What is Weak Ground?

Louis deRosset

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Abstract

Kit Fine, in "The Pure Logic of Ground", has made a seminal attempt at formalizing the notion of ground. Fine ties the formal treatment of grounding to the notion of a weak ground. Formalization of this sort is supposed to bring clarity and precision to our theorizing. Unfortunately, as I will argue, it's not clear what weak ground is. I review five alternative explanations of the idea, and argue that none of them are ultimately satisfactory. I close by outlining a more complicated explanation of the notion that turns out to be more satisfactory.

A number of contemporary metaphysicians are exploring the nature and uses of a phenomenon known as *grounding*. These thinkers link grounding to a certain kind of explanation. Philosophers and scientists are fond of asking for explanations of this kind: “In virtue of what is murder wrong?” “In virtue of what am I justified in believing that I have hands?” “What makes gravity such a weak force?” Each question sets the stage for a more or less familiar ongoing research program. Each question calls for an explanation. A correct answer to each question will tell us which are the facts in virtue of which something is the case. In general, the facts that ground a given fact are the facts in virtue of which that fact obtains.1

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1 Enthusiasts of grounding agree that facts may ground other facts, but they split on whether grounding relates things other than facts; Schaffer [2009] contends that it does, and Fine [2001, 2012] disagrees. If Schaffer is correct, then Fine’s formal treatment of ground may be incomplete. I take no stand on this dispute here. Fine also argues in [Fine, 2001] that, strictly speaking, we don’t need to reify facts and claim that grounding is a relation between them in order to give a theory of ground; we may instead treat talk of grounding’s being a relation between facts as a mere *façon de parler*. We should formalize our theory of ground by appeal to *sentential operators* which do not pick out any relation, and whose arguments, semantically speaking, do not pick out some special category of entity. According to Fine, the logical

Corresponding Author: Louis deRosset
University of Vermont
email – Louis.deRosset@uvm.edu
Though the study of grounding is still in the early stages, Kit Fine, in “The Pure Logic of Ground” [Fine, 2012], has made a seminal attempt at formalization. Formalization of this sort is supposed to bring clarity and precision to our theorizing, as it has to the study of other metaphysically important phenomena, like modality and vagueness. Unfortunately, as I will argue, Fine ties the formal treatment of grounding to the notion of a weak ground, and it is not clear what that notion comes to.

**Weak Ground in the Pure Logic of Ground**

In Fine’s system, which he calls *the pure logic of ground* (PLG), grounding claims vary along two independent axes: (i) a grounding claim may either be partial or full; and (ii) it may either be strict or weak. There are thus four types of grounding claim in Fine’s system. Corresponding to each type of grounding claim is an operator in the language of PLG:

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The difference between a full grounding claim and a corresponding partial grounding claim is relatively clear: a partial ground for a fact φ is some fact that is a (perhaps improper) part of a full ground for φ; a partial ground of φ is either itself a full ground for φ, or is one of a plurality of facts that fully ground φ. And the notion of a strict ground for φ is the relatively familiar notion of a fact in virtue of which φ obtains.

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2 This rough and ready explanation of the notion of a partial grounding claim explains that notion in terms of full grounding. I do not mean by these informal remarks to undertake any commitment on the interesting question of whether partial grounding is ultimately to be analyzed in terms of full grounding. The characterization in the main text is deployed merely as an intuitive aid to the reader’s understanding. Fine specifies a number of distinct notions of partial ground, not all of which can be characterized in the way suggested in the main text. See [Fine, forthcoming, p. 21] in particular for an argument that strict partial ground cannot be characterized in that way.
The notion of weak ground is obscure by comparison. What is a weak ground for a fact $\phi$? Fine takes two claims about weak ground as axiomatic: (i) that every strict ground for $\phi$ is also a weak ground for $\phi$; and (ii) that every fact is a weak ground for itself. This second claim marks a contrast with strict ground, which is taken by Fine (along with most other philosophers working on ground) to be irreflexive. Still, these two claims fall far short of a characterization of what weak ground comes to.

The obscurity, or at least unfamiliarity, of the notion of weak ground is discomfiting in large measure because of the importance the notion has in developing PLG. According to Fine, “it turns out that the most natural way of developing a logic of strict ground is by combining it with the logic of weak ground” (p. 1). If PLG represents the best way to develop a logic of ground, and PLG crucially relies on a notion that is unclear or problematic, then we might worry that the logic of ground is itself problematic. It is difficult to assess the plausibility of the logical principles on offer if we don’t understand one of the notions used to frame those principles. Worse, if the best way of giving a formal treatment of the notion of strict ground turns out to rely on an unclear notion, then we might worry that the notion of strict ground also stands in need of clarification. The worry here is akin to Quine’s complaint that modal logic yielded only an “illusion of understanding” of the notion of necessity, since, he claimed, it relied on a confusion of use and mention [Quine, 1966, p. 176]. If formal treatment of strict ground relies on an obscure notion, then we have reason to suspect that the notion so treated is obscure.

Fine offers two characterizations of weak ground. There are two further characterizations that may be gleaned from what he says. A fifth characterization is at least suggested by his use of ‘$\leq$’ to stand for weak ground. Still, as I will argue, none of these characterizations offers a satisfactory explication of the notion of weak ground.

Fine never claims that weak ground is indispensable for formulating the logic of ground. Instead he makes the weaker claim that treating the logic of strict ground in isolation leads to “anomalies in the formulation”, and that combining the treatment of weak ground with a treatment of strict ground turns out to provide a more natural starting point for the logic of ground [Fine, 2012, p. 1]. This leaves open the hope of offering a characterization of weak ground that appeals to the notion of strict ground, but still satisfies the axioms of PLG. In fact, there is such a characterization. Thus, there is a notion that is analyzable in terms of strict ground, and which satisfies the inference rules of PLG. So, we can introduce a notion of weak ground, in effect defined in terms of strict ground, and show that the notion, so-defined, yields the pure logic of ground. If this notion captures everything of importance in
the notion of weak ground deployed by Fine, then we will have thereby provided a clarification of that notion. I will close by sketching this proposal for understanding weak ground.

Levels of Explanation

Fine offers two intuitive characterizations of weak ground. The nomenclature Fine chooses to represent weak ground suggests another characterization. Fine’s semantics suggests yet another. A remark suggests a fifth. I will argue that none of these characterizations provides a satisfactory explanation of the notion of weak ground.3

Fine first suggests that, while a strict ground for \( \phi \) is a fact occurring lower than \( \phi \) in the explanatory hierarchy, a weak ground for \( \phi \) is a fact occurring at the same level as \( \phi \) in the explanatory hierarchy. In other work,4 I have defended the idea that grounding makes available a creditable explication of the idea of an explanatory hierarchy organized into levels. But it is not clear that being at the same level as \( \phi \) in an explanatory hierarchy of this sort corresponds to any useful notion of ground. Suppose it’s chilly, but neither windy nor sunny. Then, it is either chilly or windy in virtue of the fact that it is chilly; similarly, it is either chilly or sunny in virtue of the fact that it is chilly. Its being either chilly or windy occurs at the same level in the explanatory hierarchy than its being either chilly or sunny. But, one may reasonably feel, there is no explanatory relation between them that one would want to classify as a kind of ground, akin to the in virtue of relation.

Fine might respond by noting that the sense in which the two disjunctive facts are at the same level is not the sense intended in the explication of the idea of weak ground. What’s intended instead is some other sort of explanatory equivalence. Obviously, then, the

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3 My review of the first, second, and fourth characterizations pushes them farther than I believe Fine intends. On my reading, Fine does not intend any of these three characterizations as a full explication of the notion of weak ground, so much as an interesting further fact concerning the relation picked out by the notion that may help us understand the idea. The third characterization isn’t Fine’s at all. Only the fifth is advanced by Fine as a definition of weak ground; it is notable that this definition appeals to strict ground. The adequacy of all five characterizations, however Fine himself thinks of them, is worth exploring. The arguments that follow, if sound, provide reasons not only for rejecting the full explications of the notion of weak ground suggested by the characterizations, but also for finding each of the characterizations less helpful for understanding weak ground than one might have hoped.

4 [deRosset, forthcoming]
characterization in question needs to specify what sort of explanatory equivalence is in question. Appeal to the idea of levels in the explanatory hierarchy by itself does not adequately characterize the idea of weak ground.

**The “For ... is For ...” Idiom**

Fine’s second intuitive characterization of the notion of weak ground is in terms of the English idiom “For ... is for ...”. He writes, “[t]hus for John to marry Mary is for John to marry Mary, for John to marry Mary is for Mary to marry John, and for John to marry Mary is for John to marry Mary and (for) Mary to marry John. In each of these cases, we may say that the truth or truths on the right weakly ground the truth on the left.” [Fine, 2012, p. 3]

This characterization is unsatisfactory, given that strict grounds are also supposed to be weak grounds. To my mind, it would be clearly false to say that for it to be either chilly or windy is for it to be chilly, in part because the former fact may obtain when the latter does not.

One might respond that this problem shows that the “For ... is for ...” idiom applies only in the cases in which the supposed weak ground is not also a strict ground. On this response, the characterization must be amended to say that a fact $\phi$ weakly grounds a fact $\psi$ iff either $\phi$ strictly grounds $\psi$, or for $\psi$ to be the case is for $\phi$ to be the case. This disjunctive characterization obviously accommodates the idea that every strict ground is also a weak ground. Fine also seems to think that it captures the idea that weak ground is reflexive, given that he finds it plausible that for John to marry Mary is for John to marry Mary. If Fine is right on this score, then the disjunctive characterization in terms of the “For ... is for ...” idiom satisfies the two principles governing weak ground that he takes as axiomatic.

I myself am not certain that Fine is right that the “For ... is for ...” idiom is reflexive. More generally, I am discomfited by the fact that I don’t have a very firm intuitive grip on particular cases which the idiom applies. By itself, this need constitute no very weighty problem for the proposed characterization. A far more serious problem is that the “For ... is for ...” idiom is symmetric. For example, since for John to marry Mary is for Mary to marry John, for Mary to marry John is for John to marry Mary. Thus, if $\phi$ is a weak, but not strict ground for $\psi$, then, on this characterization, $\psi$ should be a weak ground for $\phi$.

In Fine’s formalization, “$\leq$” does not have this feature. In PLG, the fact that
\{\phi \leq \psi\} \not\models \psi \leq \phi

is clear, since \(\phi\) might weakly ground \(\psi\) by virtue of strictly grounding it, and (it is provable that) no fact \(\psi\) weakly grounds any of its strict grounds. But this case is not relevant to the issue at hand. Call something a merely weak ground of a fact if it is a weak ground and not a strict ground. The key question is whether \(\phi\) might merely weakly ground \(\psi\) and not vice versa. Since PLG contains no way to negate strict grounding claims, this question can’t be posed as the question, as it were, of whether

\{\phi \leq \psi, \phi \not\leq \psi\} \models \psi \leq \phi

But the semantics Fine offers gives us a clear specification of when a strict grounding claim is not true in a model, so we can use Fine’s semantics to address our question. It turns out that there is a model in Fine’s system in which a fact \(\phi\) merely weakly grounds a fact \(\psi\), but in which \(\psi\) does not weakly ground \(\phi\).\(^5\) In this sense, there is a mismatch between Fine’s semantics and the disjunctive characterization of weak ground. So, at the very least, if this disjunctive characterization of weak ground is correct, then Fine’s formalization does not capture the idea. Perhaps one of the alternatives explanations of the idea will do better.

**Strict Ground and Identity**

A simpler disjunctive characterization is suggested by Fine’s choice of \(\leq\) to represent weak ground. Perhaps a weak ground for \(\phi\) is anything which is either a strict ground for \(\phi\) or is identical to \(\phi\). This obviously satisfies both of the claims that Fine takes to be axiomatic: on this characterization, everything weakly grounds itself, and every strict

\[\phi\] and \[\psi\] be sentences. Then a model \(M\) is given by letting the interpretation \([\phi]\) of \(\phi\) be \(\{a.b\}\) and the interpretation \([\psi]\) of \(\psi\) be \(\{a, a.b\}\). In this model \(M, [\phi] \leq_M [\psi]\) and \(M, [\phi] \not\leq_M [\psi]\), but also \([\psi]\) \(\not\in_M [\phi]\). The key fact is that there is a fact, namely \(b\), whose fusion with any element of the interpretation of \(\psi\) is a member of the interpretation of \(\phi\). Thus, the model verifies that \(\psi\) is a partial weak ground of \(\phi\); for this reason, \(\phi\) is not a strict ground of \(\psi\).
ground of $\phi$ is also a weak ground of $\phi$. But this characterization clearly isn’t what Fine has in mind. First of all, it has the same problem as the more complicated disjunctive characterization involving the idiom “For ... is for ...”. If this simpler disjunctive characterization were correct, then merely weak ground would be symmetric. Since, on Fine’s view, it isn’t, this obviously isn’t the characterization Fine has in mind.

A similar problem emerges when we consider the question of how to extend this characterization from cases in which the weak ground of $\phi$ is a single fact to cases in which two or more facts weakly ground $\phi$. There are two salient ways of extending the characterization. On the collective extension of the characterization, a plurality of facts weakly ground $\phi$ iff those facts either strictly ground $\phi$ or are, collectively, identical to $\phi$. On the distributive extension, a plurality of facts weakly ground $\phi$ iff all of those facts distinct from $\phi$ together strictly ground $\phi$. The collective extension is clearly wrong. In PLG, if $\phi$ strictly grounds $\psi$, then the pair of facts $\phi, \psi$ together weakly ground $\psi$. For instance, since the disjunctive fact that it’s either sunny or chilly is strictly grounded in its being sunny, that fact is weakly grounded in the pair of facts: it’s sunny, it’s either sunny or chilly. But the pair of facts do not, on Fine’s view, strictly ground the second member of that pair; nor are they, collectively, identical to the second member, since the second member can obtain without the pair, collectively, obtaining. The distributive extension of the characterization does better in this case.

Even so, the distributive extension of the identity-based characterization is clearly wrong. Suppose that it is chilly, windy, and sunny, and consider the claim that its being chilly, windy, and sunny is weakly grounded in the triple of facts: it is chilly; it is windy; it is chilly, windy, and sunny. It is clear that we should not interpret this claim as the claim that its being chilly, windy, and sunny is strictly and fully grounded in the pair of facts: it’s chilly, it’s windy. The problem isn’t the implausibility of the translation, for we’ve got no reason as yet to think that the original weak grounding claim is plausible. The problem, rather, is that this translation does not adequately capture the logic (in PLG) of the original weak grounding claim. On the distributive extension, $\phi, \chi, \psi \leq \psi$ and $\phi, \chi \leq \psi$ would get the same interpretation; thus, according to this interpretation, the latter should be trivially derivable from the former.

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*In the degenerate case in which the claim is that $\phi$ weakly grounds itself, this characterization is vacuously satisfied.

*Is this claim true? Because I don’t know exactly which notion of weak ground Fine has in mind, I am unsure.*
But, in PLG $\phi, \chi, \psi \leq \psi$ does not imply $\phi, \chi \leq \psi$. We are left with a mystery concerning why PLG does not sanction the interderivability of these two claims, given that they are synonymous according to the interpretation. In PLG, the removal of $\psi$ from the left-hand side of the sequent might leave a “hole” that needs to be filled by some other sentence. So, the distributive extension does not fit Fine’s intentions. This is unsurprising, of course, given that he himself never suggested otherwise.

**Truthmakers**

Our discussion so far has concerned characterizations of the notion of weak ground that Fine himself either never offered, or at best presented as helpful clues as to what he has in mind. I have argued that these clues are less helpful than one might have hoped or feared. I now turn to a pair of characterizations that Fine does endorse. The first such characterization is given in Fine’s semantics for PLG. That semantics relies on an ontology of *facts*, which are to be thought of as “...parts of the actual world” [Fine, 2012, p. 7, emphasis original]. The sentences of the language are all truths, and each such sentence is to be associated with a *verification set* – the set of facts that make it true (or “truthmakers,” as such things are called in the literature). On the conception of weak ground suggested by Fine’s semantics, the full weak grounding claim ‘$\phi \leq \psi$’ is true just in case every member of $\phi$’s verification set is also a member of $\psi$’s, i.e., every truthmaker for $\phi$ is also a truthmaker for $\psi$.

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8 Here, perhaps, an analogy with mereological fusion may help. It is obvious that there will be cases in which an individual is a mereological fusion of itself and some other individuals, but the individual is not the mereological fusion of the other individuals. For instance, Michelangelo’s *David* is the mereological fusion of *David’s* head, and *David’s* left leg; but *David* not the mereological fusion of *David’s* head, and *David’s* left leg. Removing *David* from the list of fusees leaves a “hole” that needs to be filled by something else.

9 There are truthmaker theorists who deny that truthmakers are facts; see [Mulligan et al., 1984] for a classic example. The argument of this section could easily be amended to accommodate alternative views concerning the nature of truthmakers.

10 This is a special case of the more general truth condition given on [Fine, 2012, p. 9], in which the left-hand side of the weak grounding claim is a single sentence $\phi$; the truth condition is stated in terms of sequents with an arbitrary set of sentences $\phi_0, \phi_1, ...$ on the left-hand side.
Suppose, again, that it is chilly but not sunny. According to Fine’s semantics, its being chilly is a weak ground for its being either chilly or sunny just in case every truthmaker for ‘it’s chilly’ is also a truthmaker for ‘it’s either chilly or sunny.’ So far, so good. A problem arises, however, if we allow that the truthmakers may be sparse in such a way that the only parts of the actual world which are truthmakers for a true disjunction with a false disjunct are the truthmakers for its true disjunct. Such a view is intuitively attractive, and many in the truthmaker literature endorse it. But, if the truthmakers are sparse, then Fine’s semantics will imply that its being either chilly or sunny is a weak ground for its being chilly. As above, one may reasonably feel that there is no explanatory relation going from the disjunction to its disjunct that one would want to classify as a kind of ground, akin to the in virtue of relation. In fact, it seems very clear that the explanatory relation between the true disjunct and the disjunction is asymmetric. It would appear, then, that the adequacy of this particular explanation of weak ground rules out a view of truthmakers that ought not to be ruled out.11

Explanatory Role

Fine makes one more claim concerning weak ground, that one might hope would helpfully specify the notion. Fine writes, “[i]n general, whenever a number of truths fully weakly ground a given truth, whatever explanatory role can be played by the given truth can also be played by their grounds” (p. 3).12 This claim describes the explanatory role the weak grounds for a fact may play. Fine suggests that we may use this specification of the explanatory role that full weak grounds play to define the notion of weak ground [Fine, forthcoming, p. 20].

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11 In personal correspondence, Fine confirms that the semantics for PLG presupposes that the truthmakers for a given sentence are plenitudinous, so that there is at least one truthmaker for ‘it is either chilly or sunny’ which isn’t a truthmaker for its true disjunct.

12 I have interpolated “fully” into this characterization in order to deal with certain uninteresting counterexamples to the unamended claim. Suppose, for instance, that $P$ merely partially weakly grounds $Q$. $Q$ fully strictly grounds $(Q \lor R)$; but we wouldn’t expect it to follow that $P$ by itself fully strictly grounds $(Q \lor R)$; given that ‘$P$’, ‘$Q$’, and ‘$(Q \lor R)$’ are sentences, in PLG \{\[P \preceq Q, Q \prec (Q \lor R)\] \} does not imply $P \prec (Q \lor R)$. My interpolation does no damage to the utility of the characterization since, if we had an adequate characterization of full weak ground, we could explain the notion of partial weak ground in its terms in the way suggested at the beginning of this paper: a partial weak ground of $\phi$ is some fact that is a (perhaps improper) part of a full weak ground for $\phi$. 

\[\$\]
The idea is that some facts weakly ground $\phi$ if and only if they strictly ground (perhaps in concert with some further facts $\Gamma$) all of the facts strictly grounded (perhaps in concert with $\Gamma$) by $\phi$. Assuming (as PLG requires) that grounding is transitive, every strict ground of $\phi$ satisfies this characterization. But there is at least one fact that also satisfies this characterization and which isn’t a strict ground of $\phi$: $\phi$ itself. So, this specification satisfies the claims concerning weak ground that Fine takes as axiomatic.

Problems arise, however, when we confront situations in which the universal generalization used to define the notion of weak ground is vacuously satisfied. Suppose, for instance, that there are only two “atomic” facts $a$ and $b$, and just one “conjunctive” fact $a.b$. The conjunctive fact $a.b$ does not strictly ground any facts, since, on pain of circularity, it strictly grounds neither itself nor its conjuncts, and these exhaust the facts. Thus, according to the definition, $a$ is a (full) weak ground of $a.b$. But, one may reasonably feel, there is no full explanation of the conjunction that appeals to only one conjunct and that one would want to classify as a kind of ground, akin to the in virtue of relation.

It is worth noting in this connection that Fine’s semantics appears to be at odds with the proposed definition of weak ground in this case. On that semantics, there is a model in which, roughly, there are only the three facts $a$, $b$, and $a.b$. On Fine’s semantics, it is not true in this model that $a$ is a full weak ground of $a.b$, even though everything strictly grounded by $a.b$ – namely, nothing – is also strictly grounded by $a$. I’ve argued that the semantics is correct on this point. If I’m wrong about that, though, the problem of the mismatch between the proposed definition and its semantic implementation remains.

The problem cannot be fixed by requiring non-vacuous satisfaction of the explanatory role played by $a.b$, since then $a.b$ would no longer weakly ground itself. There are a variety of more complicated maneuvers that might avoid the problem. For instance, we could

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13 Formally, the definition is

$$\Delta \leq \phi \iff (\forall \chi)(\forall \Gamma)(\phi, \Gamma < \chi \Rightarrow \Delta, \Gamma < \chi)$$

14 Less roughly, here is a description of the model using notions defined in [Fine, 2012]. Consider the fact frame described in n.5, in which the universe of facts is \{n, a, b, a.b\}, and the fusion operation $\Pi$ is such that $\Pi(\emptyset) = n$, $\Pi(\{a, b\}) = a.b$, $\Pi(\{x\}) = x$, $\Pi(\{n\} \cup \Gamma) = \Pi(\Gamma)$, and $\Pi(\{a.b\} \cup \Gamma) = a.b$. Suppose our language has only two sentences ‘$\phi$’ and ‘$\psi$’, respectively. Then a model $M$ for that language relative to our fact frame is given by letting the interpretation $[\phi]$ of $\phi$ be $\{a\}$ and the interpretation $[\psi]$ of $\psi$ be $\{a.b\}$. In this model $M$, $[\phi] \preceq_M [\psi]$, and so $M \not\models \phi \preceq \psi$. 

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stipulate as a background condition on the definition that chains of strict grounds have no “top”, so that every fact strictly grounds some further fact. (However, this would have the effect of ruling out the hypothesis that there are only finitely many facts.) I won’t pause to chase down the myriad ways in which one might respond to the problem for the proposed definition of weak ground. The important point for present purposes is that a response is needed. As it stands, Fine’s proposed definition of weak ground encounters problems, and does not appear to match its semantic implementation.

A proposed interpretation of weak ground

I have offered only a very short review of some initial difficulties with each of the five characterizations of weak ground. None of these difficulties are decisive. Even so, they motivate the search for a new characterization of the notion which more adequately captures the principles of PLG. In fact, there is such a characterization available.

Here’s the rough idea of the characterization; $\phi_1, \phi_2, \ldots$ weakly ground $\psi$ iff (i) $\phi_1, \phi_2, \ldots$ (collectively) strictly ground $\psi$, if they are each distinct from it; and (ii) all of the $\phi_i$ distinct from $\psi$ are collectively part of a strict ground for $\psi$, otherwise. To illustrate, suppose again that it is chilly, windy, and sunny. On the characterization on offer, the claim that its being chilly, windy, and sunny is weakly grounded in the triple of facts

(it is chilly; it is windy; it is chilly, windy, and sunny)

is true. Consider the facts in this triple other than its being chilly, windy, and sunny. They are two: its being chilly, and its being sunny. The weak grounding claim is true, on the proposed characterization, if these two facts are together part of a strict ground for its being chilly, windy, and sunny. And they are, assuming that the conjunction is strictly grounded in its conjuncts.

Obviously, this proposal defines weak ground in terms of strict ground. It can be shown that there is a precise specification of the proposal which verifies the inference rules of PLG in a fragment of PLG whose inference rules can be stated using only the notion of strict ground. In that sense, this characterization verifies the principles of PLG. Moreover, this

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15 In the degenerate case in which the claim is that $\phi$ weakly grounds itself, this characterization is vacuously satisfied.
background logic is obviously simpler than PLG, and it can be shown that it is both sound and complete for Fine’s semantics. In this sense, a simple and smooth exposition of the pure logic of ground does not require a basic notion of weak ground.

References


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16 See [deRosset, manuscript] for the formal definitions, proofs, and discussion. It should be noted that Fine (personal correspondence) has indicated that the interpretation does not capture his intended notion.

17 Thanks to Kit Fine, Jon Erling Litland, Mark Moyer, and the editors for comments and discussion.