of all states of affairs constituting Socrates's possession of his properties (call it B), and the second-order property of being a property of Socrates, i.e. T(B, *being a property of Socrates*).

Totality facts are rather peculiar entities. First of all, it might be argued that they are negative facts in disguise. After all, totality facts are a type of 'no more fact' facts—facts that there are no more things or states of affairs, or things or states of affairs of a certain kind (Molnar 2000: 82). The totality relation thus involves negation by setting a limit to the entities with a certain property. Secondly, Armstrong's position generates a regress. Take the totality state of affairs embracing all first-order states of affairs. Since this second-order state of affairs is itself a state of affairs it follows that the initial mereological aggregate failed to include all states of affairs. So there must be an additional totality fact comprising all of them. But then this third-order state of affairs would seem to require a fourth-order state of affairs which includes it, and so on *ad infinitum* (Heil 2006: 237-40 and Cox 1997).[46] Thirdly, we do not seem to have an independent reason to believe in totality states of affairs. The only reason one could give for thinking that there is a state of affairs like T(A, *being a dust bunny in my office*) is that states of affairs of this kind open the door to necessitating truthmakers for general and negative truths (Cameron 2008d: 294). But, as I argued in 3.2.1., we

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[46] For Armstrong's response to this objection, see his (2004: 78-79). To see why his response ultimately fails to convince, see (MacBride 2013).

have no reason to think that truthmakers must necessitate the truth of the propositions they make true, and once this is realized, there no longer any need for totality facts to do the truthmaker job for us. Take the complete list of mortal men (here understood as a plurality of facts). The list will only make it true that all men are mortal under the circumstances obtaining in the actual world, where *a, b, …n* are all the men there are. According to Armstrong, this requires that we also include, in the truthmaker, whatever it is that makes it true that there are no men in addition to *a, b,…n*, i.e. *T*(A, *being a man*). But the idea that this is required begs the question against those who deny that truthmaking implies necessitation. One will only think that the totality fact must be included if one assumes that truthmakers necessitate the truth of the propositions they make true. Truthmaking, however, is a matter of grounding truth, and grounding neither reduces to, nor implies, patterns of modal covariation. There is, therefore, no reason to accept totality facts, let alone include them as constituents of what make generalizations true. All it takes to ground the truth of ⟨all men are mortal⟩ are the biological dispositions which make each and every one of us mortal. These facts only ground (and thus, metaphysically explain) the truth of ⟨all men are mortal⟩ in worlds, like the actual world, where it is true that nothing is a man other than *a, b, c,…n*. Yes, assuming maximalism, there must be something in the actual world which grounds the truth of that proposition. But there is no further requirement that the grounds for the truth of ⟨nothing is a man other than *a, b, …n*⟩ be brought into the truthmaker for the proposition that all men are mortal.

3.3.4. Grounds for Negative Truths

Recall Mellor's claim that there is no need to postulate separate truthmakers for conjunctions and disjunctions. The truth of a conjunction is determined by the truth of both its conjuncts, and the truth of a disjunction is determined by the truth of either of its disjuncts. Mellor thinks something similar holds true for true negations: "all it takes to make ⟨P⟩ false and hence ⟨~P⟩ true is that S *not* exist" (2003: 213). As with the conjunction and disjunction case, there is no need for a separate truthmaker, some sort of negative entity, to make ⟨~P⟩ true. A negative proposition is true just in case the corresponding positive proposition lacks a truthmaker.[47]

If this were correct there would be no need to uphold maximalism. But Mellor's argument can be resisted. In the conjunction and disjunction case, truthmaking distributes across entailment: there is no need to postulate the existence of separate

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[47] As Mellor points out, no claim is being made to the effect that we can always tell which, if either, of ⟨P⟩ or ⟨~P⟩ expresses an atomic proposition: if either does, it will be the one that *does* have a truthmaker.

truthmakers for ⟨P ∧ Q⟩ and ⟨P ∨ Q⟩, because we already have truthmakers for the atomic truths and these entail the truth of the corresponding complexes. But in the case of negation matters are quite different. Here ⟨~P⟩ is supposed to be true because nothing makes the more atomic proposition ⟨P⟩ true. This asymmetry is worrying, since it seems to undermine not just maximalism, but truthmaker theory altogether. Ross Cameron explains why:

> If we don't get the negative truths for free given the positive truths, then what possible motivation could there be for accepting that some truths require truth-makers but that negative truths don't? That would be to accept that the negative truths are not true in virtue of anything: but if we allow that then why do we not allow positive truths that are not true in virtue of anything? It's one thing to say that certain truths are obtained for free given our grounding of other truths, and hence that they don't need further grounding; it's another thing altogether to say that certain truths just aren't grounded. Either there's something wrong with accepting truths that don't have an ontological grounding or there isn't: if there is, then every truth requires grounding; if there isn't, then no truth requires grounding (2008c: 411).

I think Cameron is right about this. Truthmaker theory is, as we have seen, about the groundedness of truth. As such, it is not the kind of theory that can apply only in a restricted domain (at least with respect to synthetic truths). But what exactly makes negative truths true? A host of suggestions have been made here. I will briefly discuss three of these.

The distinction between positive and negative truths—more precisely, how that distinction is to be drawn—is rather murky. I take it that there is no formal test for the status of negative truth which settles the issue merely by looking at the surface structure of propositions, and that any attempt to provide such a test will raise needlessly difficult questions about general principles of demarcation. One could quite plausibly argue that ⟨Socrates is dead⟩ negatively represents it not being the case that Socrates is alive, and that ⟨Socrates is not blind⟩ positively represents it being the case that Socrates has eyesight. Of course, it does not follow from the fact that a syntactic test cannot be given here that there is nothing fruitful to be said about the demarcation between positive and negative truths. George Molnar, for example, thinks the demarcation is settled partly by science. Predications that involve natural kind terms, he says, are paradigm instances of the positive and denote attributes that are identified *a posteriori* (2000: 73). To say that a thing belongs to a natural kind identified in this way is to make a positive claim, and to negate such a statement is to make a negative claim.

Like Armstrong, Russell famously postulated the existence of negative states of affairs in order to account for negative truths. But instead of dressing negative facts in the guise of totality facts, he reluctantly chose to acknowledge their existence at face value (1956). On this view, if it is false that *a* is F, there is a corresponding state of

affairs *a's not being F* which makes ⟨a is not F⟩ true. Negative states of affairs, however, are even more suspicious than totality facts. We can conceive of properties as ways that things are, and, as pointed out by Armstrong, "a way that nothing is seems ontologically near unintelligible" (2004: 15). By postulating the existence of negative facts, however, we are committed to something even more incomprehensible, namely ways that a particular is not, such as *not being black, not smelling like a wet dog, not bearing R to b* and so on, for all the other colors, properties and relations that the particular does not possess or stand in. This involves an alarming inflation of our ontology. It is also obscure how such properties could possibly contribute to the causal order of the world. Moreover, the theory makes it hard to see what could possibly make negative existentials true. What, for example, makes it true that Pegasus does not exist? Is it the negative state of affairs *it's not being the case that Pegasus exists*, or is it the world having the negative property of *being such that Pegasus does not exist*? The answer simply is not clear (Molnar 2000: 77). Nor are we better off postulating a negative particular like a non-Pegasus, which exists just in case Pegasus does not exist. Negative particulars, if they exist, possess incompatible properties, and since it is impossible for things to have incompatible properties, it follows that there cannot be such particulars (Mellor 1995: 133; Ramsey 1990).

Faced with problems like these, Raphael Demos (1917) suggested that the truthmaker for a negative truth is any fact which makes true another proposition that is incompatible with the fact that is denied by the negative truth. This is a rather natural suggestion and has the advantage of avoiding a commitment to negative states of affairs. So according to this view, what makes it true that Socrates is not black is the positive state of affairs *Socrates's being white*. But this would seem to involve a negative proposition stating that it is not possible for the relevant two facts to obtain together, and this threatens to give rise to a regress. Thus we are now committed finding a positive truthmaker for the second-order claim that the existence of *Socrates's being white* is incompatible with the existence of *Socrates's being black*, which (according to the theory) is some state of affairs whose existence excludes the existence of *Socrates's being white* being compatible with the existence of *Socrates's being black*, and so on (Russell 1918: 213-15; Grossman 1992: 130-31; and Molnar 2000: 74-75). What is more, it is difficult to see how the incompatibility theorist would deal with true negative existentials like ⟨Pegasus does not exist⟩. Assuming that there are no totality facts, it is far from clear that there is some entity whose existence is incompatible with the existence of Pegasus. The theory also has a difficult time explaining what makes negative determinable predications true. It is quite easy to see why one would be persuaded to say that what makes it true that Socrates is not black is the fact that he is white; that what makes it true that the flower does not smell like a wet dog is the fact that it smells like a rose; and that what makes it true that my food does not taste like cardboard is the fact that it tastes like Jambalaya. But these are all determinate predications, and as, Armstrong points out, this is where the incompatibility solution triumphs (2004: 62). The incompatibility theorist will need to talk a good deal faster when accounting for

the truth of determinable predications like ⟨the glass is colorless⟩, ⟨the liquid is odorless⟩ and ⟨the food is tasteless⟩. In each of these cases there does not appear to be a fact that is incompatible with the fact denied (Molnar 2000: 75; Armstrong 2004: 62-63; and Dodd 2007: 387).

Another solution to the problem of negative truths is to say that they are made true by 'lacks' or absences, where these are treated with ontological seriousness (Martin 1996). On this view, the truthmaker for ⟨Pegasus does not exist⟩ is the lack or absence of a truthmaker for ⟨Pegasus exists⟩, and the truthmaker for the proposition that Socrates is not black is the absence of a truthmaker for ⟨Socrates is black⟩. It is important to bear in mind that this solution is different from Mellor's. According to Mellor, ⟨Pegasus does not exist⟩ is an ungrounded truth in that nothing makes it true. The proposition is true simply because there is no entity to make it true that Pegasus exists. By contrast, when we say that ⟨Pegasus does not exist⟩ is true in virtue of the absence of a truthmaker for the proposition that Pegasus exists, the absence is treated as a "localised state of the world" (Martin 1996: 58) which grounds the truth of the proposition in question. This requires reified absences, but an absence of an entity is not itself an entity. The absence of a truthmaker for ⟨Pegasus exists⟩ (e.g. Pegasus) is not some entity that is capable of acting as grounds for truths. And make no mistake, truthmakers are entities (see 3.1.3.). So unless we find a way to reify them, absences are simply not fit to make anything true. The reification is more easily said than done. If we treat absences as localized states of the world as suggested by C. B. Martin, it seems we must model them on positive states of affairs, and agree that they involve objects having properties and standing in relations. However, they can't be states of affairs in this sense, for many of the things, properties and relations aren't existing elements of reality (MacBride 2013; and Molnar 2000: 77). The alternative is to say that absences are *sui generis* entities whose nature is completely unlike that of positive states of affairs. But this is hardly an attractive retreat. Not only does it introduce a whole new, fundamental category into our ontology. It also obliges us to give up "the project of providing what is needed: an account of their ontological nature that would assuage the doubts of those skeptical about the very idea of a negative truthmaker" (Dodd 2007: 388).

I think, therefore, that we need to look elsewhere for truthmakers for negative truths. The usual candidates, by virtue of the requirement that truthmakers necessitate truth, are rendered too suspicious to be admitted into the ontology.

3.3.5. Grounding Truth in Causal Facts

At the beginning of the previous section we noted that among the truth-functional complexes it is only negative truths that are meant to be true because there is nothing making the more atomic propositions true. The truth of all the other complexes bottoms out with existent facts in the form of truthmakers for atomic constituents. But

then, what if one could provide ontological grounds for negative truths, not in the truthmakers for their atomic constituents (since these are non-existent), but in the truthmakers for complexes that entail negative truths? Cameron considers this strategy, but rejects it on the following basis: "if we don't have a truthmaker for ¬p then we don't have a truthmaker for any truth that entails ¬p either: it's not as if truthmakers for ¬¬¬P are any easier to find than truthmakers for ¬P!" (2008c: 411). This is correct provided that truth-functions do not need, and therefore (if Mellor is right) do not have, their own truthmakers to begin with. But it does not follow from this that only simple atomic propositions have truthmakers of their own. For even if truth-functions do not have them, other complexes may. Consider, for example, ⟨the chance of P is *p*⟩, ⟨if P had been the case, then Q would be⟩ and ⟨P because Q⟩, all of which are non-truth-functional complexes whose truth values do not follow from those of their atomic constituents. And once we expand the class of truths that require their own separate truthmakers to include these, there is no reason to exempt negative truths from ontological grounding. In what follows, then, I will consider Mellor's non-relational view of causation to see whether it provides us with a means of grounding negative truths.

In his (1995) Mellor argues, against Davidson (1967) and other event-theorists, that causes and effects are facts, in the minimal non-truthmaking sense of 'fact' given by the principle that ⟨P⟩ is true iff it is a fact that P (see also 2.2). Following Mellor, let us take the canonical form of a causal report to be:

(CT)   ⟨E because C⟩,

where 'because' is a non-truth-functional connective linking ⟨E⟩ and ⟨C⟩. To take an example, suppose that ⟨Socrates dies because he drinks hemlock⟩ is a true causal instance of (CT). The stated effect E is then the fact that Socrates dies and the stated cause C, the fact that Socrates drinks hemlock. All that is meant by calling the relata of causation 'facts' in this case is that true instances of (CT) entail both ⟨E⟩ and ⟨C⟩: Socrates cannot die because he drinks hemlock if he does not die or does not drink hemlock. But since (CT) is not a complete truth-function of ⟨E⟩ and ⟨C⟩, the reverse fails to obtain: that Socrates dies and that he drinks hemlock does not entail that he dies *because* he drinks hemlock. True causal instances of (CT) will therefore require complex truthmakers with at least three constituents: two to make ⟨C⟩ and ⟨E⟩ true and a third to make ⟨E because C⟩ state a causal truth. The relation holding between the first two propositions and their truthmakers is that of determination, as, for example, when ⟨Socrates drinks hemlock⟩ and ⟨Socrates dies⟩ are respectively made true by the corresponding events, *Socrates' drinking hemlock* and *Socrates' death*. The problematic constituent is the third, the one which, according to Mellor, "adds causation to a world of otherwise causally unrelated facts" (2000: 244).

Whatever makes ⟨E *because* C⟩ true must be such that it makes C raise the chance of E. Mellor writes this as '*ch*(E)'. This chance (stating an objective probabil-

ity) is a property of C in conjunction with the circumstances S in which ⟨E *because* C⟩ is true.[48] By 'C raising the chance of E' is meant that the chance of E given C is higher than it would be in S in the absence of C: formally, $ch_C(E) > ch_{-C}(E)$. The claim is then that these chances are the p and p' such that the following conditionals are true in S:

(4) $C \Rightarrow ch(E) = p$ and

(~4) $~C \Rightarrow ch(E) = p'$,

where '$\Rightarrow$' is given the possible world semantics of Lewis (1973) by taking (4) and (~4) to be true if and only if their consequents are true in all the worlds closest to the actual world where their antecedents are true. So to understand what makes causal instances of (CT) true we need to know what makes these conditionals true. Fortunately, many well-known truthmakers fit the bill here. The example Mellor provides is of a massive object a conforming to Newton's Laws of Motion (1995: 171-74). Let 'F' and 'M' range over net forces and values of inertial mass respectively, and let A be a's acceleration. The following deterministic instances of (4) and (~4):

'$Fa \Rightarrow ch(A = F/M) = 1$', and

'$~Fa \Rightarrow ch(A = F/M) = 0$',

are then made true in S by a's having some determinate value M of M. Ma (together with the laws of motion) makes both (4) and (~4) true by making a accelerate at F/M when a net force acts on it and not do so when a is not subject to a net force. Similarly in more complex cases, such as the case where the fact that Socrates drinks hemlock raises the chance of him dying—a truth which we may assume is made true, in the relevant circumstances, by the laws of nature together with a large number of atomic states of affairs involving the physical state of Socrates' digestive, circulatory and central nervous system. As in these cases, so in general: whenever there is a true causal instance of (CT), some atomic state of affairs or plurality of such states of affairs joins with the laws of nature to make (4) and (~4) true for some p and p', such that $p > p'$.[49]

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[48] $ch(E)$ cannot be a property of E, since the effect might not exist for $ch(E)$ to be a property of. This is hardly surprising since E is a fact if and only if ⟨E⟩ is true, and there might be a *chance* that ⟨E⟩ is true (where $ch(E) = p$, such that $p < 1$) even though ⟨E⟩ is actually false. See Mellor (1995: 21-24).

[49] It is possible that the laws of nature are metaphysically necessary (see paper II), and if they are, the atomic states of affairs would suffice to make (4) and (~4) true on their own. For then, since the laws of nature obtain in every possible world, there would be no need to include them in the truthmaker for the conditionals in question.

In addition to ⟨E because C⟩, there are also true causal instances of (CT) with negative reports substituted for ⟨E⟩ and/or ⟨C⟩ as in ⟨Socrates does *not* die because he does *not* drink hemlock⟩, ⟨Kim has *no* children because she uses contraception⟩ or ⟨there is a famine because there is *no* water⟩. Again, the stated cause must raise the chance of the effect. So if the form of the causal report is ⟨~E because ~C⟩, the chance of ~E given ~C must be higher than it would be if C: formally, $ch_{~C}(~E) > ch_C(~E)$. By analogy with ⟨E because C⟩, these chances are the p and p' such that the following holds in S:

(5)   ~C $\Rightarrow ch(~E) = p$ and

(~5)   C $\Rightarrow ch(~E) = p'$,

where these conditionals are true in virtue of some atomic state of affairs (or plurality thereof) together with the laws of nature, such that $p > p'$. The truthmakers for the negative reports differ from the positive ones only in that they do not include constituent truthmakers making the negative causes and/or effects true. All it takes for ⟨~P⟩ to be true is that nothing makes ⟨P⟩ true—a fact in the non-substantial sense of 'fact' if ⟨P⟩ is false, but not a truthmaker. This, however, does not prevent negative reports from being causal. For if P is a fact if and only if ⟨P⟩ is true, both ⟨Socrates dies because he drinks hemlock⟩ and ⟨Socrates does not die because he does not drink hemlock⟩ are capable of reporting causal links between facts. The fact that Socrates does not drink hemlock and the fact that he does not die are still facts (albeit negative ones) if the corresponding propositions are true. So the fact (if it is a fact) that C causes E cannot stop ~C and ~E being causally linked when *they* are facts, i.e. when ⟨C⟩ and ⟨E⟩ are false. In other words, it is immaterial to causation whether true instances of (CT) state negative or positive causes and/or effects, since the corresponding reports are equally capable of being causal in each case.[50]

To this one might object that if there are true causal instance of (CT) with negative causes and effects, there must be far more causal reports than we normally care to mention. Thus for example, it is true that my orchid is wilting because Barack Obama does not water it; that my skin is not blue because I do not drink colloidal silver; that my room is tidy because there is no hippo in it, and so on. We would ordinarily refrain from making causal judgments like these, even though the stated cause raises the chance of the effect in each case. However, the mere fact that we do not burden our talk with promiscuously many negative causal judgments does not make them any the

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[50] This is not to say that ⟨E because C⟩ and ⟨~E because ~C⟩ can be true together—they cannot. However, although ⟨Socrates dies because he drinks hemlock⟩ and ⟨Socrates does not die because he does not drink hemlock⟩ cannot both be true, Socrates may still die because he drinks hemlock *if* he drinks hemlock, and not die because he does not drink hemlock *if* he does not drink hemlock (Mellor 1995: 134).

less true. As David Lewis points out, "There are ever so many reasons for why it might be inappropriate to say something true. It might be irrelevant to the conversation, it might convey a false hint, it might be known already to all concerned" (Lewis 2000: 196).

With these preparations in place, consider ⟨~P⟩ and assume that it states an effect in a causal report of the form ⟨~P because ~Q⟩. What makes it true (if true) is then some state of affairs or plurality of states of affairs which, together with the laws of nature, makes the cause ~Q raise the chance of the effect ~P. This is all there is to the causal truthmaker in question. To make ⟨~P because ~Q⟩ true, there is no need to include a 'separate' truthmaker for ⟨~P⟩ (or ⟨~Q⟩). It suffices for the truth of the negative propositions that nothing makes the corresponding positive propositions true. But this is no more evidence for negative truths being ungrounded than conjunctive truths lacking conjunctive truthmakers is evidence for true conjunctions being ungrounded. For just as we took the truth of ⟨P ∧ Q⟩ to be grounded in the truthmakers for ⟨P⟩ and ⟨Q⟩, we can now take the truth of ⟨~P⟩ (and ⟨~Q⟩) to be grounded in the causal truthmaker for ⟨~P because ~Q⟩.[51] All we need to assume is that truthmaking (*qua* grounding) transmits across entailment in the present case. For since a true causal instance of (CT) entails its constituent cause and effect (whether positive or negative), whatever makes the former true also makes the latter true. There is thus no need for negative or totality states of affairs in addition to what makes causal truths true. Once the latter are grounded, the negative truths are obtained for free, thus reestablishing symmetry in grounding.

There is a problem here, however, with the idea that alethic facts are thickly grounded by the entities in virtue of which they obtain. 'Thick' grounding is an explanatory relation, and causal truthmakers are not generally explanatorily relevant to the stated cause. In the above case, for example, it is not clear that the atomic states of affairs making the fact that Socrates does not drink hemlock raise the chance of him not dying are of any explanatory relevance to the truth of the propositions that Socrates does not drink hemlock. What should we do about this?

There are at least two ways to go about solving this problem. The first is to say that although the truthmaker for ⟨~P because ~Q⟩ does not provide a 'thick' ground for the truth of ⟨~Q⟩, the latter can still be said to be thinly grounded in the truthmaker for the former. 'Thin' grounds need not explain the facts they ground, and if 'thin' grounding distributes across entailment, it follows that whatever grounds the truth of ⟨~P because ~Q⟩ also thinly grounds the truth of both ⟨~P⟩ and ⟨~Q⟩. The

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[51] The conjunction and negation cases differ with respect to grounding only insofar as, in the former, the ground is truthmakers for atomic truths, whereas in the latter it is a truthmaker for a non-truth-functional complex. However, it is not essential to maximalist versions of logical atomism that all truths be grounded in atomic truth-makers. It suffices that each truth is grounded in the existence of truthmakers for non-recursive truths: i.e. truths which are not recursive functions of more atomic truths.

problem with this move is that it forces us to conclude that there are two ways in which alethic facts can be grounded: some facts about propositions being true are thickly grounded, whereas others are merely thinly grounded. But perhaps we should accept this if the alternative is an overpopulated ontology involving entities whose mere purpose is to necessitate negative truths. The other option is to restrict the grounding relation to stated effects. For notice that the atomic states of affairs making causal reports of the form ⟨~P because ~Q⟩ and ⟨~P because Q⟩ true provide explanatory grounds for the stated effects. In the case of a true causal ⟨~P because ~Q⟩, the facts that explain ⟨~P⟩'s truth are the states of affairs which, with the laws of nature and under the relevant circumstances S, raise the probability of ~P given ~Q. And in the case of ⟨~P because Q⟩, the explanatory facts are the states of affairs which, with the truthmaker for ⟨Q⟩ and the laws of nature, raise the probability of ~P in S.

This is not to say that causal truthmakers cause truth. The relation that holds between the fact that ⟨~P⟩ is true and the states of affairs which make ⟨~P because ~Q⟩ (and ⟨~P because Q⟩) true, is not causal. Rather, the atomic states of affairs explain why it is that the truthmaker for ⟨P⟩ does not exist. And this is exactly what we would expect truthmakers for negative truths to do. Truthmaking is the relation we invoke to explain why a proposition is true by reference to the existence of that which grounds its truth. In the case of negative truths the entities that perform the grounding cannot be anything other than those entities which explain why the truthmaker for the corresponding positive truth does not exist. This suggests that we can take causal truthmakers to thickly ground the truth of negative propositions that occur as effects. As in this case, so in general: by only allowing for effects to be grounded in the truthmakers for true causal instances of ⟨~P because ~Q⟩ (and ⟨~P because Q⟩) we prevent the problem of explanatorily irrelevant grounds for negative truths from arising.

So far so good. Still, I take it that most theorists, including those sympathetic to an entailment principle, will not be convinced that causal truthmakers provide us with a rich enough ontology to ground negative truths. I want now to defend causal truthmaking against this charge, and show it to be unsubstantiated. What I hope will emerge is an elegant solution to the problem of negative truths that is both ontologically economical and illuminating.

Causal truthmakers serve to ground several truths. This is hardly a problem. Most theorists agree that a single entity can make multiple truths true—as, for instance, when 'thick' Socrates makes true both ⟨Socrates exists⟩ and ⟨something exists⟩. What might be thought problematic, however, is that, unlike truthmakers for standard existential assertions, causal truthmakers fail to necessitate the truth of any of the propositions they make true. This is because the states of affairs that join with the laws of nature to make causes raise their effects' chances will do so only contingently upon circumstances that obtain in this world. To illustrate: suppose I am holding a ball in my hands, and that the claim 'the ball does not fall because I do not let go' is a true causal report of the form ⟨~E because ~C⟩. Its truthmaker, we may assume, is *the*

ball's having mass M, which joins with Newton's Law of Gravity to make the cause raise the chance of the effect. The problem is that these states of affairs will only make the corresponding chance-raising-conditionals (5) and (~5) true in circumstances like S (taken to include facts about how I am holding the ball, its distance from the surface of the earth, and so on). In other possible worlds, nomologically identical to ours, *the ball's having mass M* will not make the stated cause raise the chance of the stated effect. It might be that in those worlds the ball is not subject to a net gravitational field, or that it is held to the ground. In either case, the chance of the ball not falling (~E) given that I do not let go (~C) will not be any higher than it would be had I let go (C): formally, $ch_{~C}(~E) \leq ch_C(~E)$.

This failure of causal truthmakers to necessitate is only a problem if truthmaking is a matter of necessitating truth. But it is not. As argued in 3.2.1., truthmaking is a matter of grounding truth, and grounding neither reduces to nor implies necessitating. Here there is no reason to incorporate the grounds for the actual circumstances into the causal truthmaker. If Armstrong were to insist that these circumstances must be included to yield the complete truthmaker, he would be begging the question. He has yet to show that this supplement needs to be added to the causal truthmaker in order for 'the ball does not fall because I do not let go' to be true, and until he does so there is no reason to assume that truthmakers must necessitate truth.

More troublesome is the thought that there are not enough causal truthmakers out there to ground all negative truths. Are there causal grounds for the truth of the propositions that there is not a flying spaghetti monster or that Barack Obama does not water my plants? The first thing to notice is that if truthmaking distributes across entailment with respect to negative truths, then providing truthmakers for such truths is far less of an ontological burden than it otherwise would be. For assuming some plausible version of (EP), the grounds for negative truths would also serve to ground the truth of the proposition(s) it entails. Thus, for example, since ⟨no one waters my plants⟩ entails ⟨Barack Obama does not water my plants⟩, there is no need for a separate truthmaker for the latter proposition if the former is already grounded. The second thing to notice is that if there are negative truths which fail to be causally grounded, there will have to be some non-reified way the world is that does not occur in any pattern of causal dependence. But such facts (in the non-reified sense of 'fact') would be naturalistically queer. They would be causally disconnected from every other fact, so we would have to accept that there are contingent propositions which state facts with no causal bearing on any other fact. Thus, unless we allow for 'causal danglers' into our ontology, we would expect causal truthmaking to be general enough to cover all contingent negative truths. Of course, it might be that I am wrong about this. But nothing of what I have said requires all negative truths to have causal grounds. For theoretic purposes, it suffices that all negative truths are grounded in the truthmakers for some non-truth-functional complex or other that serves to explain their truth, which seems highly plausible.

Causal truthmaking has a number of virtuous consequences. Molnar (2000: 84-85) famously argued that at least one of the following claims must be rejected if we are to have truthmakers for negative truths: (i) the world is everything that exists; (ii) everything that exists is positive; (iii) some negative claims about the world are true; and (iv) every true claim about the world is made true by something that exists. In paper III, I provide reasons for thinking that this is false. There is no need to give up any of (i) – (iv) if we allow negative truths to be causally grounded; nor need we appeal to strange new entities like totality states of affairs, negative states of affairs, 'lacks' or absences. All we need are the positive first-order states of affairs that contribute to the causal order of the world, and such causal facts are needed anyway to provide grounds for a large set of truths. They are useful, for example, when we are seeking to identify grounds for truths about rainbows and mirror images (see 3.1.3.). The rainbow that is not at any specific distance from the observer does not exist; nor does the object behind the mirror appearing to be reversed. Truths about rainbows are grounded in various causal truthmakers involving water-drops refracting and reflecting light. Similarly, truths about mirror images are grounded in causal truthmakers involving objects reflecting light in front of the mirror (Persson 2006: 546).

4. Summary of the Papers

Each of the five papers that follow is entirely free-standing and should be read as such. The order of appearance is thematic. Paper I deals with the notion of ontological dependence in hierarchies of natural kinds. Paper II deals with the notion of grounding and the resemblance orderings among powers. Paper III, IV and V discuss various aspects of truthmaker theory.

In the sections that follow, I provide a brief summary of each essay.

4.1. Paper I, "Aspect Kinds"

The paper discusses explanations involving natural kinds. Such explanations are usually structurally complex. For example, in explaining why zinc sulphate is easily soluble in water, we make reference to solubility being a characteristic of metallic *sulphates*, but when an explanation of the positive effects of the immune system is called for, we tend to point out that it is a *zinc* compound. The paper is devoted to natural kinds that crosscut in this way. A new category of natural kinds is presented that differ from how they have traditionally been conceived in that they do not have their species necessarily included in the class of members of those kinds. This goes against the so-called *Essential Membership Thesis* which states that a subordinate of a natural kind is any natural kind whose membership is essentially included in the class of members of the superordinate natural kind. I argue that the thesis only holds in crosscutting hierarchical structures if the shared common genus is ontologically dependent in a weak sense on the crosscutting kinds. However, I also argue that we are not forced to abandon the essential membership thesis if we allow for properties that are necessary for some *aspects* of natural kinds, but not necessary for the kind *as that kind*.

4.2. Paper II, "Nomological Resemblance"

Laws of nature and natural properties are connected in that laws of nature concern the natural properties of things. Thus for example, the law of gravity depicts that the gravitational force between objects is proportional to the product of their masses and inversely proportional to the square of their distance; Coulomb's law depicts a similar functional dependency between charged particles. Each of the corresponding determinate properties confers a power to act as specified by the laws. Consequently, properties of the same quantity confer resembling powers. Any theory that takes powers seriously has to account for their resemblance. This is the challenge set by the paper. In the first part I discuss Armstrong's view according to which property resemblances are grounded in partial identities between categorical properties. Since the properties involved are categorical, resemblance orderings among powers also has to involve the laws under which they fall. The question then becomes whether Armstrong is able to provide ontological grounds for resemblance orderings among powers of the terms of the relation also include the laws in which those properties figure. My conclusion is negative. Armstrong's solution involves accepting determinable properties. However, such properties lack independent justification, violate the *Eleatic Principle* and leave the link between them and their subordinates unexplained. In the second part of the essay, I argue that dispositional essentialism can satisfactory account for resemblances among powers in terms of degrees of overlapping potentialities. This also enables us to do without determinable properties and provide truthmakers for functional laws with uninstantiated values.

4.3. Paper III, "Causal Truthmaking"

Paper III provides an outline of a theory of causal truthmaking according to which contingent truths are made true by causal facts and dispositional mechanisms. These facts and mechanisms account for the truth of propositions by non-epistemically explaining why they have come about as truths. Given that negative causation is allowed for we are able to provide truthmakers for negative truths without making appeal to totality facts, negative facts, lacks or absences. The paper stars with the following claims by George Molnar: (1) The world is everything that exists; (2) everything that exists is positive; (3) some negative claims about the world are true; and (4) every true claim about the world is made true by something that exists. The conclusion reached is that we are not forced to give up any of (1) – (4) if causal truthmaking is allowed for. Causal truthmaking, however, requires us to give up on the view that the exist-

ence of a truthmaker necessitates the truth of that which it makes true. I show that failure to accommodate this view is not decisive against causal truthmaking and, in any case, causal truthmaking avoids the problems threatening views that understand truthmaking to depend on facts beyond the terms it relates.

4.4. Paper IV, "Against Truthmaker Necessitarianism"

In paper IV I argue against Truthmaker Necessitarianism, the view according to which the existence of a truthmaker necessitates the truth of the proposition it makes true. Armstrong's sufficiency argument for necessitarianism is examined and shown to be question begging. I go on to argue that truthmaking is a matter of grounding truth and that grounding neither entails nor reduces to patterns of modal covariation. It is furthermore argued that the explanatory role that some theorists take truthmakers to play can be played equally well by truthmakers that need not necessitate the truth of that which they make true.

4.5. Paper V, "Truthmaker Internalism and the Mind-Dependence of Propositions"

It is generally thought that truthmaking has to be an internal relation because if it weren't, then, as David Armstrong states "everything may be a truthmaker for any truth" (1997: 198). Depending on whether we take an internal relation to be one that is necessitated by the mere existence of its terms (Armstrong 2004: 9) or one that supervenes on the intrinsic properties of its relata (Lewis 1986: 62), the truthbearers involved in the truthmaking relation must either have their contents essentially or intrinsically. The paper examines Armstrong's naturalist account of propositions according to which proposition-talk reduces to talk about classes of intentionally equivalent mental state tokens, and the related idea that what is made true at the fundamental level are such tokens. The conclusion is reached that mental tokens have their contents neither essentially nor intrinsically, and so, cannot be made true internally.

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