

Grounding, metaphysical laws, and structure

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Abstract

According to the deductive-nomological account of ground, a fact A grounds another fact B in case the laws of metaphysics determine the existence of B on the basis of the existence of A. Accounts of grounding of this particular variety have already been developed in the literature. My aim in this paper is to sketch a new version of this account. My preferred account offers two main improvements over existing accounts. First, the present account is able to deal with necessitarian as well as non-necessitarian cases of grounding by acknowledging the existence of two types of metaphysical laws. I will argue that we should assume that metaphysical laws come in the necessitarian as well as in the non-necessitarian variety closely paralleling the distinction between strict and non-strict laws in the philosophy of science. The second main improvement of the present account is that this account is able to provide an explanation of why the laws of metaphysics have a direction built into them. I will argue that we should characterize metaphysical laws with the help of Theodore Sider's (2011) notion of structure, which is a descendent of David Lewis's (1983) notion of naturalness. According to the account of metaphysical laws developed in this paper, metaphysical laws express in their antecedents either perfectly structural truths or more structural truths than in their consequents. Since on Sider's account structural features of reality are fundamental features of reality, the account is able to explain as to why the laws of metaphysics take us from the fundamental to the derivative.

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Reality appears to be structured. A paradigm structuring relation of reality is causation. If I drop a bottle of wine out of clumsiness and the bottle shatters into pieces, then we usually say that my dropping the bottle caused the bottle to shatter. If we conceive of causation as a relation that holds between events, the event of my dropping the bottle thus caused or brought about the event of the bottle bursting. It is plausible to suppose that besides causation there exist further relations that structure reality. Candidate relations include supervenience, reduction, ontological dependence, and identity, among others. Most of these relations have already received a fair amount of attention in the literature. However, only very recently a lot of philosophers have turned their attention to the notion of grounding. The notion of grounding allows us to state the following claims of metaphysical structure:

(Conscious) My being in a phenomenally conscious state is grounded in my being in physical state ϕ .

(Moral) The wrongness of this action is grounded in this action's natural property N (e.g., the property of failing to maximize overall happiness).

(Singleton) The existence of {Socrates} is grounded in the existence of Socrates.

(Disjunction) The truth of $p \vee q$ is grounded in the truth of p .

When one particular fact A grounds another fact B, then B's existence is determined by the fact A. Yet in comparison to the notions mentioned above—viz. supervenience, reduction, and so on—grounding appears to denote a distinct relation of determination.

A lot of authors claim that a pivotal feature of grounding is that this notion serves to express (or underlie) a distinctive sort of explanation. When we state that a certain causal relation obtains—for example, that my dropping of the bottle caused the bottle to shatter—we are in a position to provide a causal explanation as to why a certain event occurred. In a similar vein, when we report that one fact A (or a plurality of facts Γ) grounds another fact B, we are thereby in a position to provide a metaphysical explanation as to why B obtains or has the particular nature that it has. Though the term “metaphysical explanation” is a philosopher's term of art, the explanations that we might provide by invoking the notion of grounding are obviously of a different kind than causal or scientific explanations. One proposal regarding wherein metaphysical explanations differ from causal or scientific explanations is that metaphysical explanations rely on different laws: metaphysical explanations rely on distinctively metaphysical laws, while causal and scientific explanations rely on causal or scientific laws, respectively.

In this paper, I shall develop a new version of the deductive-nomological account of ground. The basic idea of the deductive-nomological account of ground is that certain fact A grounds another fact B in case the laws of metaphysics determine B on the basis of A. Accounts of this sort have already been developed in the literature.¹ The account I wish to recommend offers two main improvements over existing accounts. First, the present account is able to deal with necessitarian as well as non-necessitarian cases of grounding by acknowledging the existence of two types of metaphysical laws. I will argue that we should assume that metaphysical laws come in the necessitarian as well as in the non-necessitarian variety—closely paralleling the distinction between strict and non-strict laws in the philosophy of science. While necessitarian laws connect explanans and explanandum in a strict way, non-necessitarian laws allow for exceptions and connect explanans and

¹See Wilsch (2015, 2016) and Glazier (2016).

explanandum in a defeasible way. The second main improvement of the present account is that this account is able to provide an explanation of why metaphysical laws have a direction built into them. I will argue that we should characterize metaphysical laws with the help of Theodore Sider's (2011) notion of structure, which is a descendent of David Lewis's (1983) notion of naturalness. According to the account I wish to develop, metaphysical laws express in their antecedents either perfectly structural or more structural truths than in their consequents. Since on Sider's account structural features of reality are fundamental features of reality, the account explains the direction built into metaphysical laws: their direction is due to expressing in their antecedents more structural truths than in their consequents.

My paper is organized as follows. In the first section, I will outline what I take to be the main features of grounding that an account or an analysis of grounding should accommodate. In the second section, I will outline my account and consider whether this account is able to satisfy the desiderata for a theory of grounding sketched in the first section.

1 | THE MAIN FEATURES OF GROUNDING

In order to adjudicate whether a particular account of grounding is successful, we should take into account whether the account preserves the properties that we pre-theoretically associate with the notion of grounding. Though some features of grounding that I will introduce are considered as controversial by a minority of theorists, there is nonetheless a core set of features that are considered to be non-negotiable characteristics of grounding.

First, the paradigm characteristic of grounding is that grounding is a form of *determination*.² When one fact A grounds another fact B, then B's nature or existence is determined by A. I think that it is safe to assume that grounding is in this respect on a par with causation, which is also most plausibly understood as being a determinative relation. It has been suggested that grounding might be understood as a relation of non-causal determination.³ Yet it has been proven difficult, on this proposal, to distinguish grounding from other relations of non-causal determination. I will get back to this issue in the next section.

Second, grounding appears to be *worldly and mind-independent*. Similarly as with causation, when one fact grounds another fact, then this relation obtains independently of whether we think or know that it obtains. This feature makes grounding also suitable for playing a pivotal role in stating metaphysical theses because we also take metaphysical claims to concern how the world ultimately like and to be mind-independently true.

Third, "grounds" is *factive*. If "A grounds B" is true, then both "A" and "B" need to be true as well. Again, also in this respect "grounds" behaves in the same way as "causes." "Causes" is, if used to express singular causal claims such as "my dropping the bottle caused the bottle to shatter," factive because this claim cannot be true unless both events of my dropping the bottle and the bottle bursting occurred.⁴ However, some think that we should also acknowledge the existence of a non-factive notion of ground. Fine (2012: 49) characterizes this notion as follows:

²See Audi (2012: 690). Audi mentions that there might be a further sense of "determine" that means roughly "to fix a value." However, this notion of determination should be distinguished from the sense of determination at issue here.

³See Audi (2012: 686).

⁴On the assumption that grounding is a relation, true claims of ground entail that the entities that are supposedly connected via this relation exist. Otherwise, it would not be intelligible to say that the one is grounded in the other.

On the non-factive conception, we can also correctly talk of something non-factive—such as a false statement or a merely possible fact—being grounded; and what grounds may likewise be non-factive. Thus on the factive conception, $A \wedge B$ can only be grounded in A and B if $A \wedge B$ (and hence A and B) are indeed the case while, on the non-factive conception, $A \wedge B$ can be grounded in A and B even if A or B (and hence $A \wedge B$) is not the case.

On Fine's view, the non-factive notion is defined in terms of the factive notion. A grounds B non-factively, in case A possibly factively grounds B . Fine (2012: 49) holds that by acknowledging a non-factive notion of ground “we may extend the “field” of the relation from the actual facts, so to speak, to the possible facts.” In what follows, however, I will be concerned with the factive notion of ground.

Another distinction relevant to the present paper is the distinction between *singular and general claims of ground*.⁵ While singular claims of ground state that one particular fact (or a plurality of facts) grounds another particular fact, general claims of ground make claims about certain types of facts grounding other types of facts. Singular claims of ground are expressed with the help of claims such as those mentioned above—for example, (Conscious), (Moral) and so on. By contrast, general claims of ground are expressed with the help of claims such as “Moral facts are grounded in natural facts” or “Non-empty sets are grounded in the existence of their members.” Again, a similar distinction has been drawn with respect to causal claims, where it is also common to distinguish between singular and general causal claims. In what follows, I will be mainly concerned with singular claims of ground.

Fourth, most writers assume that the relata of grounding explanations differ with respect to their fundamentality and priority. In case A grounds B , A is more fundamental than B . Again, also in this respect there are close parallels between grounding and causation. If an event E_1 causes another event E_2 , then E_1 is temporally prior to the second event. However, there exists some controversy how far this sort of priority extends. Some have claimed that grounding is a well-founded relation and that therefore chains of ground necessarily bottom out.⁶ Notice further, that it is challenging to provide an explanation as to why grounding relates the fundamental to the derivative. The account that I favor will provide an explanation of this feature of grounding in terms of Sider's notion of structure. I will say more about this issue below.

Fifth, ground appears to be an *explanatory* notion. When one fact A grounds another fact B , then we seem to be able to explain why B exists by reference to A . There even exist contradictory statements such as “ B is grounded in A , though A doesn't explain B ” that seem to suggest that grounding and explanation are closely intertwined. It is common to distinguish between two views regarding the relation between grounding and explanation. On the one hand, grounding might be considered to be the worldly relation that backs metaphysical explanations; on the other hand, grounding might be identified with metaphysical explanation itself.⁷ If one opts for the latter view, one needs to spell out in more detail what makes an explanation a metaphysical explanation. Metaphysical explanations, at least initially, appear to be non-pragmatic and interest-independent, just as their scientific counterparts are. Yet, this will not distinguish metaphysical explanations from other varieties of explanation which share this feature. I will get back to this issue when I will outline the view I favor.

⁵Some have only acknowledged the existence of singular claims of ground. Paul Audi (2012: 692) claims that determination in general is singular in the sense of not concerning the determination of one type of fact or event with another type of fact or event.

⁶See especially Schaffer (2016: 95). Dixon (2015) is a discussion of how to conceive of the well-foundedness of grounding. Bohn (2018) provides an argument that grounding is not well-founded. Trogon (2018) criticizes Schaffer's argument for the well-foundedness of grounding.

⁷Audi (2012) and Schaffer (2009, 2016) are proponents of the former view, while Fine (2012) is most plausibly understood as subscribing to the latter view.

Sixth, grounding appears to be *hyperintensional*. In contrast to an extensional or intensional relation, a hyperintensional relation does not allow for the substitution of co-intensional terms without a change in truth-value. If we consider claims of ground that are formulated by means of the relational predicate “grounds,” a substitution of necessarily co-extensional terms for facts in a statement of the form “A grounds B” might change the truth-value of the corresponding claim of ground. For example, the statements “That figure is an equilateral rectangle” and “That figure is square” express propositions which are true in the same possible worlds if the referent of the demonstrative “That figure” is held fixed. But we cannot freely substitute them in a claim of the form “[That figure is an equilateral rectangle] grounds [that figure is square]” without a change in truth-value of the whole claim. (In what follows, I will use square brackets to represent facts; so “[p]” is shorthand for “the fact that p.”)

Seventh, it has recently been argued that there are instances of non-necessitarian grounding.⁸ Grounding necessitarianism is characterized by the following entailment-thesis, where the modal operator holds with metaphysical necessity⁹:

(Nec) A grounds B \supset (A obtains \rightarrow B obtains).

There appear to be several cases that speak against this principle. One such example might be construed from the claim that mental properties, such as the property of possessing a particular phenomenally conscious experience, are grounded in physical properties of the experiencing subject.¹⁰ If [S exemplifies a certain physical property ϕ] would necessitate [S possesses a particular phenomenally conscious experience e], then there should not exist any world in which some person S has ϕ yet fails to possess this particular phenomenally conscious experience. But surely there are worlds in which someone fails to possess this experience though she still exemplifies a particular physical property. Think of zombies that are physical duplicates of us but lack conscious experiences. In zombie worlds, physical facts fail to necessitate facts about consciousness. Thus, physical properties seem to ground properties about consciousness without thereby necessitating them.

There are still further examples which call (Nec) into question; for example, dispositions which are defeasibly grounded in categorical properties, facts about composition which also hold contingently, or moral facts or properties which might be grounded in natural facts or properties.¹¹ It is important to bear in mind that if there are instances of grounding which fail to satisfy (Nec), then this seems to rule out certain analyses of “grounds” as being adequate. For example, these examples speak against the idea that grounding might be understood in terms of entailment or supervenience. Nonetheless, there are many instances of grounding claims which satisfy (Nec), and where the grounding facts indeed necessitate the fact which they ground. Think about Socrates grounding his singleton or cases of logical grounding. An account of grounding should do justice to these cases as well in the sense that the account should entail that (Nec) holds in the cases in question. I will address this issue below when I will outline the account that I favor.

⁸See Skiles (2015) and Leuenberger (2014a, 2014b). Other proponents of grounding non-necessitarianism include Dancy (2004) and Chudnoff (2011).

⁹Rosen explicitly subscribes to this principle. See Rosen (2010: 118). Fine (2012) thinks that there are different grounding relations corresponding to different necessitations.

¹⁰See Leuenberger (2014a: 8–11).

¹¹See Leuenberger (2014a: 11–15), who argues that the groundedness of dispositions provides another example against (Nec). Cameron (2007) and Skiles (2015) argue that facts about composition are contingent. See Dancy (2004) for the groundedness of moral properties.

Finally, most writers assume that grounding is distinct from other relations of determination, such as supervenience, emergence, reduction or causation. If one proposes a particular account of grounding, it seems to be a condition of adequacy that the account should indeed discriminate grounding sufficiently from the relations just mentioned. Of course, accounts have been proposed on which grounding and one of these other notions just mentioned belong to the same genus. For example, it might be maintained that grounding is an instance of a “building relation,” as Karen Bennett (2011, 2017) has suggested. Bennett claims that grounding and other relations, such as composition, set membership and many others, are all instances of a building relation. I take it, however, that even on this approach it should still turn out that grounding is distinct from the notions just mentioned.

Connected with these properties of grounding are certain formal properties. They result from one or more of the features of grounding outlined above. Let “A,” “B,” ... stand for singular terms denoting particular facts and let “grounds” stand for the grounding relation, then grounding seems to possess the following formal features:

(Asymmetry) If A grounds B, then it is not the case that B grounds A.

(Irreflexivity) It is false that A grounds A.

(Transitivity) If A grounds B and B grounds C, then A grounds C.

(Non-Monotonicity) If A fully grounds B and some arbitrary fact C obtains, then it is not the case that A & C ground B.

That grounding obeys these principles is very straightforward. The asymmetry of grounding likely ensues from the fact that grounding is explanatory (or underlies explanations) and that grounding connects the fundamental with the derivative. The second formal feature of grounding also very likely ensues from these two features. It seems that nothing can explain itself and that nothing can be prior to itself. The same holds for the other remaining features. Both the transitivity of “grounds” and its being non-monotonic also likely result from the fact that grounding is explanatory and connects the fundamental with the derivative. Several theorists, however, have challenged the thesis that grounding obeys these formal principles.¹² Due to reasons of space, I will not engage with these challenges here.

2 | GROUNDING, METAPHYSICAL LAWS, AND STRUCTURE

The basic idea of the account I favor is that grounding is a special form of explanation governed by the laws of metaphysics. The account might be put as follows:

(GE) A grounds B iff A determines B via the laws of metaphysics.¹³

¹²Jenkins (2011) challenges the irreflexivity of grounding. Schaffer (2012) provides examples against the transitivity of grounding. Rodriguez-Pereyra (2015) argues that grounding is not a strict partial order. Litland (2013) is a critical discussion of Schaffer's counterexamples to the transitivity. Raven (2013) is a defense of the irreflexivity and the transitivity of ground against the challenges presented by Jenkins and Schaffer.

¹³As will become apparent below, (GE) needs to be supplemented by an account for logical grounding. Nevertheless, (GE) covers all remaining cases of grounding.

A proponent of (GE) needs to address the following three questions:

- (a) How should we cash out the notion of *lawful determination*?
- (b) What *form* do metaphysical laws take?
- (c) What makes a law a law of *metaphysics*?

In what follows, I will address these three questions in more detail.

2.1 | How should we cash out the notion of lawful determination?

As regards question (a), I follow the proposal developed in Wilsch (2016). On one possible picture, the grounding facts together with the laws of metaphysics deductively entail the grounded facts. Given that a certain fact A obtains (or a plurality of facts Γ) and given that the totality of the laws of metaphysics L comprise a law L_1 which accounts for the connection between A and B, then A together with L will deductively entail that B obtains. As a first pass, I think metaphysical laws should be understood as universally quantified material conditionals. Here are some examples of statements expressing metaphysical laws “ $(\forall x)$ if x exists, then $(\exists y)$ y is x's singleton,” “ $(\forall x)$ if x is red, then x is colored,” and so on. I will say more about the nature of metaphysical laws below. The core idea of the present account of lawful determination might be put as follows, where “ $A \vdash_L B$ ” is shorthand for “ $A, L \vdash B$ ”:

A lawfully determines B iff $A \vdash_L B$.

Which notion of entailment is at issue in the present context? The entailment symbol “ \vdash ” will be interpreted as standing for classical logical entailment, as opposed to a metaphysical or an epistemic notion of entailment. Note further that entailment is a relation holding between sentences. In order to secure that lawful determination is a relation between truths, one might simply stipulate that if $s \vdash q$, then “s” expresses A and the “q” expresses B, where “A” and “B” express true propositions.

But is entailment the right notion to cash out what we mean by lawful determination? One principal worry is that logical entailment has the wrong formal features to be of help to understand the notion of lawful determination. Entailment is reflexive and symmetric, while grounding is irreflexive and asymmetric. As a result, entailment will not be of help in analyzing the concept of lawful determination. One possible solution to this problem might consist in restricting the permissible inference rules in the context of lawful determination.¹⁴ For example, modus ponens and \forall -elimination might be considered as the only permissible inference rules in the present context, which secure that lawful determination will have the right formal features to be of use in analyzing grounding. So while it may be permissible on the present suggestion to deduce the proposition that there is something which is Socrates singleton from the proposition that Socrates exists, the deduction of the proposition that Socrates exists from the proposition that there is something which is his singleton is, however, thereby not licensed. It might therefore be proposed to conceive of lawful determination *as being defined* by logical entailment in conjunction with modus ponens and \forall -elimination.¹⁵ Note that the subscript “G” indicates that we are dealing in the present context with the so restricted form of entailment:

¹⁴See Wilsch (2016: 8–10).

¹⁵See Wilsch (2016: 9).

(LD) A lawfully determines B iff $A \vdash_{L,G} B$.

This proposal is underwritten by the nature of metaphysical laws I will outline below. If we can give an explanation as to why metaphysical laws have a direction built into them—that is, if they take us from the fundamental to the derivative—then it seems that only those inference rules which are in accordance with that direction are suitable to understand the notion of lawful determination at work in cases of grounding.

As Wilsch (2016: 9) notes, a further component that needs to be added to the account of lawful determination is a device to refer to derivative entities by name. Some metaphysical laws only allow, due to their generality, for the derivation of an existentially quantified statement that a certain derivative entity exists but not of a proposition that explicitly refers via a name to this entity. So, for example, the law which connects some arbitrary object x with his singleton states: “ $(\forall x)$ if x exists, then $(\exists y)$ y is x 's singleton.” With the help of the permissible inference rules and on the assumption that Socrates exists, we can only infer that there is some entity y , which is Socrates's singleton. In order to deduce the proposition expressed by “Socrates singleton exists,” an additional rule is needed. Wilsch has proposed to introduce a device that he calls “Auxiliary Locating-Identities,” which fills this lacuna.

(ALI) AUX ($a = \iota x(Fx)$).

In (ALI), we have on the left-hand side a name “ a ” for some individual and on the right-hand side a definite description that refers to that individual.¹⁶ (AUX) allows for substitution of co-referring names in the bearer position *salva veritate*. (ALI) needs to be added to the account (LD), where the subscript “A” indicates that (ALI) is an additional principle of inference, which might be used in the present context. The resulting account reads:

(LD) A lawfully determines B iff $A \vdash_{L,GA} B$.

To see how the present account of lawful determination works, I will just consider one toy example—namely of how to derive the existence Socrates's singleton from the assumption that Socrates exists.

- (1) Socrates exists. [Assumption]
- (2) $(\forall x) (x \text{ exists} \rightarrow (\exists y) (y = \{ \} (x)))$ [Law of Set-Determination]
- (3) Socrates exists $\rightarrow (\exists y) (y = \{ \} (\text{Socrates}))$ [\forall -Elimination]
- (4) $(\exists y) (y = \{ \} (\text{Socrates}))$ [modus ponens]
- (5) Aux ($\{ \text{Socrates} \} = \iota y y = \{ \} (\text{Socrates})$) [ALI]
- (6) $\{ \text{Socrates} \}$ exists.

Notice that the deductive-nomological account of lawful determination does not fall prey to the objections that the deductive-nomological account of scientific explanation, as advanced by Hempel and Oppenheim, faces.¹⁷ First, due to restricting the permissible inference rules and the character of metaphysical laws I will sketch below, the present account is able to stab off possible concerns regarding the directionality of explanations. Second, as will become also clearer below, the present account does not rely on a purely syntactic conception of law-like generalities, which was the view of laws

¹⁶There are different ways to interpret the identities expressed by (ALI), which don't matter for present purposes. For example, (ALI) might express individual facts or individual essences. They might further be conceived as purely representational devices. See Wilsch (2016: 12).

¹⁷See Wilsch (2016: 14–17).

favored by Hempel and Oppenheim. Therefore, it does not face objections that result from bogus laws, which constitute counterexamples to the syntactic characterization of laws of Hempel and Oppenheim. Finally, probabilistic or statistical explanations do not seem to occur in the domain of metaphysics, which also spell trouble for a deductive-nomological account of scientific explanation.¹⁸

2.2 | What form do metaphysical laws take?

Coming to question (b), I propose that metaphysical laws come in two varieties. On the one hand, there are what I call “necessitarian laws”; on the other, there are laws which connect explanans and explanandum in a looser way and which might be dubbed “non-necessitarian laws.” Take necessitarian laws first. These laws demand that, once the conditions figuring in the antecedent are satisfied, the conditions figuring in the consequent are satisfied as well. There do not seem to be any exceptions to these kinds of laws. Just to give a couple of examples of the kind of law-statements I have in mind¹⁹: “If x exists, then there is a y , which is x 's singleton” or “If x is red, then x is colored,” and so on.

But if we wish to account for cases of non-necessitarian grounding, we have to acknowledge the existence of non-strict metaphysical laws, which connect explanans and explanandum in a defeasible way. But how should we characterize these laws? It is customary in the philosophy of science to refer to non-strict laws as *ceteris paribus* laws. Alternatively, the content of a non-strict law could also be spelled out by a *ceteris absentibus* clause—meaning, roughly, that disturbing factors are absent.²⁰ I will refer to non-strict laws in metaphysics as *ceteris absentibus* laws.

In the philosophy of science, it is in general assumed that non-strict laws pertain to the special sciences, while strict laws belong to fundamental physics. There are several crucial differences between special science laws and laws from fundamental physics. Barry Loewer (2008: 154) summarizes their difference as follows:

The main relevant differences between fundamental dynamical laws and special science laws are these. The candidates for fundamental dynamical laws are (i) global, (ii) temporally symmetric, (iii) exceptionless, (iv) fundamental (not further implemented), and (v) make no reference to causation. In contrast, typical special science laws are (i*) local,

¹⁸Another thing that I need to point out is that the present account will have some trouble in handling cases of logical grounding. For one thing, the present account only acknowledges the permissibility of two inference rules: modus ponens and \vee -elimination. Therefore, it will not be possible to deduce $p \vee q$ from p , since this deduction relies on the rule of disjunction-introduction. For another, for some instances of logical grounding we will not be able to state a law, which connects two atomic propositions with a molecular proposition. We could appeal to sentential quantification to state a law that could account for the groundedness of conjunctions in their conjuncts in the following way: “ $\forall p \forall q (p, q \rightarrow p \& q)$ ”. However, “ $\forall p \forall q (p, q \rightarrow p \& q)$ ” involves in its antecedent a hitherto unknown connective. A possible suggestion in light of this difficulty is to provide a different treatment of cases of logical grounding. One possible strategy might be to appeal to Fine's (2012) truthmaker semantics to account for cases of logical grounding. Another might be to supplement the present view with additional principles to handle cases of logical grounding. I will leave the issue of how to deal with cases of logical grounding for another occasion. I thank an anonymous reviewer for this journal for urging me to omit my discussion of cases of logical grounding in a previous version of this paper.

¹⁹All these claims are universally quantified. In what follows, I omit the quantifier symbols to avoid clutter.

²⁰The notion of a *ceteris absentibus* condition appears in Leuenberger (2008). Leuenberger has used this notion to provide a definition of physicalism. On Leuenberger's view, the actual physical facts will be *ceteris absentibus* sufficient for all other facts.

(ii*) temporally asymmetric, (iii*) multiply realized and implemented, (iv*) *ceteris paribus*, and (v*) often specify causal relations and mechanism.

Since we are dealing with non-strict laws in metaphysics, the features that non-strict metaphysical exhibit, if we follow Loewer's characterization, are feature (iv*)—that is, that they hold *ceteris paribus* or *ceteris absentibus* as I prefer to characterize them—and perhaps (iii*)—that they are multiply realized. None of the remaining features applies to them, since they do not apply to just locally, they are atemporal (though asymmetric), and they do not make reference to causal relations or mechanisms.

Here are some examples of metaphysical laws containing a *ceteris absentibus* clause: “If x is in some physical state ϕ , then, *ceteris absentibus*, x is in some phenomenally conscious state” or “If some things xx are in C , then, *ceteris absentibus*, then there exists an entity y composed out of the xx ” or “If F_1, F_2, \dots, F_n are some categorical properties of an object x , then, *ceteris absentibus*, x has a particular disposition D .” If we consider the first example of a non-necessitarian metaphysical law just mentioned—namely the law regarding the connection between physical states and phenomenally conscious states—it is plausible to suppose that physical states of a certain type are sufficient for phenomenally conscious states only in case undermining conditions are absent. In case a particular person is a zombie, for example, being in a certain physical state will not give rise to a phenomenally conscious experience in that person. These examples can be excluded as cases of grounding on the present account because in neither of these cases the *ceteris absentibus* condition of the law connecting physical states and phenomenally conscious states will be satisfied. Thus, if we assume that the determination of phenomenally conscious experiences is governed by a law of the sort just mentioned the present proposal will be able to deal with this instance of non-necessitarian grounding. And this proposal generalizes to other instances of non-necessitarian grounding, which, for example, concern the relation between natural and moral properties or laws concerning the connection between categorical properties and dispositions of an object.

However, it might be objected that we can dispense with the existence of metaphysical laws which connect explanans and explanandum only given that a *ceteris absentibus* condition is satisfied. It might be suggested that if we individuate metaphysical laws more finely, then the examples just presented might be handled by an account that recognizes only necessitarian laws. So, to consider one possible example, if we conceive of the law that connects physical states and phenomenally conscious states as being restricted to the actual world @, for instance, and as only applying to normal human beings, we will exclude the counterexample that the possibility of zombies poses for this law. However, to conceive of the law in this way will have some downsides. In particular, it seems plausible that physical states will give rise to mental states in worlds that are very close to the actual world and, further, that this law might also apply to the determination of mental states by physical states in other human-like creatures. If we want to do justice to the fact that there are cases of grounding where these two types of states or properties are connected and which extend beyond the actual world, a restriction of the sort just considered will not be very plausible. Moreover, with respect to other examples that I mentioned above in passing, like the groundedness of general facts in singular facts or the groundedness of dispositions, it becomes much more thornier to specify the content of the alleged laws in such a way that they will not be subject to counterexamples. By contrast, if we accept the view that these laws involve a *ceteris absentibus* clause, the problems just reviewed will be excluded.

But there have been expressed doubts about non-strict laws in the philosophy of science, and these worries will carry over to the present case. Marc Lange (1993: 235) has presented the following dilemma for non-strict laws. According to the first horn of the dilemma, non-strict laws are in fact false because not every F is also G . The second horn of the dilemma claims that if we acknowledge the existence of non-strict laws, then these laws are trivially true: a law in the form of “cp, $(\forall x) (x \text{ is } F,$

then x is G)” or “ca, $(\forall x) (x \text{ is } F, \text{ then } x \text{ is } G)$ ” might be taken to be in fact equivalent to “ $(\forall x) (x \text{ is } F, \text{ then } x \text{ is } G)$ or it is not the case $(\forall x) (x \text{ is } F, \text{ then } x \text{ is } G)$ ”—where the latter statement is vacuously true and lacks empirical content.

Most theorists claim that the first horn of the dilemma can be avoided by assuming that non-strict laws aren't universal. It is natural to maintain that non-strict laws fail to be universal because they (a) fail to hold under all external conditions and (b) they further do not hold for all values of the variables quantified over in the law statement. It is more challenging, however, to avoid the second horn of the dilemma. Why are non-strict laws not vacuously true? In the literature on non-strict laws, numerous solutions were proposed as to how to a proponent of non-strict laws can avoid the second horn of the dilemma.

One suggestion that I think holds some promise for the present case is the minimal invariance approach by Woodward and Hitchcock (2003). Their approach maintains that a generalization counts as law-like if this generalization is minimally invariant under possible interventions. To a first approximation, a generalization counts as *minimally invariant* if it continues to hold for different values of the variables quantified over in the law statement. It counts as minimally invariant *under interventions* if it remains invariant for changes of the values of the variables that were brought about by possible interventions. Woodward and Hitchcock conceive of an intervention as, roughly, a possible causal exogenous process that alters the value of the variable in the antecedent of a law.²¹ However, I take it that it is not mandatory to conceive of an intervention along causal lines—an intervention might also be understood as realized possibility that brings about a change in the variables of the law statement. Note, though, that Woodward and Hitchcock maintain that the notion of a law should be replaced with the notion of an invariant generalization. Nevertheless, they claim that “readers who wish to retain the idea that laws are essential to explanation may view our account of explanatory generalizations as a new account of laws” (Woodward & Hitchcock, 2003: 3). They further think that the difference between their account of explanatory generalizations and an account which invokes laws is “largely verbal.”²²

This account provides the tools to escape the second horn of Lange's dilemma: a minimally invariant generalization is not vacuously true and can arguably play a role in explanations, since it remains true in counterfactual situations. Note that Woodward and Hitchcock conceive of the content of laws or generalizations in a different way than assumed here.²³ They hold that the content of a law should be represented in terms of functions and their values. So, for example a law expressed by “If x is in some physical state ϕ , *ceteris absentibus*, then x is in some conscious state” might be rendered as “ $Y = f(x)$.” “ Y ” represents the fact that x is conscious, the explanandum, while “ $f(x)$ ” represents the antecedent of this law, its explanans, that is, that x is in a certain physical state. The variable Y can take two different values, 1 or 0, depending on whether x is conscious or not. Leaving the many subtle details of their approach aside, according to Woodward and Hitchcock, the generalization “ $Y = f(x)$ ” would count as minimally invariant if the relationship stated in this generalization would still hold true in at least some possible situations or possible worlds where the value of x occurring in the explanans would be changed due to an intervention. Due to reasons of space, I cannot go into the details of Woodward and Hitchcock's approach. I just wish to note, though, that their account might be applied to the present case and thus could be of help to dispel the worry that non-strict laws are vacuously true.

²¹See for the details Woodward and Hitchcock (2003: 9–11).

²²I thank an anonymous reviewer for this journal for urging me to clarify this issue.

²³See also Woodward and Hitchcock (2003: 18–21), where they relate their view about generalizations to the account of laws assumed by Hempel and Oppenheim.

Due to invoking the notion of an intervention, the present view about non-strict laws, on the surface, bears similarities to the accounts of grounding introduced by Jonathan Schaffer (2016) and Alistair Wilson (2018).²⁴ Schaffer and Wilson have both developed views on which grounding is conceived of as a form of causation. Wilson claims that “the grounding relation is a special case of a causal relation: whenever A grounds B, A is a (metaphysical) cause of B and B is a (metaphysical) effect of A” (Wilson, 2018: 723). Schaffer says, “I propose to take the analogy between grounding and causation seriously, by providing an account of grounding in the image of causation” (2016: 50).

Both authors have sketched structural equation models for grounding, which are modeled after structural equation models for causation as developed by Pearl (2000), Spirtes et al. (2000) or Woodward (2003). Wilson's models for metaphysical causation parallel the account of Woodward, and consist of a set of variables, structural equations linking the values of the variables according to the metaphysical dependencies at issue and actual assignments of the values of the variables. As in Woodward's account, the notion of an intervention plays a crucial role in models for metaphysical causation: changes in the values of the variables are on this account brought about by interventions. And by appealing to interventions, which are themselves conceived along causal-metaphysical lines, Wilson's account of grounding fails to be reductive. The same applies to Schaffer's account of structural equations for metaphysical causation, which parallel structural equation models for causation as introduced by Spirtes et al. (2000).

Because I have considered to account for the stability of non-strict metaphysical laws in terms of Woodward and Hitchcock's invariance proposal, the present account might fail to be reductive itself with respect to non-necessitarian cases of grounding. However, as I already mentioned above, I take it that it is not mandatory to conceive of an intervention with respect to the variables of a law statement along causal or causal-metaphysical lines—an intervention might also be understood as a realized possibility that brings about a change in the variables of a particular law statement. Moreover, in the context of an account of non-strict laws, I do not think that it is even necessary to bring the notion of an intervention into play. The important thing in the present context is that a law statement remains true in counterfactual circumstances. How the changes in the values of the variables of a particular law statement are brought about is not essential to understand how they might have exceptions without being vacuously true.²⁵ I therefore conclude that adopting Woodward and Hitchcock's solution to the problem of the vacuity of non-strict laws is not in tension with the ambition of the present account of giving a reductive analysis of grounding.

With the distinction between necessitarian laws and non-necessitarian laws in hand, the view that I wish to recommend now comes down to this:

(GL) A grounds B =_{df} A lawfully determines B either (i) on the basis of L_N or (ii) on the basis of L_{CA} .

“ L_N ” stands proxy for any necessitarian law, while “ L_{CA} ” designates laws containing a *ceteris absentibus* condition. Note, of course, that in order to apply the account of lawful determination sketched in the preceding section to instances of non-necessitarian grounding, we need to stipulate that the *ceteris absentibus* clause is satisfied—otherwise, we cannot deduce the explanandum from the explanans.

²⁴I am grateful to an anonymous reviewer for this journal for prompting me to address the relation between the present account of non-strict laws and the theories of Schaffer and Wilson.

²⁵By contrast, the notion of an intervention is essential in structural equation models for metaphysical causation—in particular, because there is in most cases a causal-metaphysical path to the existence to the more fundamental relatum of a grounding relation from the less fundamental relatum.

2.3 | What makes a law a law of metaphysics?

Now I turn to question (c). The metaphysical laws I introduced in the previous sections share one feature: they are true universally quantified material conditionals. But not every true material conditional qualifies as a law of metaphysics. Think of accidentally true generalizations, such as “If x is a creature with a liver, then x is a creature with a heart,” or of causal laws, such as “If a fragile object x is dropped from a certain height, then x will shatter.” Both examples possess the same logical form as metaphysical laws but surely do not qualify as metaphysical laws. What, then, makes a universally quantified true material conditional a law of metaphysics? The I account I wish to propose characterizes metaphysical laws in terms of Sider's notion of structure. The guiding idea of my approach is that metaphysical laws express in their antecedents more structural truths in comparison to the truths their consequents express. I think that this account of metaphysical laws allows us to distinguish metaphysical laws from other law-like generalizations, such as those mentioned above. Note further that the present account is able to distinguish metaphysical laws from laws of nature. Even though laws of nature might be considered to be couched in perfectly structural terms, if we adopt Sider's approach to laws of nature, they differ from metaphysical laws in that they don't describe a progress from the perfectly structural to the less than perfectly structural features of reality. In what follows, I will first sketch the contours of Sider's notion of structure and then consider how this notion might be of help in shedding light on a law of metaphysics.

Sider's notion of structure is strongly inspired by Lewis's (1983) notion of naturalness. Lewis took the notion of naturalness to be mainly applicable to properties and relations and therefore to be a second-order property. Examples of perfectly natural properties in Lewis are properties like spin, mass and charge. Perfectly natural properties are according to Lewis simple, intrinsic and non-gerrymandered. In Lewis, the distinction between the perfectly natural properties and the less-than-perfectly-natural properties has been put to work in many different ways. For example, the perfectly natural properties figure in laws, they provide the minimal supervenience base for all other properties, they are of help in elucidating notions such as intrinsicity, duplication, and reference magnetism.

In contrast to Lewis, Sider takes the notion of structure to have a wider application. According to Sider, the structure operator “ $S(x)$ ” applies to expressions from any grammatical category: connectives, quantifiers, operators and predicates can all be structural on Sider's view. Sider takes any expression to which the structure operator can truthfully be applied to “carve at the joints,” that is, to designate objective, non-gerrymandered and fundamental features of the world. He further claims that metaphysical inquiry is directed at discovering the structural features of reality. Sider (2011: 1) writes:

Metaphysics, at bottom, is about the fundamental structure of reality. (...) Discerning “structure” means discerning patterns. It means figuring out the right categories for describing the world. It means “carving reality at the joints”, to paraphrase Plato. It means inquiring into how the world fundamentally is, as opposed to how we ordinarily speak or think of it.

But which terms are perfectly structural on Sider's view? Sider claims, for example, that negation (“ \neg ”) is a structural notion but disjunction (“ \vee ”) is not structural; and that terms like “mass,” “spin” and “charge” are structural notions and carve at the joints, while “city,” “cow,” or “blue” do not qualify as structural. As the above quote shows, Sider is of the view that we also should define fundamentality in terms of structure. Sider holds that the “joint-carving notions are the fundamental notions; a fact is fundamental when it is stated in joint-carving terms” (2011: vii). He assumes that there is an absolute sense of “structural”—“perfectly structural”—as well as a comparative sense of “structural,” expressed by the

predicate “is more structural than.” He further thinks that structure is a primitive concept and that structure is itself structural.

But if structure is a primitive notion, how we can shed light on this notion? Sider presents several considerations to convince us that structure is an intelligible and useful concept—among them the following three. First, Sider provides at the beginning of his book (2011) several examples that are supposed to provide us with an initial grip on “structure.” Here is one example, presented in Sider (2011: 1–2), which makes vivid how we should conceive of this notion:

Imagine a universe that entirely full of fluid. A plane divides the universe in two halves, one in which the fluid is red, the other in which the fluid is uniformly red (...). Now imagine a group of people who encounter this universe, but accord no special status to the dividing blue-red plane. Instead of thinking of the universe as divided into the red and blue halves, they think that of it as being divided in half by a different plane (...). And they do not use predicates for red and blue. Instead, they have a pair of predicates that they apply uniformly within the two regions separated by their dividing plane. These predicates (...) cut across the predicates “red” and “blue”. The regions to the left of the dashed line they call “bred”; the regions to the right they call “rue”.

Sider thinks that it is “almost irresistible” to describe the people who use “bred” and “rue” instead of “red” and “blue” as making a mistake. He urges that the mistake of the users of “bred” and “rue” doesn’t consist in the fact that they don’t make true judgments. Their mistake rather consists in having the wrong concepts, which fail to carve reality at the joints. What accounts for our verdict that the users of “bred” and “rue” are mistaken is that “red” and “blue” are structural terms—at least in the scenario imagined by Sider—while “bred” and “rue” aren’t structural: the terms “red” and “blue” designate objective, non-germymandered and fundamental aspects of reality, while “bred” and “rue” don’t designate structural aspects of reality.

Second, in the preface of his book, Sider even gestures at a transcendental argument, which underpins the need to acknowledge the notion of structure. One of Sider’s chief concerns in his book (2011) is to save substantive metaphysical inquiry from deflationary attacks by philosophers like Rudolf Carnap, Hilary Putnam and Eli Hirsch. These critics claim that metaphysical disputes are shallow, non-substantive or merely verbal. They reject the view that metaphysical theorizing is a way to find out how reality is ultimately like. However, Sider claims that even those who espouse deflationary views and deny that there is any structure to reality are tacitly committed to the notion of structure. Sider (2011: vii) writes:

Those who say that questions in ontology are merely “verbal”, for example, are best regarded as holding that reality lacks ontological structure. Such deflationary metametaphysical stances are thus themselves metaphysical stances. There is no ametaphysical Archimedean point from which to advance deflationary metaphysics, since any such metametaphysics is committed at least to this much metaphysics: reality *lacks* a certain kind of structure.

Third, Sider further tries to make sense of structure by connecting structure to other notions. He thinks that we can make sense of the following notions by reference to the notion of structure: objective similarity, intrinsic properties, laws of nature, reference, induction and confirmation, the intrinsic structure of space and time, and several others.²⁶ He claims that positing a primitive notion like structure is most jus-

²⁶See Sider (2011: chapters 3 & 4).

tified when this particular posit is unifying. Structure counts, according to this line of thought, as unifying because multiple phenomena can be accounted for by one single notion. In Sider's mind, this provides strong evidence in favor of the need to posit a primitive notion of structure. I must admit that more needs to be said about Sider's notion of structure and the theoretical payoffs that we will incur if we make use of this notion. What is further, some have expressed doubts about Sider's notion.²⁷ However, it would take me too far afield from the main topic of this paper to address these issues here.

Now, how might the notion of structure be of help in characterizing a law of metaphysics? I think that if we take a look at those metaphysical laws I introduced above, it will become apparent that these laws express in their antecedents either perfectly structural truths in comparison to their consequents or more structural truths in comparison to their consequents. I call laws in which the antecedent expresses a perfectly structural truth "basic metaphysical laws." By contrast, laws that express in their antecedents more structural truths in comparison to their antecedents I shall call "derivative metaphysical laws."

Here are some candidate examples of basic metaphysical laws (though I don't wish to commit myself to any of them). The law expressed by "If an object x exists, then there is a y , which is x 's singleton" might be taken to express in its antecedent a perfectly structural truth—if we accept the view that "exists" or the existential quantifier is a perfectly structural term—while its consequent expresses a less than perfectly structural truth because it contains an additional notion besides "exists," namely the notion of a set. Or consider another example, concerning the composition of wholes out of their parts.²⁸ If we assume that composition happens in the actual world, then it also makes sense to assume that there will exist a law, which accounts for the composition of composite objects out of their parts. This law might be stated very roughly as follows: "If some things xx are in C , then, *ceteris absentibus*, then there is an entity y composed out of the xx ." The proposition expressed by the antecedent of this law might be taken to be a perfectly structural truth, while the proposition expressed in the consequent of this law might be a less than perfectly structural truth because composite objects will be derivative and non-fundamental entities on this view. If composition indeed happens, then the notions of a part and the notions describing facts about the arrangement of those parts might be taken to designate perfectly structural features of reality than the notions appearing in the consequent of this law.

Of course, there will be some dispute about which notions are in fact perfectly structural, depending on the metaphysical views one accepts. Sider, for example, claims that the joint-carving existential quantifier, which is not identical to the existential quantifier of ordinary English, is a perfectly structural notion.²⁹ Yet it might be disputed that the existential quantifier in principle carves at the joints if one, for instance, subscribes to a Tractarian view of reality on which individual facts consisting of objects and properties are metaphysically basic. One could also hold that the notion of a part is not a perfectly structural notion if the case can be made that the parts of an object are grounded in the existence of the whole, rather than vice versa. Similarly as with the previous case, the precise content of a metaphysical law will depend on which metaphysical views one accepts. In the present context, I don't wish to commit myself to any particular view regarding which notions are in fact perfectly structural.

²⁷Jared Warren argues that a proponent of the notion of structure faces the same challenge as Platonists about abstract objects or realists about valuenamely, that there needs to be given an explanation as to how we can have reliable beliefs about structure. See Warren (2016), who develops this challenge in more detail. Due to reasons of space, I cannot address these concerns here.

²⁸Sider (2013) is a nihilist about composite objects and he consequently denies that "parthood" is a perfectly structural term. His argument against the existence of composite objects relies on the idea that nihilism is an ideologically simpler theory.

²⁹Donaldson (2015) is a critical discussion of Sider's view that the existential quantifier is perfectly structural.

Now consider derivative metaphysical laws. These are laws which connect more fundamental properties or facts with less fundamental properties or facts. The law expressed by “If x is red, then x is colored,” for example, only connects a more fundamental property with a less fundamental property. The property figuring in the antecedent of this particular law, redness, is plausibly not a fundamental feature of the world and therefore “red” is not a perfectly structural term. In order to make sense of metaphysical laws of this particular sort one needs to invoke a relative notion of structure to which Sider at some points appeals to. In the example just considered, the predicate “is red” designates a more fundamental feature of reality than the predicate “is colored,” albeit both predicates fail to be perfectly structural. Therefore, also this particular law can be considered to be a metaphysical law since the terms figuring in the antecedent of this law are more structural than the terms figuring in the consequent of this law.

But how should we individuate a perfectly structural truth? It is natural to assume that a truth S is a perfectly structural truth, and for that matter a fundamental truth, if and only if S is true and the notions that compose S are perfectly structural.

(Structural Truth) S is a perfectly structural truth iff the notions which compose S are perfectly structural.³⁰

Sider accepts a definition along these lines and he further thinks that this definition entails a combinatorial principle of fundamental truth, which states:

(Combinatorial) If S is a fundamental truth, and S' is any true sentence containing no other expressions other than those occurring in S , then S' is a fundamental truth as well.

However, there are counterexamples to this simple definition of a perfectly structural truth and the combinatorial principle.³¹ One counterexample mentioned in Sider runs as follows: “ p ” and “ p ” at first sight differ with respect to their structuralness and their fundamentality. Only the first truth, it might be maintained, is perfectly structural and fundamental, while the second one isn't. But both “ p ” and “ p ” contain only perfectly structural terms.³² The example just presented will of course also call into question an account of metaphysical laws in terms of structure. If “ p ” and “ p ” would both express perfectly structural truths, then there could be no law that accounts for the determination of instances of the latter truths in terms of the former.

Sider thinks he can simply outright reject the example.³³ In his mind, the example is based on the false idea that p grounds p , and that we therefore deem the first truth to be more fundamental than the second. Note that Sider's approach to account for the connection between the fundamental and the derivative is in terms of what he calls a “metaphysical semantics.” On this approach, all non-fundamental truths have a semantic content which can be stated in purely joint-carving terms. Sider's

³⁰See Sider (2011: 148).

³¹See Sider (2011: 148–149), who credits Fine with having proposed this example. I thank Julio De Rizzo and Alex Skiles for urging me to address this example.

³²Notice though, as already mentioned in footnote 18, that the present account will have difficulties in handling all cases of logical grounding. Dealing with all these cases will require a different treatment than by appealing to metaphysical laws. Nevertheless, in what follows, I will stick to the example involving negation.

³³See Sider (2011: 149). Fine (2013) critically discusses this response. Fine (2013: 723) presents another counterexample to Sider's definition. I will discuss below an example that is very similar to Fine's, and I will present a solution to the example discussed below, which also allows to exclude Fine's example.

account assigns to both “p” and “p” the same metaphysical truth conditions. Since Sider rejects the notion of ground and provides an account of the connection between the fundamental and the derivative in semantic terms, there is, in his mind, no basis for claiming that this example is a counterexample to his definition of perfectly structural truths and, for that matter, of fundamental truth.

But if one wishes to hold on to the notion of grounding and give an account of metaphysical laws in terms of structure, the example cannot be outright rejected. Yet, I think that a definition of perfectly structural truths in terms of structural notions can be given, which nonetheless entails that “p” and “p” don’t come out as equally expressing perfectly structural truths. Note that there is an ambiguity in the phrases “the notions which compose S” in (Structural Truth) and “containing no other expressions than,” which occurs in (Combinatorial). On the one hand, the phrases might mean that if S and S’ contain perfectly structural notions of the same type, regardless of whether they in fact contain the same amount of tokens of this type in the same syntactic arrangement, then S and S’ are both perfectly structural truths. On the other hand, these phrases might also be understood as claiming that only if S and S’ contain (i) the same expressions of the same type and (ii) the same amount of tokens of the types in question in the same syntactic arrangement, then both S and S’ will be perfectly structural. On the second reading, then, “p” will not come out as perfectly structural if “p” is perfectly structural because the iterated application of negation in “p” will violate clause (ii). If we opt for the second reading of the phrases “containing the same expressions” and “no other expressions occurring in,” then, we can exclude the present counterexample against a definition of perfectly structural truths.

Another type of counterexample to a definition of metaphysical laws in terms of structure emerges if we consider any true material conditional, which connects two types of arbitrary facts and in which a term in the antecedent of this conditional is substituted for a co-extensional but more structural term. As a result, the antecedent presumably expresses a more structural truth than its consequent and, therefore, the conditional might be taken to be a metaphysical law.³⁴ Consider, as an example, the following conditional: “If cold water is poured on a hot stove, then some of the water will evaporate.” This conditional should not come out as a law of metaphysics because the propositions expressed in the antecedent and the consequent don’t differ in terms of their structuralness; there is no progress from the perfectly structural to the less than perfectly structural features of reality. But we might rephrase this conditional as follows: “If cold H₂O is poured on a hot stove, then some of the water will evaporate.” Of course, we wouldn’t use this statement in ordinary discourse. Nonetheless, it would constitute a counterexample to the account of metaphysical laws suggested here because the antecedent differs from its consequent in containing one more structural notion. Therefore, it might be taken to express a more structural truth in its antecedent in comparison to its consequent.

I think this counterexample does not apply to an account of metaphysical laws in terms of structure if we conceive of metaphysical laws as hyperintensional and if we assume that is essential to them that they are couched in the terms in which they are in fact couched. In contrast to accidentally true generalizations, metaphysical laws cease to be laws of metaphysics relevant to grounding if substitutions of co-intensional terms are made. Consider another example, which provides evidence that metaphysical laws are sensitive to the terms they are couched in. The law expressed by “If x is an equilateral rectangle, then x is square” will cease to be a law of metaphysics relevant to grounding if we substitute the predicate “is an equilateral rectangle” appearing in the antecedent with “is square.” In order to account

³⁴Thanks to Jon Shaheen for this counterexample. As mentioned in the previous footnote, Fine (2013: 726) has presented a very similar example. Fine invites us to consider the following possibility. Let’s assume that “Electron e has a certain mass” expresses a fundamental truth and “Person S is in pain” also states a fundamental truth, if we assume that facts about mental states are fundamental. Fine claims that if we accept Sider’s principles, then “Person S has a certain mass” would equally express a fundamental truth, which is, however, absurd. I think that the example I will introduce below and Fine’s example can be dealt with in the exact same way—namely, by assuming the metaphysical laws or truths are hyperintensional.

for the fact that the property of being an equilateral rectangle brings it about that a certain figure is square, the law needs to be stated in the terms in which it is in fact stated. In the case just considered, substitution of necessarily co-extensional terms will make void the difference in structuralness of the propositions expressed in the conditional and therefore the law will cease to be a law of metaphysics relevant to grounding. If we assume that metaphysical laws are hyperintensional and thus sensitive to the terms they are couched in, the above counterexample can be excluded.

Summing up, I think that metaphysical laws can be either basic or non-basic. In case they are basic, metaphysical laws should be conceived of as expressing perfectly structural truths in their antecedent in comparison to their consequents; in case they are non-basic, they should be characterized as expressing more structural truths in their antecedents than in their consequents. A perfectly structural truth is individuated very finely. If *S* is a perfectly structural truth, then *S'* express the same perfectly structural truth if *S'* is composed of (i) the same type of expressions as occurring in *S* and (ii) the same amount of tokens as in *S* in the same syntactic arrangement. Finally, I take it that it is essential to a law of metaphysics that this law, if true, is couched in the terms in which it is couched; metaphysical laws are hyperintensional and do not allow for substitutions of co-intensional terms.

I now wish to take a brief look as to whether the present proposal satisfies the main desiderata that an account of grounding should be able to satisfy. Recall that I mentioned at the beginning of this paper that there are the following features of grounding that an account of grounding should be able to accommodate: (1) grounding is a form of determination, (2) grounding is worldly and mind-independent, (3) grounding is factive, (4) grounding entails that the relata differ in terms of their priority and fundamentality, (5) grounding is explanatory, (6) grounding is hyperintensional, (7) there are both necessitarian and non-necessitarian cases of grounding, (8) grounding should come out as being distinct from other phenomena, such as causation, supervenience, and so on, and (9) grounding has certain formal features (irreflexivity, asymmetry, transitivity, and non-monotonicity).

The present account consists of three main components: (i) an account of lawful determination in terms of a restricted form of logical entailment; (ii) an account of metaphysical laws as coming in two varieties—the former which I call “necessitarian laws” and the latter “non-necessitarian laws”; and (iii) a proposal regarding what distinguishes metaphysical laws from other law-like generalizations in terms of Sider's notion of structure. The features (1)–(3) and the formal features of grounding, as mentioned under (9), will be accommodated by the first component of the view sketched above. Recall the account of lawful determination I laid out above. Lawful determination is cashed out in terms of logical entailment and a certain set of permissible inference rules, which secure that the grounded fact indeed determines the grounded fact and not vice versa. This restriction secures that grounding possesses the desired formal features.

The remaining features will be accounted for by the present proposal due to the characterization of metaphysical laws just presented. Grounding will possess the feature mentioned under (4) because the laws of metaphysics express in their antecedents either perfectly structural or more structural truths than in their consequents. Grounding will be explanatory, as per feature (5), because lawful determination just is a certain form of explanation. The hyperintensionality of grounding, that is, feature (6), will be secured by the fact that the laws of metaphysics are hyperintensional and by the fact that lawful determination just allows appeal to a restricted set of inference rules. Feature (7) will be accommodated by the present proposal because there are two types of metaphysical laws, which cover both necessitarian and non-necessitarian cases of grounding. Finally, grounding will on the present proposal be also distinct from other notions, as desideratum (8) demands. Grounding will be distinct from causation due to involving metaphysical laws, which are hyperintensional and which take us from perfectly structural features to less than perfectly structural features of reality. In comparison to supervenience, grounding will possess a distinct modal profile because grounding comes in the

necessitarian as well as in the non-necessitarian variety. In comparison to reduction, grounding does not imply that one relatum reduces to the other. I take it, therefore, that the present account satisfies the core features of grounding.

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