Grounding Logically Complex Facts
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Introduction

Some of the paradigmatic examples of grounding (that are often used to motivate, or help

us latch onto, the notion of grounding itself) are relations between logically complex facts and

the logically simpler facts that entail them. For example:

[The grass is green] grounds [Either the grass is green or the moon is made of cheese].
[The grass is green], [The sky is blue] ground [The grass is green and the sky is blue].
[The chair is orange] grounds [Something is orange].

Either implicitly or explicitly, these are usually (but not always) taken as instances of variations

of the following principles:

Conjunctive grounding ('CG'): If each of p, q is true, then [p], [q] together ground [p & q].

Disjunctive grounding ('DG'): If p is true, then [p] grounds [p v q].

Existential grounding ('EG'): If Fa is true, then [Fa] grounds [∃x Fx].

This entry surveys some things that have been said in favor of these principles (and about logical

grounding in general), and raises (but does not resolve) some questions about why we should

accept these principles, and, if we should, what it *means* to accept these principles.

I will also discuss the relationship between facts that are instances of universal

generalizations, and the universally quantified facts that they bear a similar relationship to.

Universal generalizations are at least superficially more complicated than other cases. But the

difficulty they pose might tell us something about how to think about other cases.

Before I get into the details, let me address some preliminaries.

First, there is not very much literature directly challenging these principles or purportedly paradigmatic examples. Wilson (2014, p. 549-50 & note 46) raises some of the issues I will discuss here, though it is not her central focus. Jansson (2017, §4) argues that we do not need to posit ground to account for the felt asymmetry present in logical cases. And Kovacs (2019) provides an account of metaphysical explanation (not ground) which resists the principles. Many have argued that these cases of *logical ground* involve a different kind of grounding than paradigmatically metaphysical cases of ground, such as: [Michaela's c-fibers are firing] grounds [Michaela is in pain]. *How* different these two kinds of cases are, though, is a matter of disagreement.

Koslicki (2015: 317) points out one difference between cases of logical ground and other cases: logical ground seems to allow for systematic *grounding overdetermination.* DG tells us that if p is true, [p] grounds [p v q]. If we read 'grounds' here as 'fully grounds' (which most authors seem to want us to), then in every case in which both disjuncts of a disjunction are true, there are multiple distinct full grounds for the disjunctive fact.

If we want to reject that ground allows for systematic overdetermination, it seems that we either need to weaken DG somehow, or deny that disjuncts ground their disjunctions at all. (There is actually a third option here: Poggiolesi (2016) gives an account of 'robust conditions' for grounding on which the falsity of a disjunct gets involved, along with the true disjunct, in grounding the disjunction.) But many don't think that systematic overdetermination is problematic. Another option (and Koslicki's point here) is not to take the systematic overdetermination as problematic, but rather to take it to indicate that there is a distinctive kind of dependence relation in logical cases, and it is perhaps not best lumped together with (e.g.) distinctively *metaphysical* grounding (for which overdetermination may be more problematic).

Correia suggests a tripartite distinction between metaphysical, conceptual, and logical grounding. Unlike Koslicki, Correia thinks that there are important relationships between his three different kinds of grounding: "It is indeed plausible to hold that every case of logical grounding is a case of conceptual grounding (but not vice versa), and that every case of conceptual grounding is a case of metaphysical grounding (but not vice versa)" (2014: 32). The discussion in §3 touches on whether this is the case.

I should note two choices I have made for ease of explication. First, I will use a predicational notion of grounding throughout. This is in part because some of the discussion is framed around Rosen (2010), so it is easiest to follow his notation. Second, I will, for the most part, only focus on the simplest cases of interaction between grounding and classical logic. This should not mislead readers into thinking that there are not hard questions about more complex cases, or about the relationship between choice of logic and grounding. Indeed, part of the point of this chapter is to suggest that these questions are very hard in even the simplest cases, and so are likely much harder in more complex cases.

§1 surveys a few places in the grounding literature in which these issues are discussed, and examines four defenses of the principles. §2 discusses particular challenges with grounding universally quantified facts, and discusses a related principle. §3 examines EG, and raises some problems for the (perhaps strawmanned, but still useful for the purposes of explication) claim that these principles are (a) theoretically harmless and (b) easy answers to questions of logical ground. I do not discuss problems with CG and DG, largely because there are no challenges to these principles in the literature (that I know of).[i] However, I suggest that there are likely similar challenges to these principles.

§1 Discussions of and motivations for CG, DG, and EG

While there is not a huge amount of discussion of the motivation for principles like CG, DG, and EG, there is a fair amount of work that attempts to lay out a formal logic of ground, e.g. Fine (2012), Correia (2014, 2015), Litland (2016, forthcoming), Poggiolesi (2016, 2018), Schnieder (2011), among others. (For discussion of the logic of ground, see Poggiolesi's entry in this handbook.) I want to emphasize that in some ways these logics of ground *themselves* might be taken to motivate certain principles, in that the principles follow from the logics. Poggiolesi (2016, 2018), for example, develops a definition of 'complete and immediate' formal (logical) grounding, and shows that certain principles follow from that definition. And some motivation is provided, in particular in (2016), for thinking this is the correct account of logical ground. But in most of the works listed above, such motivation is fairly minimal and relies on appeal to our intuitions. Further, when questions of e.g. logical complexity are raised, it is often simply assumed that in logical cases, the grounds must be less complex (or at least, cannot be more complex) than what is grounded.

Suppose that we had a plethora of well-developed logics of ground to choose from. In that case, the question I am asking in this section could be construed as 'on what philosophical grounds do we choose between these logics?'. While a logical framework might internally motivate a choice of principles, here I am looking for general philosophical motivation for adopting a given framework, principle, or set of principles.

That being said, there is a bridge between the question of choice of a framework and the question of what internally follows from a framework. The motivation for adopting CG, DG, and EG might come from them helping to give us a clean, simple, or theoretically fruitful theory of the logic of ground. That is, if we develop logics of ground that are themselves theoretically virtuous in various respects, that might help motivate the adoption of the particular principles

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that those theories put forth. The only place I know of in which an explicit defense that looks anything like this is given is in Schneider (2016: §3), which I discuss below.

Rosen (2010, §6) proposes all of CG, DG, and EG. More generally, he suggests that these are instances of the following principle:

ENTAILMENT: if [p] is grounded in [q], then q entails p.

(He also puts things this way: "The facts that ground [p] together ensure as a matter of metaphysical necessity that [p] obtains" (p. 118), which is closer to other formulations, e.g. Leuenberger (2014).)

This principle is sometimes also called *necessitation* in the grounding literature. One interesting thing to note here, though, is that it does not actually look like CG, DG, and EG are instances of ENTAILMENT. In the case of conjunction, for example, ENTAILMENT would only suggest the following principle:

CG*: If [p & q] is grounded in [p], [q], then [p & q] entails [p] and entails [q].

Granted, Rosen is not suggesting that ENTAILMENT is the *basis* for adopting CG, DG, and EG. Still, it is interesting that ENTAILMENT does not seem to motivate any of our principles. In §2, I'll suggest that there are reasons to reject ENTAILMENT. (Leuenberger (2014) and Skiles (2014) argue against it, but only one of Skiles' arguments are relevant to this chapter. For further discussion of ENTAILMENT, see Skiles' entry in this handbook.)

Fine employs versions of two of our three principles in motivating his "puzzles of ground". However, he uses the notion of "helping to ground" (partial ground). Fine says that "given the truth of a disjunct, that disjunct will help ground its disjunction" (2010: 100); and, "given that y exists and that Ay, then y's being an A helps ground that something is an A" (2010: 101). Correia (2014) produces 'rules of logical grounding' that look quite similar.

One interesting feature of almost all of the work discussing logical cases of grounding is that it is rare to find explicit *motivation* or *argument* for the claim that logical grounding works

in the way it does, and in the direction that it does. There are four notable exceptions. The first is to appeal to intuitions, and is advocated by Schnieder (2016, §2), and Correia (2014). Both Correia and (in a more developed argument) Schnieder appeal to the legitimacy of intuitions in determining the relevant principles about the logic of ground. And indeed, in some sense all of the canonical cases of ground seem to be motivated via intuitions—e.g. [that Socrates exists] grounds [that {Socrates} exists] seems to be motivated by an intuition that, despite the necessary coextension of Socrates and his singleton set, the concrete members of singleton sets are somehow *prior* to, or *more fundamental than,* their singleton sets. So, one might ask, why not appeal to intuitions in the logical cases? Especially given that there seems to be widespread agreement about these intuitions? Correia says of his logical grounding rules: "they all strike me as correct once a fine-grained conception of grounding is taken for granted… there would actually seem to be something like a consensus, among the friends of a fine-grained conception, that the basic rules plausibly record genuine grounding ties, and I guess that those who do share that view would be happy to say that the ties in question are properly logical in character." (2014: 37.) (For more on the coarse-grained vs. fine-grained conceptions of ground, see Correia's entry in this handbook.)

So intuitions are one way to motivate canonical cases of logical ground. I won't take a stand here about whether this is the right way to go, but one possibility is that this motivates canonical *cases* (e.g. [the ball is red] and [the ball is round] together ground [the ball is red and round]) without motivating perfectly general principles like the three principles discussed above. (One reason to think this might be the case is to compare this to, e.g., methodology in the moral realm. Very often applied ethics questions, or questions about thought experiments, are "settled" by intuitions; but it is less common for us to think that we can simply immediately intuit which normative theory is true, except by piece-mealing together our intuitions about individual cases.)

Or perhaps our intuitions are meant to be direct intuitions of the principles themselves. One question that arises from this issue is the following: even supposing we assume that principles like CG, DG, and EG are true, what is their status? Are they completely inviolable? Might they instead be general rules that admit of exceptions?

A second way to motivate the principles is discussed by Fine (2010: 105-106). Fine suggests that perhaps the reason these principles seem right to us is because of their relationship to truth conditions—but then points out that, given a deflationary reading of truth, there is no substance to truth conditions (where 'T' means 'it is true that', a statement of the truth conditions for conjunction, T(p & q) IFF (Tp & Tq), given deflationism about truth, says the same thing as (p & q) IFF (p & q). One way to recover the directionality that seems to have been lost here is to adopt the ground-theoretic principles. It's not that the truth of (p & q) somehow is grounded in the truth of p and the truth of q; if we adopt deflationism about truth, this would become a reflexive case of ground. Rather, it's that p and q ground p & q. I suspect, then, that Fine is trying to suggest that the principles are the best way to recover this feeling of directionality given deflationism about truth. This may, however, be a more spelled-out version of the first way of motivating the principles: what it seems to boil down to is that we have an intuition about the direction of dependence in either specific, or generic, cases of these kinds of logical relationships.

A third way to motivate the principles—and the most extensive positive argument for them—can be found in Schnieder (2016, §3). Schnieder's argument is as follows:

(P.1) The rejection of my inference rules leads to a situation where at least some truth-functionally complex statements are regarded as fundamental truths.
(P.2) (i) The view that a truth-functionally complex statement can be classed as a fundamental truth is, however, counter-intuitive;
(ii) The view is also theoretically unattractive, given the common principles of theory choice.
(C) Hence, there are two reasons (that are independent of… intuitions) for accepting my rules. (Schnieder (2016: 165).

While intuitions are invoked in P2, these intuitions are different than those we consult when we just ask whether particular logical principles of ground are true. What is crucial to Schnieder's argument is this: he suggests that (a) rejecting that there are any systematic grounding relations at stake when it comes to things like disjunctions, conjunctions, and existentially quantified claims results in us having to accept truth-functionally complex statements (such as disjunctions) as fundamental, and that (b) the only possible alternative principles to (his versions of) CG, DG, and EG are things like "an explanation of a true disjunction proceeds in terms of whatever explains its true disjunct(s)." (Schnieder 2016: 165).) (i.e. something like the reverse of DG: in our lingo, if p v q, p are both true, then [p v q] grounds [p].) In both cases, Schnieder argues, we end up with fundamental truths that are disjunctive, conjunctive, etc.

Schnieder's defense of P2 (ii) is worth mentioning: he argues that if we have to posit truth-functionally complex fundamental truths, we will end up with a bloated fundamental base. And this violates a principle of theory choice that tells us to favor theories with smaller fundamental bases. (This issue is related to, but not identical to, the question of whether parsimony only matters at the fundamental level. Schaffer (2015) argues that it does.) A different line of defense for P2 might be to argue that positing fundamental truth-functionally complex truths will end up violating some sort of neo-humean principle about the independence of and/or free recombinability of fundamental truths.

A final way to motivate the principles is to claim that (e.g.) it is *in the nature of,* or *in the essence of,* disjunction that true disjuncts ground their disjunctions. This is the strategy that Rosen (2010: §13) uses. One reason that this strategy might seem appealing is that it corresponds to the way entailment works: Fa entails ($\exists$x)Fx, and not vice-versa; Fa entails Fa v Gb, and not

vice-versa, and so on. A second reason that it is appealing is that it corresponds to the way that the *semantics* for disjunction, the existential quantifier, and conjunction work.

But there are problems for this approach. One immediate problem is that it is unclear what it is for a quantifier, or conjunction, or disjunction, to have an essence. I will focus only on conjunction and disjunction here (with the promise that quantifiers present even more difficult issues). I suspect that the following are roughly the most common views about what conjunction and disjunction are: (a) truth functions; and (b) this question is misguided; '&' and 'v' are *non-referential, syncategorematic* expressions; conjunction and disjunction aren't anything, or, at most, they are the *meanings* of these expressions. If (b) is true, then the only candidate entity that could have an essence is either the expression, '&', or the meaning (but not the referent!) of '&'. If it is the *expression* that has an essence, then it seems to me that we make a mistake if we claim that it is part of the essence of the expression '&' that [snow is white and grass is green] is grounded in [snow is white] and [grass is green]. For this grounding claim is about facts, not linguistic entities. If instead it is the *meaning* that has an essence, but '&' has no referent, then, at the least, more work needs to be done to spell out how this is supposed to work.

If (a) is true, many questions remain. If we think truth functions have essences, then it is probably reasonable to think that it is essential to conjunction that, for any p, q, if p and q are both true, then p & q is true. But this claim can't be a grounding claim, nor, by itself, is it enough to somehow generate a grounding claim; notice that it should also be essential to conjunction that, for any p & q that is true, then p is true and q is true. But to my knowledge, no one thinks that when p, q are true: [p & q] grounds [p] and [p & q] grounds [q]. The person who thinks that it is essential to a truth function hence needs to either explain why it is *not* essential to conjunction that, for any p & q that is true, then p is true and q is true, *or* they need to explain why the grounding facts here are asymmetrical while the essence facts are symmetrical.

One option here is to claim that it is something about our commitment to compositionality that explains why the essence claim only goes in one direction (and hence why the grounding claim only goes in one direction): because we think of our semantics for conjunction as working by assuming that the conjuncts have truth values and spitting out a truth value for their conjunction, we think of this function as moving from conjuncts to conjunction. But note that this kind of justification seems to be committed to the idea that functions are somehow "productive" or "determining": they, by their nature, take their inputs and *produce* a new entity, claim, truth value, etc. as an output. This is a highly contentious view of functions. More generally: if functions have these kinds of directional essences—if it is essential to them that their inputs somehow ground their outputs—then it seems to me that we need an account of either what is special about a truth function, or of what a function is, generally speaking, that makes sense of this, given that standard accounts of functions as, e.g. sets or classes of ordered pairs will not get us directional essences.

Further, notice that the proponent of predicational grounding (rather than operational grounding—see the introduction of this handbook for a discussion of this distinction) might have some additional work to do here. Some predicational grounders (e.g. Rosen) take facts to be (something like) true Russellian propositions. If propositions are the relata of truth functions, then the fact grounder does not have to do additional work. But if facts are something else—e.g. obtaining Armstrongian states of affairs, that is, individuals actually instantiating properties-- then it is mysterious why the essence of a truth function would produce a principle of grounding between facts, unless the truth function is literally a part of the obtaining state of affairs. (But this would seem to be confused, since states of affairs are not the kinds of things which truth functions take as inputs and outputs—states of affairs are not true or false.)

§2 Universal Quantification and ENTAILMENT

Is there a principle like CG, DG, and EG for universally quantified facts? Rosen doesn't think so. Fine, on the other hand, appeals to a fairly weak principle about the universal quantifier: "Given that everything is an A and that y exists, then y's being an A helps ground that everything is an A" (Fine 2010: 100). Should we accept Fine's principle? Universally quantified facts pose a challenge to both the "essence" and the "intuition" approaches to motivating a principle, for the universal quantifier, that would correspond to CG, DG, and EG. This is, at least in part, because of the interaction between universally quantified facts and laws.

Rosen argues that there are three kinds of cases of ground between universally quantified facts and their instances. First, universally quantified facts may be grounded in non-quantified facts about *essences;* to use Rosen's example, [it lies in the nature of triangles that for all x, if x is a triangle then x has three sides] grounds [∀x: if x is a triangle, x has three sides]. (2010: 119.) Second, universally quantified facts may be grounded in strong laws of nature. Again to use Rosen's example: that "[any two bodies attract one another with a force inversely proportional to their square distance and proportional to their masses]" is grounded in [it is a law of nature that all bodies act in this way]. (2010: 119-120.) (Some philosophers—humeans about laws of nature—should reject this.)

And finally, when a universally quantified fact is an accidental generalization—i.e. when there is no reason that the fact must obtain, but it just happens that it has no counter-instances, Rosen claims that it is grounded in its instances together with a *totality fact.* What this means is best seen by example. Suppose it is an accidental generalization that all of the five people in this room were born in May. This is grounded by (a) the facts about each individual, e.g. [Michaela was born in May]; and (b) the fact that the exhaustive list of people in the room are *all* the people

in the room; there are no other people in the room. (b) is a (restricted) totality fact. (Rosen 2010: 120-121.)

It is important to note about this last claim that if we deny ENTAILMENT, we don't need to supplement the instances of the universally quantified claim with a totality fact. This is not on its own a reason to deny ENTAILMENT, but doing so might be motivated in two different ways. First, if one was generally squeamish about ungrounded, basic, universally quantified facts, one might want to deny ENTAILMENT rather than admit that we needed an ungrounded, basic, universally quantified fact. (Rosen claims that the totality fact is the only such fact one is left with, if one adopts his disjunctive story about grounding universals).

Second, one might want to deny ENTAILMENT if one had a particular conception of what grounding is: one that adopts as a rough metaphor the idea that the fundamental facts are "what god would have to fix" in order for everything else to be "gotten for free". Skiles (2014: §4.1) argues, partly based on this kind of conception of ground, that the totality fact does not enter into the grounds of accidental generalizations. I won't examine the details of his proposal, but it is easy to see its intuitive motivation. (God didn't have to lay down a totality fact in addition to everything else she did to make accidental generalizations true.) (For more discussion of questions of entailment/necessitation, see Skiles' entry in this handbook.)

There is an additional issue with ENTAILMENT in the context of cases of logical ground. Metaphysical necessitation is not the same thing as logical entailment, and indeed there is no obvious relationship between the two. I won't explore this issue further here, but in §3, I will show that there is reason to think that *if* CG, DG, and EG are true principles, they are principles about our concepts (of conjunction, disjunction, and the existential quantifier) and not about mind-and-language-independent reality. If this is true, and if there is an important relationship between CG, DG, and EG, then it might be that the kind of logical entailment that CG, DG, and

EG seem to be based on is unrelated to metaphysical necessitation, which seems to be mind-and-language independent.[ii]

Even if Rosen is not right about the details, it seems that universally quantified facts don't elicit the same strong intuitions about there being a single principle of ground that relates these facts and their instances. Why are universally quantified facts so different in this respect? One possibility is that they aren't—that, instead, we should take the diversity of ways that universally quantified facts can be grounded (or at least, the general sense that there is no obvious consistent grounding relationship at play when it comes to universally quantified facts) to be indicative that there should be more disagreement and diversity at play when it comes to grounding other logically complex facts.

§3 Challenges to EG

In this section, I describe two challenges that arise for EG. (One could produce related challenges to CG and DG, but I do not discuss them here.) The two challenges come from Sider (2011) and Dasgupta (2009), though neither would describe their arguments as providing a challenge to EG, for two different reasons: Sider rejects the relevant notion of grounding, and Dasgupta seems to think that it's at least possible that EG holds, but that this is a reason to theorize about the world without either conjunction or the existential quantifier.

Sider argues that the fundamental facts are best expressed by quantified sentences, and argues against the opposing 'Tractarian' view, on which fundamental facts are individualistic rather than general (2011: ch. 9.13). Though they would disagree with the details here, the arguments in Sider (and Dasgupta, who I'll discuss in a moment) can be construed as arguments in favor of a metaphysical picture of the world on which true sentences like $(\exists x)Fx$ (or facts like $[(\exists x)Fx]$ are more fundamental than true sentences like Fa (or facts like $[Fa]$), not vice-versa.

I won't go into the details of Sider's argument here. But the general strategy is this: Sider is trying to describe reality in the most "joint-carving" terms possible. And, he argues that the existential quantifier is indispensable to doing so. I'll just mention two ingredients in this argument. First, given that Sider sees the metaphysical project as importantly related to, and informed by, the projects of physicists and mathematicians, one part of this argument is to point out that "no serious work on the foundations of physics and mathematics has been done in a quantifier-free setting". (2011: 184). (For further discussion of the relationship between "joint-carving" terms and fundamentality/grounding, see Tahko's entry in this handbook.)

Second, Sider is suspicious of intuitions about "distinctively metaphysical production or causation" except when they can be rephrased as being about *explanation.* He thinks that the Tractarian intuition just *is* the intuition that "the general fact that $\exists xFx$ holds *because* of the individualistic fact that *Fa"* (2011: 204-205). And he argues that if we attempt to re-phrase this claim as being about explanation, it does not hold up—a theory of the world that involves individual names, and no quantifiers, is not more explanatory than a theory of the world that involves quantifiers. We can now see how this relates to the first point: if no scientific theories fail to use quantifiers, and none of them are Tractarian in nature, then this might in part be because a scientific theory that failed to use quantifiers would be less explanatory than one that used them.

I should note here that Fine (2010) provides a weakened version of EG that perhaps seems to avoid Sider's concern here, if the concern is genuinely one about whether individual names appear in our fundamental theory. This weakened principle says that $\exists xAx$ implies that $\exists y$ (Ay helps ground $\exists xAx$) (p. 108). (Roughly, the difference between this weakened principle and EG is that the weakened principle just says that any existential truth is grounded by *an* instance, whereas EG says that any true instance of an existential helps ground the existential truth.) I

think that there is no way, even if he wanted to do things in terms of ground, that Sider could adopt such a principle given his framework, but it is worth thinking through what work Fine's weakened principle could do generally here.

Sider, I suspect, would reject that there is grounding in either direction between existential facts and their instances. So he would be suspicious of EG (and weakened EG) for independent reasons. However, it is easy to see how his arguments could supply a grounding theorist with the tools to resist EG, even if they wanted to maintain that there was grounding between an existential fact and its instances. My sense is that we already have reason to worry about the status of EG.

The second argument I want to examine is built out of ingredients from Dasgupta (2009). Dasgupta's thesis, 'generalism', is that what is fundamental is a single, holistic, perfectly general fact. There are no fundamental individuals. We needn't explore Dasgupta's argument for this thesis here. What is important for our purposes is how we should understand what grounding claims will hold if this thesis is true. Dasgupta suggests that the right way to understand his view is to adopt a "predicate functorese" language, *G,* that involves very little overlap with standard first order logic. However, before he does this, he explores the idea that we might instead express/understand the view by adopting a first order logic with identity, but with no individual constants. Call this, following Dasgupta, *PL.*

One reason that Dasgupta rejects the idea that *PL* should be used to express his view is that "we have been brought up to understand that quantifiers range over a domain of individuals. So our natural understanding of the facts listed above is that they hold in virtue of facts about individuals." (2009, p. 50.) So facts like $[(\exists x)Fx]$, $[(\exists x)(\exists y)Rxy]$, and so on, are understood to be grounded in facts like [Fa] and [Rab].

Note that it is still open to the generalist to use (at least the syntax of) *PL* to express her view. She simply would need to deny that facts like [(∃x)Fx], [(∃x)(∃y)Rxy], and so on, are grounded in facts like [Fa] and [Rab]. She can claim that our ordinary understanding of how the existential quantifier works is in tension with this, but that our ordinary understanding of how the existential quantifier works is wrong.

When are we licensed to argue that we are wrong about our ordinary understanding of either the meaning of a word, or a concept? One answer is: whenever that concept is supposed to correspond to something out there in the mind-and-language-independent world, or whenever that concept is supposed to *carve nature at its joints* (that is, while not corresponding to a worldly entity, still being required to explain the objective structure of reality). (There are other answers: for example, we might follow philosophers like Haslanger (e.g. forthcoming) in thinking that conceptual choice and negotiation matters, even when (perhaps even more than when) none of the candidate concepts is taken to carve nature at its joints—for example, when those concepts are politically and socially important, e.g. *woman*). For discussion of related issues, see the Passinsky's entry in this handbook.)

So, if the generalist thinks that logical concepts are like this—that it is not just ordinary use that determines how we should use these concepts, and which concepts we should adopt, but that instead, these concepts reflect something important about the mind-and-language-independent world—then she might adopt *PL* and insist on a revisionary understanding of the existential quantifier. After all, she is trying to express what are supposed to be mind-and-language-independent, objective facts about fundamental reality, and perhaps about how non-fundamental reality depends upon fundamental reality. Her logical terms should be bound by those facts, and not by our practices.

Now return to what Rosen claims: that it is essential to the existential quantifier that EG holds. Suppose this is true. Then, the generalist could not re-define the quantifier. Instead, if she wanted to use *PL*, she would have to replace the quantifier with a new one, call it ∃*. EG* would not be true of this quantifier (indeed, if there are individualistic facts, according to Dasgupta, they are grounded by the general facts—so something like the inverse of EG* might be essential to ∃*).

If this is right, what does it tell us about the status of EG? I think it tells us that EG gives us no insight whatsoever into what *mind-and-language-independent* reality is like. It tells us that, in order to state metaphysical views that conflict with EG, we cannot use the existential quantifier. So, if EG is essential to the existential quantifier, then EG is uninteresting from a metaphysical perspective: it has to do with how our ordinary concept of existential quantification works, but nothing to do with what reality is like. Perhaps EG is a principle that is best understood as solely belonging in a *representational* rather than a *worldly* grounding framework.

What I take this to show is that there are questions about fundamental reality to which the truth of EG is irrelevant: is reality fundamentally individualistic? Is it fundamentally general? Does (some kind of) quantification "carve at (its) joints"?

But there also may well be questions of *ground* that EG (and, I suspect, CG and DG) obscure, even if they are true (but regard conceptual or representational matters). To see this, consider the following: suppose it is a fact that p. It follows that [~~p] and [p v q]. Now focus on a *worldly* understanding of these facts: facts are something like obtaining Armstrongian states of affairs. According to such an understanding of facts, are [snow is white], [~~snow is white], and [snow is white v Shaquille O'Neil is a ballet dancer] all distinct? Perhaps. But perhaps what is contained between each pair of square brackets is simply a *representationally* different way of picking out the same worldly fact. You might think that they are obviously distinct, given that

the sentences in the square brackets all have different truth conditions. In a possible world in which Shaq is a ballet dancer, and snow is grey, one of these things will obtain, and the others won't. But this is to think about the question in the wrong way. If facts are just actually obtaining states of affairs, then what appears in between the square brackets is simply a name for an actually obtaining state of affairs. Perhaps all of these sentences name a single actually obtaining state of affairs, despite *meaning* different things qua sentences, and having different truth conditions qua sentences. This may be a reason to prefer operational accounts of ground; but it may simply be a reason to be careful about what, exactly, we are talking about when we talk about the relata of ground.

If [snow is white], [~~snow is white], and [either snow is white or Shaq is a ballet dancer] are not identical, and they are worldly states of affairs, then there are important grounding questions that we must ask about them. And these grounding questions may well come apart from questions of whether it follows from our concept of (e.g.) disjunction that true disjuncts ground their disjunctions.

The main upshot I take from this section is that EG (and, I think, CG and DG, though I have not discussed them in detail here) should be part of a broader conversation about the status of logical constants, logical entailment, and their relationship to metaphysics. This conversation is alive and well (see e.g. Tahko (2009, ms), the papers in Rush (2014), McSweeney (2017), (2019)), and would also be well-served by more interaction with the grounding literature.[iii]

Related Topics
Logic and Structure, Puzzles of Ground, Necessity, Structure, Laws, Varieties, Realism, Bolzano, Skeptical Doubts.

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[i] While I do not know of any challenges to DG in the *grounding* literature, Michael Raven has pointed out to me that there may be an important connection here to the (an?) Aristotelian view about future contingents that accepts LEM but denies bivalence ('there will or won't be a sea battle' is true because it is such an instance, but neither of its disjuncts is true). If this is right, then this is a case where disjuncts (or the truth of disjuncts) can't possibly ground a disjunction (or the truth of the disjunct). This kind of view is often attributed to Aristotle (*De Interpretatione* 9), but a related view that perhaps most closely approaches denying DG is also developed in Thomason (1970).

Additionally, while I've tried to focus on principles that are restricted to classical logic, an obvious connection here is to discussion of quantum logic, which can be interpreted in such a way as to get a similar result. (See Putnam 1965, 1994, 2005, Hughes 1980.)

[ii] Two related questions, that I won't discuss here but is important to thinking through logical questions of ground, are whether grounding is *internal* (see e.g. Litland 2015), and whether grounding is *superinternal* (see e.g. Bennett (2011), deRosset (2013), Dasgupta (2014), Clark (2018).)

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