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Where Are You Going, Metaphysics, and How Are You Getting There? – Grounding Theory as a Case Study

The viability of metaphysics as a field of knowledge has been challenged time and again. Some have challenged “traditional” metaphysics, or what was considered to be “traditional metaphysics” at the time; others have challenged metaphysics in general. Kant falls under the former category, Carnap under the latter. Kant likened Plato’s metaphysics to a “light dove” who, “cleaving the air in her free flight, and feeling its resistance, might imagine that her¹ flight would be still easier in empty space”. “Plato”, Kant continues, “ventured out beyond [the world of the senses] on the wings of the ideas, in the empty space of the pure understanding. He did not observe that with all his efforts he made no advance – meeting no resistance that might, as it were, serve as a support upon which he could take a stand, to which he could apply his powers, and so set his understanding in motion.” (Kant (1781/87), A5/B8-9). Carnap rejected metaphysics altogether: “the so-called statements of metaphysics are *meaningless*”; “metaphysics in its entirety consists of ... pseudo-statements” (Carnap (1932), p. 61).

In spite of the continuing tendency to dismiss metaphysics, there has been considerable progress in this field in the 20th- and 21st-centuries. Both continental and analytic philosophers contributed to this progress, the latter including Prior, Barcan Marcus, Kripke, Lewis, Plantinga, Armstrong, van Inwagen, Stalnaker, Williamson, and others. One of the newest – though, in a sense, also oldest – frontiers of metaphysics is the *grounding* project. Traced back to Aristotle, the grounding project has been recently renewed by Fine (2001, 2012a,b), Rosen (2010), Schaffer (2009), Sider (2011), and others.

In this paper I will raise a methodological challenge to grounding theory – the theory (or theories) developed in pursuit of the new grounding project – and propose a constructive solution. Both the challenge and its solution apply to metaphysics in general, but grounding theory puts the challenge in an especially sharp

¹ I follow Kant’s original text by using “her” (“ihr”) for the dove in this place, where Kemp Smith uses “its”, although in the first part of the sentence he uses “her”. Guyer and Wood use “it” in both places. Kant’s original formulation of the sentence is: “Die lechte Taube, indem sie im freien Fluge die Luft teilt, deren Widerstand sie fühlt, könnte die Vorstellung fassen, daß es ihr im luftleeren Raum noch viel besser gelingen werde.”

focus.

1 The grounding project/theory²

The *grounding project* is a metaphysical project that seeks to provide an explanatory account of reality in terms of what is grounded in, or depends on, what. This project is often combined with the *fundamentality* project, which endeavors to ground reality in a layer of fundamental elements. In this paper I mean by “the grounding project/theory” the grounding-and-fundamentality project/theory.³ The grounding project is a vibrant theoretical project, going against the current deflationist, quietist, and philosophy-made-easy trends. It is a “substantivist” project, in the intuitive, common-sense meaning of the word.⁴

The origins of the grounding project, as we have noted above, go back to Aristotle, and in particular to his conception of metaphysics as providing an explanatory description of reality based on the idea of ontological priority. Thus, in introducing his work on grounding, Schaffer says:

I will argue for the revival of a ... traditional Aristotelian view, on which metaphysics is about what grounds what. (Schaffer (2009), p. 347)

And describing what Aristotle’s view amounts to, he says:

[O]n Aristotle’s view, metaphysics is the discipline that studies substances and their modes and kinds, by studying the fundamental entities and what depends on them. (*Ibid.*, p. 351)⁵

While the different practitioners of the grounding project differ on various points, several characteristics emerge as central to this project, as it is currently pursued. Four of these are:⁶

² In speaking about contemporary works on metaphysical grounding I will alternate between “theory” and “project”, depending on which perspective on this work I wish to emphasize.

³ One grounding theorist who does not require fundamental elements is Rosen (2010). Since much of what he says, however, falls under my category of grounding theory/project, I will include his work in this category.

⁴ Compare with the substantivist approach to truth (e.g., Sher (1998, 2004, 2016b)).

⁵ Fine (2012b), p. 8, fn. 1) also indicates that his “conception of metaphysics is broadly Aristotelian in character”.

⁶ Note: These characteristics hold regardless of whether we identify the units of grounding and fundamentality as facts, propositions, truths, entities (objects), etc. Since my own concerns in the present paper are also independent of this question, I will put it aside here.

1. *The ideas of dependence and fundamentality are central to grounding.* The idea of substantive dependence is the idea of what depends on what. It is the main idea underlying the typical vocabulary of grounding: “in virtue of”, “because”, “explains why”, “is due to the fact that”, and so on. The idea of fundamentality is the idea of what is basic, namely, what the ultimate elements of the dependence relation are.

Ground theorists emphasize the centrality of dependence and fundamentality both to grounding theory and to metaphysics more generally. Thus, the title of Rosen’s paper on grounding is “Metaphysical Dependence: Grounding and Reduction” (Rosen (2010), p. 109). And a subsection in Schaffer’s article on grounding is titled “*Ordering: The Importance of Dependence Structure*” (Schaffer (2009), p. 362). Schaffer sums up his paper by saying:

[M]etaphysics as I understand it is about what grounds what. It is about the structure of the world. It is about what is fundamental, and what derives from it. (*Ibid.*, p. 379)

And Sider says:

Metaphysics, at bottom, is about the fundamental structure of reality. ... the ultimate goal is insight into ... what the world is like, at the most fundamental level. (Sider (2011), p. 1)

2. *Grounding is strongly hierarchical.* The grounding relation, *X grounds Y*, is strongly hierarchical. In this paper, I will understand by a “strongly hierarchical grounding relation” a partially-ordered grounding relation – anti-reflexive, anti-symmetric, and transitive – with minimal (“fundamental”) elements, where each non-minimal element is grounded in minimal element(s) in a finite number of steps. I will call such a relation as “strictly-ordered” ~~and~~ “strictly hierarchical” relation.

Although grounding theorists differ in the extent to which they offer a detailed description of the formal structure of the grounding relation as well as the specific features they attribute to it, they all view it as strongly hierarchical:

[T]he attempt to determine what grounds what naturally proceeds in stages – one first determines the relatively immediate grounds for the truths in question, then the relatively immediate grounds of those grounds, and so on until one reaches the ultimate grounds. (Fine (2012a), p. 44)

[T]he relation [of ground is] irreflexive and anti-symmetric. (*Ibid.*, p. 45)

[The contemporary philosopher of grounding] will begin from *a hierarchical view of reality ordered by priority in nature*. The primary entities form the sparse structure of being, while the grounding relations generate an abundant superstructure of posterior entities. (Schaffer

(2009), p. 351)

Grounding is ... irreflexive, asymmetric, and transitive. It thus induces a partial ordering over the entities (*the great chain of being*) Formally this may be modeled by a directed acyclic graph, for which every path has a starting point. (*Ibid.*, p. 376)

[T]he fundamental facts underwrite or give rise to all other facts. (Sider (2011), p. 105)

And Rosen says that “the binary part of the grounding relation is asymmetric and hence irreflexive”. He then characterizes these features as “[s]trong asymmetry” and “[s]trong irreflexivity”. He also assumes “transitivity in a strong form”. He indicates that “the [grounding] relation is presumably not connected”, so we have only a “partial order” (Rosen (2010), pp. 115–116). In one of his examples – that of a naturalistic grounding – he identifies the grounding relation with a (mathematical) tree: “every fact tops a naturalistic tree” (*Ibid.*, p. 112).

In an encyclopedia article on metaphysical grounding, Bliss and Trogon describe the grounding relation as “*well-founded*” (Bliss and Trogon (2014), p. 10).

3. *Grounding is objective.* What grounds what and what is basic or fundamental are objective matters, not just in the sense of being intersubjective, but also, and most importantly, in the sense of being *factual*, that is, being features of the world (reality) itself. Fine speaks about ground as a relation between *worldly entities* such as *facts* (Fine (2012a)), and he emphasizes the connection between grounding and realism (Fine (2001)). Rosen (2010), too, regards the grounding relation as a worldly relation among facts. Sider (2011) titles his book on grounding “Writing the Book of the World” and continuously emphasizes his interest in the *objective structure of the world*. There is a “fundamental structure of reality” (*Ibid.*, p. 1), Sider says, and the grounding or fundamentality project is that of uncovering this structure. Schaffer, too, as a neo-Aristotelian, talks of grounding in terms of substances, objects, entities, existence, and world: “metaphysics as I understand it is about what grounds what. It is about the structure of the world” (Schaffer (2009), p. 379).

Another aspect of the objectivity of grounding is veridicality or truth. The grounding project, as I understand it, is subject to a robust veridicality requirement. Grounding theory is required to provide a *true* description of what grounds what, where “true” is understood in a strong sense, closer to correspondence than to coherence or pragmatic truth.

4. *Grounding theory is highly explanatory.* The task of grounding theory is to provide a substantial and highly explanatory account of reality in terms of

grounding. This point is salient for all the grounding theorists we are considering:

We take *ground* to be an explanatory relation: if the truth that *P* is grounded in other truths, then they for its truth. (Fine (2001), p. 15)

[T]he relationship of ground is a form of explanation; in providing the ground for a given proposition, one is explaining, in the most metaphysically satisfying manner, what it is that makes it true. (*Ibid.*, p. 22)

[Ground is] a distinctive kind of metaphysical explanation, in which explanans and explanandum are connected ... through some constitutive form of determination. (Fine (2012a), p. 37)

[T]he grounding relation is an explanatory relation – to specify the grounds for [*p*] is to say why [*p*] obtains. (Rosen (2010), p. 117)⁷

Schaffer (2009) contrasts his Aristotelian conception of ontology with Quine's conception which limits ontology to a mere "list" of "beings" (*ibid.*, p. 348). And Sider (2011) views his entire metaphysical project (with its notions of *structure*, *carving at the joints*, *fundamentality*, and *grounding*) as substantive and explanatory:

[The book] show[s] how structure illuminates explanation, ..., substantivity, (*Ibid.*, p. ix)

Good ... theories ... must be cast in joint-carving terms. We may put this in terms of explanation: "theories" based on ... non-joint-carving classifications are unexplanatory. (*Ibid.*, p. 23)⁸

Fineans and I can give satisfying ultimate explanations. For we accept structured and plentiful fundamental truths, and can tell detailed stories about how they ground (Fine) or are metaphysically truth-conditions for ([Sider]) various nonfundamental truths. (*Ibid.*, p. 161)

⁷ Here "[*p*]" stands for "the fact that *p*".

⁸ This citation is explicitly about good scientific theories. But it is quite clear that it holds for all theories, including metaphysical theories, according to Sider.

2 The grounding project and the foundationalist project

Although the grounding project is a metaphysical, largely descriptive project whereas the foundationalist project is an epistemic, largely justificatory project, it is hard not to see significant similarities between the two.⁹

The foundationalist project is a well-known epistemic project, so there is no need to describe it here in detail. A classical example of this project is Descartes's *cogito* project. A later example is Frege's and Russell's logicist project, and more recently, we may view some forms of naturalism (see example below) as foundationalist in character.

Briefly, the foundationalist project is a theoretical philosophical project that seeks to construct an objective and highly explanatory foundation for human knowledge. Human knowledge, here, includes the totality of our theories of the world (various facets of the world), or, on a more mundane level, our claims about the world.¹⁰

The foundationalist project shares the four distinctive characteristics of the grounding project described above: the centrality of *dependence*, the requirement of a *strongly hierarchical structure*, the demand of *objectivity*, and the commitment to a *highly explanatory* account. These features can, in principle, characterize both descriptive and justificatory projects, both metaphysical and epistemic projects. And they do characterize both the grounding and the foundationalist projects. We have seen how they characterize the grounding project. Their characterization of the foundationalist project is straightforward:

1. The relation *X founds Y* is a dependence relation: If *X* founds *Y*, then *Y* (or *Y* having the status of knowledge, or the justification of *Y*) depends on *X*.
2. This relation is also an objective relation: If *X* founds *Y*, then *X* is real or objective and it objectively founds/justifies *Y*.
3. The founding relation is (or is required to be) strictly hierarchical as well: The relation *X founds Y* is a strong partial-ordering. It is anti-reflexive, anti-symmetric, and transitive. It has minimal (basic, foundational) elements, and

⁹ A similar point is made by Thompson (2014).

¹⁰ (i) The understanding of "world" may vary from one foundationalist to another, and such variations have significant consequences for the proposed foundations, but for the most part, the general principles remain the same.

(ii) For accounts of foundationalism that are similar in spirit to the one given below, see, e.g., Sosa (1980a,b).

each non-minimal element is connected by finite chains to the minimal elements that form its ultimate foundation.

4. Finally, the founding relation is required to be highly-explanatory: If X founds Y , then X , along with its (founding) relation to Y , explain how Y is justified (or why Y is a genuine item of knowledge).

The foundationalist project has other characteristic features as well. For example, it requires absolute certainty of the founding of knowledge. But since this feature is not shared by the grounding project, it is of lesser interest for us here. One result of the strict-hierarchy requirement of the foundationalist project is that it bans all forms of circularity and infinite regress.

We see that, their differences notwithstanding, the foundationalist and grounding projects are similar in several significant respects. In particular, they both share the four characteristics noted above: both projects aim at being, and claim to be, objective and highly explanatory, and their central relations, X grounds Y and X founds Y , are both strongly hierarchical dependence relations. Occasionally, the grounding and foundation relations extensionally coincide. An example of a metaphysical grounding-chain (due to Fine (2012a), p. 44) that is also an example of a foundationalist (epistemic) grounding-chain is:

The Normative is grounded in the Natural;
 The Natural is grounded in the (Macro-) Physical;
 The (Macro-) Physical is grounded in the Micro-physical.

The foundationalist project, however, is fraught with difficulties, and today many epistemologists regard this project as flawed beyond repair. Here I will focus on one of its serious problems, which has to do with its shared characteristics with the grounding project.

The foundationalist project requires that the founding or justification relation be strictly hierarchical. But if the justification relation is strictly hierarchical, then the main burden of justification falls on the minimal elements of this relation, namely, on the *founding* elements of the foundationalist hierarchy. If the minimal (founding) elements lack appropriate justification (foundation), then our entire body of knowledge lacks justification (foundation). What is an appropriate justification? Two central requirements on an appropriate justification are, as we have seen above, objectivity and explanatory power. So the main burden of an objective, explanatory justification (foundation) falls on the minimal, foundational elements. But where could the minimal elements get their objective, explanatory justification from? There are no elements lower than the minimal elements in the foundationalist hierarchy, hence there are no elements that could provide, or could produce resources for providing, an objective, explanatory justification

of the fundamental elements.

Foundationalists may say that foundational elements do not require an objective, explanatory foundation or justification. Explanation and justification must stop somewhere; it is impossible to either objectively justify or give an explanatory account of everything, and foundationalism is not to be blamed for not doing the impossible. But this claim is problematic in several respects. For one thing, the question is not whether the foundationalist project can objectively and explanatorily justify everything, but whether it can establish and explain something very specific, namely the foundational elements that play an active role in founding the rest of our knowledge. Not all elements are alike. Failure to give an objective, explanatory justification of an isolated unit of knowledge will not undermine the entire foundationalist project, but failure to justify foundational elements that are supposed to found, directly or indirectly, many nonfoundational elements, will. A system of knowledge grounded in unfounded elements is like a building having a “foundation” of sand. It is important to note that this problem is independent of the absolute certainty requirement of the foundationalist project. Even if we do not require that the foundational elements be founded in a perfect, complete, once-and-for-all way, with no possibility of error, the problem remains. It remains even if all we require is significant progress toward an establishing and explaining the foundational elements.

Furthermore, just because it is impossible to do *Y* does not mean that a project *X* cannot be criticized based on its inability to do *Y*. If *X* *requires* something that is in principle undoable, this is a reason to question *X*, not to excuse it. It is a sign that something is wrong with *X*. If the viability of the foundationalist project requires that the foundational elements be objectively and explanatorily justified, then if, in principle, this requirement cannot be satisfied, this casts doubt on the foundationalist project. A project that, to be viable, must do the impossible, is not viable.

The foundationalist may concede these points but say that the justification of foundational units of knowledge is inherently different from that of the other elements: they are, in principle, justified without using any other units of knowledge. They are self-justifying, or else they are justified without resort to any knowledge whatsoever. Self-justification violates one central principle of foundationalism: its ban on circularity. The logical prototype of a self-justifying item of knowledge is: “ Φ ; therefore Φ ”. While such justification is objective in the sense that it is factually (or, indeed, logically) valid, it fails both to establish the objectivity of Φ and to explain its ability to found other items of knowledge. As far as the validity of “ Φ ; therefore Φ ” is concerned, Φ might be a figment of our imagination and its ability to justify other units of knowledge might be null.

Four contenders for a “self-standing” justification, i.e., justification that does

not appeal to any unit of knowledge, are: pure sensory perception, intuition (either everyday intuition or rational intuition), common-sense obviousness, and conventionality. But all four are highly problematic both with respect to their objectivity and with respect to their explanatory power. The epistemic credentials of pure sensory perception were criticized by, e.g., Sellars (1956), under the heading “the myth of the given”. The epistemic credentials of intuition were questioned by e.g., Benacerraf (1973), Harman (1977), and Cummins (1998). Those of common-sense obviousness were criticized by, e.g., Sher (1999). And Quine (1935, 1954) sharply criticized conventionality as trivializing the very idea of knowledge. For additional criticisms of all these contenders, see Sher (2016a), Chapters 2 and 9.

To give the flavor of some of these criticisms, take common-sense obviousness as an example. A few (not necessarily disjoint) criticisms of common-sense obviousness as a source of foundational knowledge are: (a) Our sense of obviousness is often utterly unreliable. (Think of what was considered obvious prior to the revolutionary discoveries of modern science and mathematics.) (b) It is not clear in what way common-sense obviousness is said to justify the foundational elements of knowledge. If the claim is that all obvious elements are foundational (minimal), it is false. If it is that all foundational elements are obvious, it requires objective justification and explanation. (c) The foundationalist project is a theoretical rather than a phenomenological or a psychological project; hence the justification of the foundational elements has to be theoretical. A justification based on common-sense obviousness, however, does not satisfy this requirement. It is impressionistic or psychological, but not theoretical. (d) Obviousness is an exceedingly weak, unobjective, and unexplanatory standard of fundamentality. In short, common-sense obviousness cannot do any of the things that an objective and explanatory theoretical foundation must do.

In light of the similarities between the grounding project and the foundationalist project, the question arises whether the former suffers from some of the problems that undermined the latter. These similarities, as we have seen above, center on four central characteristics of the grounding project – *centrality of dependence, objectivity, explanatory power, and strict hierarchy* – and the question is whether the strictly hierarchical structure of the grounding project subverts its goal of a highly-explanatory, objective account of reality in terms of dependence. Unfortunately, the answer to this question appears to be positive. If the grounding-account of reality is strictly hierarchical, then the main burden of its objectivity and explanatory power falls on the minimal, fundamental elements. If the fundamental elements are deprived of objectivity and resist explanation, then the entire grounding falls short of objectivity and explanation. Suppose the fundamental elements are arbitrary, suppose they are figments of our imagination, suppose they are irrevocably mysterious, or their ability to ground other elements is mag-

ical. In all these cases the grounding of higher elements will ultimately lack both objectivity and explanatory power. Suppose X is grounded in a fundamental element Z through an intermediate element Y . Without establishing the objectivity of Z , without understanding what Z is (what its features, laws, and/or principles or regularities are), without establishing that Z in fact grounds Y , and without explaining how it grounds Y , the grounding of X has very little objectivity and explanatory power.¹¹

How could grounding theorists handle this problem? Responses analogous to those attempted by foundationalists – saying that we have no choice but to leave some elements unestablished/unexplained, appealing to common-sense obviousness, sensory perception, intuition, or conventionality – will not do here too, and for similar reasons to those given in the case of foundationalism. (Although here the crux of the matter is theoretical description rather than theoretical justification, the requirements of objectivity and explanatory power will be violated here too.)

In the next section I will propose an adjustment to the grounding project that will solve the problem without undermining the project itself.¹² This solution is analogous to one I recently proposed in response to the above-mentioned problems with the foundationalist project. In the case of grounding, however, the adjustment can preserve more features of the original project than in the case of the foundationalist project.

3 Holistic grounding

My solution to the problem facing grounding theory is methodological. I will propose a new methodology, *holistic grounding*, that makes an objective and highly explanatory account of the fundamental elements possible. Holistic grounding is modeled after *foundational holism*, an epistemic methodology developed in Sher

¹¹ The inadequacy of having unexplainable fundamental elements is also noted by Chang (2013), though her point is specific to a particular context of grounding: the grounding of practical reasons. When we reach the fundamental elements of the grounding, Chang says, “there’s no more explanation to be had, end of story. Facts that are explanatorily primitive are self-grounded; they cannot be accounted for in any other terms and represent the end of the line in explanation.” (*Ibid.*, p. 165) The problem with self-grounded facts, according to Chang, is “the *Problem of Explanatory Shortfall*” (*ibid.*, p. 170). In some cases “it is wholly unsatisfying to rest with ‘That’s just how things are.’” (*Ibid.*, p. 173)

¹² Needless to say, I do not claim this is the only possible solution to the problem.

(2016a) and designed to avoid the foundationalist predicament.¹³ Both foundational holism and holistic grounding involve a special kind of holism, one that differs from most existent conceptions of holism. I will begin with foundational holism and then turn to holistic grounding.

3.1 Foundational holism

The key to understanding foundational holism as an alternative to foundationalism lies in distinguishing between the concepts of *foundation* and *foundationalism*. A *foundation for knowledge*, under this distinction, seeks to establish the viability of human knowledge, both empirical and abstract, and provide objective, veridical, and highly explanatory justification of such knowledge: A *robust foundation* establishes our claims to knowledge by connecting them to the *world*, thus by exhibiting an ultimate dependence of our knowledge on the world. Three of the four characteristics we have examined in this paper are thus built into the idea of a *robust foundation*: (i) dependence, (ii) objectivity, and (iii) strong explanatory power. But the fourth characteristic – a strictly hierarchical justification relation – is not part of the idea of a foundation. This characteristic has to do with the *methodology* used to pursue the foundation project, and in principle different methodologies might be used in pursuit of this project. Foundationalism and foundational holism are two distinct methodologies for pursuit of the foundational project.

One of the distinctive characteristics of the *foundationalist* methodology is its requirement that the foundation of knowledge be strictly hierarchical. Foundational holism renounces this requirement. Another distinctive feature of the *foundationalist* methodology is its requirement that the foundation be absolutely certain. This requirement, too, is renounced by foundational holism.

Viewing foundational holism as a project, namely the project of *foundation-without-foundationalism*, two of its main principles are:

- (a) Every field/item of knowledge, qua a field/item of knowledge, requires a robust, objective, and highly explanatory foundation in the world (broadly un-

¹³ There are some similarities between foundational holism and foundherentism (Haack (1993)), but there are also significant differences between them. Two of these are: (a) While foundherentism is limited to empirical knowledge, foundational holism is applicable both to empirical and to abstract (e.g., logical and mathematical) knowledge. (b) Foundational holism is *holistic* rather than *coherentist*. (The *holism in foundational holism* is, as we shall see below, not a coherentist holism.)

derstood) or in those facets of the world that it targets.

- (b) The founding/justification relation may take different forms in different cases and at different times. The underlying idea is that the foundational project is a dynamic project. There are multiple ways for our theories to reach, and be founded in, the world, some simple, others complex, some strictly hierarchical, others not. What pattern the justification relation can/should take is affected by particular circumstances, including the “distance” between the targeted facets of the world and our cognitive resources for reaching these facets. The point is that some facets of the world are more difficult for us to discover than others, given our cognitive resources, and some theories are more difficult to justify, requiring more complex (circuitous, indirect) patterns of justification than other theories.

These principles point to two ways in which foundational holism differs from other conceptions of holism. First, it is world-oriented rather than coherentist. While coherentist holism says that the justification of an item of knowledge largely consists in establishing its coherence with other items of knowledge, foundational holism says that it primarily consists in establishing its connection to the world. Second, foundational holism licenses the use of *two* rich networks of interconnections by the foundational project: (i) a network of connections among fields (theories, items) of knowledge, and (ii) a network of connections between fields (theories, items) of knowledge and the world. The two networks themselves are interconnected. Most importantly, the first network enriches the second and its interconnections are integrated into those between our body of knowledge and the world.

But foundational holism differs from other conceptions of holism in other ways as well. For example, one conception of holism regards it as “wholistic” in character. Dummett (1973/81) calls this type of holism “total” holism and I call it “one-unit” holism (Sher (2016a)). One-unit holism is the view that the smallest unit of knowledge is our body of knowledge as a whole.¹⁴ In contrast to this type of holism, foundational holism regards our body of knowledge as consisting of multiple elements. It is a *network of independent elements, standing in multiple relations*. Another conception of holism regards it as “unstructured”. Unstructured holism is the view that every item of knowledge is equally connected to any other item of knowledge.¹⁵ Foundational holism, in contrast, is a *structured* holism. It says that the (epistemically relevant) connections between items of knowledge are

¹⁴ Dummett (1973/81) and Glymour (1980) attribute this type of holism to Quine.

¹⁵ Friedman (2001) attributes this type of holism to Quine as well.

as selective, highly structured, and systematic as they are opened.

One feature that foundational holism shares with other types of holism is its attitude toward circularity: it does not ban all forms of circularity. More specifically, foundational holism distinguishes four types of circularity: *destructive*, *trivializing*, *indifferent*, and *constructive*. Destructive circularity is the type of circularity that leads to paradox. Some cases of self-reference (e.g., “the set of all sets that are not members of themselves”) may fall under this category. A paradigmatic example of trivializing circularity is “ P ; therefore P ”. A justification of P by a logical inference from the assumption that P is trivial to the point of not counting as a justification. These two kinds of circularity are banned by foundational holism as much as by foundationalism. Indifferent circularity is the circularity involved in studying English grammar using English grammar. It is neither better nor worse to study English grammar in a language that uses English grammar than in a language that uses, say, French grammar. Constructive circularity is an instrument of knowledge. Gödel’s representation of syntax by syntax, Henkin’s syntactic model of standard 1st-order logic, and other achievements in set theory, meta-mathematics, and meta-logic make ingenious use of patterns that have circular elements. Foundational holism regards constructive circularity as an invaluable epistemic tool.

One key to productive uses of circularity is *partiality*. The knowledge obtained is only partially circular. Non-circular elements are also involved and play a significant role. Thus, consider Henkin’s use of 1st-order syntax to prove the syntactic (proof-theoretic) completeness of 1st-order logic. Many other elements, including semantic principles and mathematical (set-theoretical) laws play a crucial role. Another key is a *discerning* use of circularity. Consider Russell’s discovery of a paradox in Frege’s logic. Given that Russell’s paradox involves relations and multi-quantifier quantifier-prefixes, he had to use a quite powerful logic to discover the paradox, and at the time the only powerful logic available to him was Frege’s logic (or some variant of Frege’s logic).¹⁶ But whatever elements of Frege’s logic Russell used to discover the paradox, he used them flexibly, dynamically, critically, and intelligently – holding off some elements, switching from some elements to others, and so on – so the paradox could come to light.¹⁷

One project in which some measure of circularity is unavoidable is the foun-

16 For discussions of how Russell discovered his paradox, see, e.g., Grattan-Guinness (1978), 2, and Moore (1988). But these articles do not raise the question of what logic Russell used to discover the paradox.

17 (i) The discoveries of the liar and heterological paradoxes are also arguably of this kind.

(ii) For a similar view of circularity as potentially productive see Sosa (1997).

dational project, and in particular those parts of this project that deal with “basic” elements, elements that significantly contribute to the founding of most other elements.¹⁸ For example, one cannot provide a foundation for logic without using logic. But by heeding the principles of partiality and discerning-use, a foundation for logic is made possible. Thus, the elements that do the major work in the holistic foundation for logic delineated in Sher (2013, 2016a) are not logical. They are philosophical and mathematical, and the work significantly involves general knowledge, nonlogical principles of rationality, all-purpose intellectual activities (such as “figuring out”)¹⁹, and so on. The foundation proceeds in a series of questions that are quite independent of the (background) logic used in answering them: “What is the task of logic in our system of knowledge?”, “Can logic be grounded only in the mind (language, concepts) or does it require a grounding in the world as well?”, “Why does logic require a grounding in the world?”, “What specific features of the world are capable of grounding logic, how and why?”, “What are the sources of the generality, necessity, and normativity of logic?”, “What is the relation between logic and mathematics?”, and so on. None of these questions or the answers given to them center on logical claims. The foundation employs elements from a variety of fields of knowledge, including logic, but its structure is as far from “ P ; therefore P ” as that of any worthwhile scientific, mathematical, or philosophical theory.²⁰

It is important to note that although the foundational holistic method renounces the strict-ordering requirement of the foundationalist methodology, it neither rejects nor denies the advantages of strictly-ordered founding, or strictly-ordered sections of the (overall) founding process. An example of a strictly-ordered (-hierarchical) justification sanctioned by foundational holism is a logical proof (that is, the series of steps involved in a logical proof). The foundational holistic method embraces strictly-hierarchical justification, but it also says that when such justification comes to an end, this is not the end of theoretical justifi-

18 One characteristic of foundational-holism is that the relation X plays a significant role in founding Y is not transitive. Z may play a significant role in founding X , but once we get to Y so many other elements might be involved in founding it that the role of Z can cease to be significant, or simply, in the context of Y , Z is no longer very relevant.

19 I use “figuring out” as a general term for a cluster of activities, from a baby figuring out how to make the mobile on her crib move (e.g., by hitting the bed with her feet (so it shakes)), a technician figuring out why a certain instrument is not operating properly, a mathematician figuring out how to solve a certain mathematical problem, and so on.

20 I should add that the general character of the above questions does not rule out precise results. For example, the answers given to these questions in the above-mentioned works lead to a precise criterion of logicity. We will briefly discuss this criterion below.

cation. Other patterns of justification are available as well, and these enable us to engage in extensive foundational projects that are rational, objective, highly explanatory, and critical, yet not strictly hierarchical (or not strictly hierarchical through and through).

3.2 Holistic grounding

In light of the inherent similarities between the foundationalist and grounding projects – both their common characteristics and their analogous problems with the minimal elements of the respective hierarchies – it is reasonable to expect that a solution to the minimal-elements problem of one project could be adapted to the second project. I will call an adaptation of foundational holism to the grounding project “holistic grounding”. Holistic grounding can be developed in a number of ways. In particular, it can be developed in ways that render it a friendly amendment to the current conception of the grounding project and in ways that render it an alternative to that conception. The crux of the matter is whether holistic grounding preserves the strict-hierarchy requirement for the non-fundamental elements, limiting the holistic treatment to the fundamental elements, or whether it views the grounding of all elements holistically. The holism described above in connection with foundational holism is, as we have seen above, compatible with giving a preferred status to hierarchical grounding whenever this is a viable option, but it is also compatible with giving equal status to hierarchical and non-hierarchical grounding.

Given the importance of *objectivity* and *explanatory power* for the grounding project, it is reasonable to use these requirements as a touchstone in determining the balance of hierarchical and non-hierarchical patterns in holistic grounding. The objectivity gauge is associated with such questions as: “Is the structure of reality in fact strongly hierarchical?”, “Is it strongly hierarchical in all areas or just in some areas?” The explanatory-power gauge is associated with questions like: “Is a hierarchical or a non-hierarchical grounding-description of reality more explanatory in case/area X?”.

I will not attempt to answer these questions here; the answers to these questions and the precise development of holistic grounding as a metaphysical methodology and descriptive project require an independent paper. Instead, I will briefly report on a few considerations that led other philosophers in the direction of a holistic approach to metaphysics and propose an example of holistic grounding in one fundamental field, logic.

Barnes (forthcoming) points out, or argues for the putative reality of, a few cases of nonhierarchical dependence:

1. Electrons, as universals, depends on their instances, and their instances depend on electrons as universals corresponding to natural kinds. (*Ibid.*, p. 9)²¹
2. Armstrongian “[s]tates of affairs depend on – and are thus explained by – their constituents” (particulars and universals) but the reason the constituents exist is that they constitute states of affairs. The “individual constituents depend on – and are thus explained by – states of affairs”. Barnes calls this “explanatory holism”. (*Ibid.*, p. 10)²²
3. “[T]here are tropes which mutually depend on each other. You cannot have a mass trope without a size trope and a shape trope, for example. ... The picture here is one of ‘dependence clusters’ – mass depends on shape and size, size depends on mass and shape, etc.” (*Ibid.*, p. 11)²³
4. On the realist, structuralist conception of numbers as places in a structure, each number depends on the other numbers, since its place in the structure depends on their places. (*Ibid.*, p. 12)²⁴
5. On an inflationary metaphysics of events, larger events consist of smaller events. Generally, there are larger and smaller events such that the smaller events are essential for the identity of the larger events and vice versa. For example, the (event of the) evacuation of Dunkirk is essential for the identity of (the event of) World War II and (the event of) World War II is essential for the identity of the (event of the) evacuation of Dunkirk. The two are dependent on each other.²⁵

The moral Barnes draws from the pervasiveness of such examples is that there is room for *holistic explanation* in terms of dependence. For additional examples of symmetric dependence see Thompson (2014), who uses the term “metaphysical interdependence” (*ibid.*, p. 69) for non-anti-symmetric dependence. While Barnes and Thompson agree on holistic dependence, they differ with respect to holistic grounding. Grounding, according to Barnes, is essentially hierarchical; Thompson, in contrast, allows holistic grounding. Another philosopher who introduces some holistic elements into his conception of grounding is Dasgupta (2014). Dasgupta regards grounding as irreducibly plural, where by this he means that it is *clusters of elements*, rather than single elements, that stand in the grounding relation. These clusters of elements are presumably interconnected, hence his view is at least partially holistic.

From the present perspective, however, we are especially interested in the holistic grounding of (what current grounding theorists view as) fundamental el-

²¹ Barnes presents this as a neo-Aristotelian conception of dependence.

²² Barnes views this as “the most stable way of making sense of the fact-based ontology that Armstrong wants to defend.” (*Ibid.*, p. 10)

²³ Barnes regards this view, which she traces to Denkel (1996) and Simons (1994), as appropriate for a trope bundle theory.

²⁴ Barnes refers to Linnebo (2008) for this view.

²⁵ Barnes directs us to Hornsby (1997) for this case of symmetric dependence.

ements. Take logic. Sider (2011) considers the logical constants as metaphysically fundamental based on indispensability considerations. But he is unsure where to locate their fundamentality. Should we treat all logical constants on a par with respect to fundamentality, or should we sort them out into fundamental and non-fundamental constants? The question is especially acute in the case of the logical connectives, due to their equal status as truth-functional or Boolean connectives. For Sider, the touchstone of fundamentality is *carving reality at the joints*, where joint carving involves capturing the real, or objective, structure of reality. It is the joint-carving notions that are minimal or fundamental, and a central task of metaphysics is to study the fundamental elements.

The question which logical connectives carve reality at the joints leads Sider to consider several options. One of these is that logical connectives, or logical constants more generally, are non-fundamental, that they are grounded in more fundamental elements, elements for which the above conundrum does not arise. This option, Sider notes, is available in the case of measurement. If we ask: “Which function from pairs of points of space to real numbers is fundamental: the distance-in-meters function, or the distance-in-feet function, or a function corresponding to some other unit?” (*ibid.*, p. 217), we have the option of answering: “none of them is; the fundamental metrical facts are facts of spatial congruence” (*ibid.*). But he is skeptical that a similar route is open for logical constants: “Unfortunately, escape of this sort seems unlikely in the case of logic: what more fundamental theory could we shift to?” (*ibid.*, p. 218)

It is in cases like these that the power of holistic grounding is most striking. Holistic grounding opens up new possibilities for the grounding of logic. One of these is grounding logic holistically in something more fundamental, from the point of view of carving reality at the joints, than logic itself (viewed as a method or a theory of inference). In Sher (2013, 2016a) I described such a grounding of logic, based, in a holistic spirit, on joint epistemic and metaphysical considerations. These considerations have to do with issues raised by the questions noted in Subsection (3.1) above: “What is the task of logic in our system of knowledge?”, “Can logic be grounded only in the mind (language, concepts) or does it require a grounding in the world as well?”, “Why does logic require a grounding in the world?”, “What specific features of the world are capable of grounding logic, how and why?”, and so on.

According to this account, logic in general, and logical constants in particular, are grounded in the formal structure of reality. Logical constants are grounded in formal properties (relations, functions) – the distinguished parameters of formal structure. “Formal structure” is a joint-carving notion in Sider’s sense, and “formality” is given a precise, objective, and highly explanatory definition or criterion. This criterion is holistic in the sense that it employs notions, and utilizes

knowledge and insights, from various fields.

I will not be able to describe the grounding of logic in the formal structure of reality in detail here (for a detailed account see Sher *op. cit.* and Sher (1991)). But in a nutshell, the idea is that due to the special character of formality (specified by its criterion), formal structures are governed by especially strong laws. If, then, the logical structure of sentences represents the formal skeleton (structure) of the situations they correspond to, and if logical rules of inference represent laws governing formal structures, then logical inferences will be grounded in formal laws governing the formal structures of the situations corresponding to their premises and conclusion. Logical constants, on this account, represent formal properties (relations, functions) of objects (actual or counterfactual), and the criterion of formality (formal properties) ensures that formal laws are sufficiently powerful to ground logic, given its task.

The criterion of formality is an *invariance* criterion. Invariance criteria (sometimes referred to as “symmetries”) are highly informative and play a central role in mathematics and science. In the present context we talk about invariance of *properties*. Every property has some degree of invariance, but properties differ in their degree of invariance. The degree of invariance of, say, the property *x is a person* is greater than that of *x is a woman*. *x is a person* is not affected by (does not notice) replacements of women by men, but *x is a woman* does. Formal properties are distinguished by their especially strong degree of invariance. They are *invariant under all isomorphisms* of relevant structures.²⁶ (In the literature, they are also said to be “invariant under bijections”.) In simple terms, the invariance criterion of formality says that a property is formal iff it does not distinguish between isomorphic structures of objects of appropriate types. For example, the identify relation does not distinguish between isomorphic structures of the type $\langle D, \langle a, b \rangle \rangle$, where a, b are objects in the domain D , and as such it is a formal relation. Logical constants denote (stand for, represent, correspond to) formal properties, and any formal property is an admissible denotation of a logical constant.

Formality in the invariance sense explains the logicity of the existential and universal quantifiers as well. The properties corresponding to these quantifiers are the 2nd-level properties of non-emptiness and universality (or universality in

²⁶ A structure is a pair, $\langle D, \beta \rangle$ where D is a (non-empty) domain of objects and β is an element or an n-tuple of elements of/on D – objects in D or extensions of properties and relations (of any level) in D . (Properties of level 1 are properties of objects, properties of level 2 are properties of properties/relations of level 1, and so on.) Two structures, $S_1 = \langle D_1, \beta_1 \rangle$ and $S_2 = \langle D_2, \beta_2 \rangle$, are isomorphic iff (if and only if) one is isomorphic to the other. S_1 is isomorphic to S_2 iff there is a 1-1 and onto function (bijection) f from D_1 to D_2 such that β_2 is the image of β_1 under f .

a given domain), and these properties satisfy the invariance criterion of formality. Formality (in the above sense) also explains the logicity of the logical connectives in the context of open formulas. (E.g., it explains the logicity of “&” in the context “ $Px \ \& \ Qx$ ” by the formality of its denotation, the intersection operation, \cap .) In the context of sentential logic, where the smallest units are atomic sentences, the formality criterion is generalized. Roughly, connectives are formal iff they are invariant under 1-1 replacements of atomic situations (facts, states of affairs) that preserve the feature of being the case. This criterion of formality coincides with truth-functionality.²⁷

We can now say that metaphysically, the notion of logical constant in general is grounded in the notion of formality just as the notion of unit of measure is grounded in the notion of congruence. The notion of formality is an objective notion, and it is given a highly explanatory account in terms of invariance.

The explanation of formality is made possible by our holistic methodology. We use mathematical notions, which are (directly or indirectly) formal, to formulate the invariance criterion of formality. But the circularity in question is constructive. We explain why logicity is grounded in formality and why the invariance criterion is an adequate criterion of formality in terms of a cluster of notions, many of which are not formal.

The notion of formality is highly explanatory in two directions: (a) it is given a highly explanatory account in terms of invariance and (b) it provides, or partakes in providing, a highly explanatory account of other notions, for example, the notion of logical constant. But that is not all. The formality of logic enables us to explain its distinctive characteristics beyond its logical constants: its strong necessity, generality, normativity, apriority (or, in my preferred view, quasi-apriority). Formality plays a central role in the grounding of mathematics as well, leading to a new, highly explanatory account of its interrelations with logic. (See *op. cit.*).

Holistic grounding, however, is not limited to logic. Nor is it limited to the special grounding of logical constants delineated above. Nor is holism, as conceived here, restricted to the grounding project. Metaphysics in general deals with very basic issues, and a holistic methodology, modeled after foundational holism and holistic grounding, is especially suited for a substantive, highly explanatory discussion of such issues.

My answers to the questions “Where are you going, metaphysics?” and “How are you getting there?” are: “You are going where you have always gone, toward an objective and highly explanatory account of basic philosophical issues”, and “To get there, you have to discard the traditional foundationalist, strictly-hierarchical

²⁷ For details, see Sher (*op. cit.*)

methodology and adopt a new, flexible yet highly demanding methodology, a holistic methodology such as holistic grounding or its epistemic prototype, foundational holism.”

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