The Simplicity of Metaphysical Structures

Samuel Z. Elgin

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“There is no greatness where there is not simplicity”—Leo Tolstoy

Abstract: Discussions about metaphysical simplicity typically address ontological parsimony—the number of entities (or kinds of entities) that theories posit. This emphasis, while understandable for metaphysicians primarily concerned with theories' ontological commitments, downplays the relevance of metaphysical structure: the way that entities metaphysically depend on one another. As metaphysicians begin to reify structure more candidly, we can begin to investigate the simplicity of those structures themselves. This paper is an attempt to undertake this investigation, and a plea to take the results of such inquiry to matter in theory selection.

Perhaps surprisingly, structural simplicity is extraordinarily complicated. Conditions in which one theory is structurally simpler than another are far from obvious. Here, I canvass numerous alternatives and bring some of their shortcomings to light. After settling on a criterion for structural simplicity that, I believe, is the most plausible, I argue that the reasons to take ontological parsimony to matter in theory selection apply equally well to structural simplicity.

1 Introduction

Among contemporary metaphysicians, theoretical agreement is scarce. Some countenance abstract objects, while others believe only in the concrete. Some hold that objects compose other objects, while others reject mereology. Even methodological questions broker disagreement. Analytic philosophers tout the virtues of rational argumentation, but disagree about what prima facie evidence consists of. What weight should particular intuitions be given? Need claims be evaluated in isolation, or holistically? Indeed, some believe that philosophical inquiry fares worse than that in the hard sciences (the so-called ‘physics envy’) because we have no methodology.

This is, perhaps, too strong. No doubt, our understanding of various theories—and the ways that they relate to one another—has improved. And there are some philosophical
proposals about which there is widespread, if not strictly universal, consensus. One such proposal is that simplicity is a theoretical virtue. Most philosophers hold that, when all else is equal, a simple theory is preferable to a complex one.\(^1\) This thought is most famously captured by Ockham’s Razor, which states, “Entities are not to be posited without necessity.” The Razor highlights an important aspect of simplicity: it concerns how many entities theories posit. Within the metaphysics literature, many (but not all) discussions address only this sort of simplicity—ontological parsimony.\(^2\)

Of course, some disagreements remain. Although many take simplicity to be a tie-breaker, it is unclear how it weighs against other theoretical considerations. Is a simple, relatively weak theory preferable to a complex, relatively powerful one? Answering this sort of question requires an understanding not only of simplicity, but also of the considerations that it weighs against. Before we can begin to address such questions we need a greater understanding of simplicity. Here I investigate a type of simplicity that has been overlooked—the simplicity of metaphysical structure.

Philosophers, with their sharply diverging commitments, doubtlessly use ‘metaphysical structure’ in various ways. For the purposes of this paper, I understand metaphysical structure in terms of ground. A theory is structurally simple, on this understanding, just in case the grounding relations that it posits are simple. Of course, this hardly exhausts the subject; it merely brings the simplicity of grounding relations to the fore. Theories with identical ontological commitments can posit distinct grounding relations. Some of these relations are simple, while others of these are complex. So the simplicity of metaphysical structures is irreducible to facts about ontological commitments. An independent criterion is needed.

The fact that some grounding relations are simple is relatively obvious. A general condition for structural simplicity is not. I spend the bulk of this paper investigating numerous contenders. Some, while initially plausible, have untenable implications. After surveying a range of alternatives, I settle on a criterion for structural simplicity that avoids the pitfalls alternatives face. I close by arguing that structural simplicity is an important factor in theory selection.

I will proceed as follows. In section 2 I will discuss ontological parsimony. In sections 3 and 4 I will introduce the notion of metaphysical grounding and show how it leads to a criterion of structural simplicity respectively. In section 5 I will provide reasons to take structural simplicity to matter in theory selection and I conclude in section 6.

\(^1\)Not all philosophers take simplicity to be a virtue (see Barnes 2000, Willard 2014 and—to some extent—Holsinger 1980).

\(^2\)Some restrict the use of the term ‘parsimony’ to ontological parsimony. I do not. I treat ‘parsimony’ and ‘simplicity’ as synonymous, and take the two terms to bear on both ontological and structural matters.
2 Ontological Parsimony

It might seem peculiar, when addressing structural simplicity, to begin by discussing ontological parsimony. Such a discussion is essential for this project. Appreciating the difference between structural simplicity and ontological parsimony would be impossible without an understanding of what ontological parsimony consists of. Further, the preponderance of developments in our understanding of metaphysical simplicity concern ontological parsimony. Many of these developments have implications for how we ought to understand structural simplicity.

Ontological parsimony concerns how many entities theories posit. It comes in two sorts—quantitative and qualitative. Quantitative parsimony involves the number of entities a theory posits. A theory that posits twelve entities is more parsimonious than one that posits seventeen. In contrast, qualitative parsimony involves the number of kinds of entities that theories posit. A theory that posits only concrete entities is more parsimonious than one that posits both concrete and abstract ones.

The following is a widely accepted criterion of quantitative ontological parsimony:

**Quantitative Ontological Parsimony (QuanOP):**

Among metaphysical theories, the most quantitatively ontologically parsimonious one is that which entails that the fewest entities exist.

Although QuanOP is relatively uncontroversial, complications arise for theories that posit infinitely many entities. What does a term like ‘few’ mean when comparing infinite sizes? For ease of exposition, I will largely disregard such theories. Should they become relevant, QuanOP can be supplemented straightforwardly. Theory \( A \) entails that fewer entities exist than theory \( B \) does just in case it satisfies two conditions: i) there is an injective mapping between the entities which \( A \) entails exist and those which \( B \) entails exist and ii) there is no injective mapping between the entities that \( B \) entails exist and those which \( A \) entails exist. Other criteria I discuss can be similarly modified if necessary.

The criterion for qualitative ontological parsimony is similar:

**Qualitative Ontological Parsimony (QualOP):**

Among metaphysical theories, the most qualitatively ontologically parsimonious one is that which entails that the fewest kinds of entities exist.

According to QualOP, theories that entail that the same kinds of entities exist are equally qualitatively ontologically parsimonious. When all else is equal, theories that do not entail the existence of properties are more ontologically parsimonious than ones that do, etc.

Often, discussions of metaphysical simplicity end there. Quantitative and qualitative ontological parsimony exhaust the types discussed. However, extending the picture is relatively straightforward. Perhaps kinds of kinds of entities can be economized as well. And
now we are off to the races—there is simplicity with respect to kinds of kinds of kinds of entities, etc.

Nolan outlines another extension (1997). Metaphysicians need not separate quantitative and qualitative criteria entirely. He values not only positing few entities and few types, but few entities of each type. A theory that posits one neutrino is more parsimonious in this respect than one that posits 17 million—regardless of the number of entities and types of entities each is committed to. Here, I stick with the classical types of ontological parsimony. I flag others only to show how the standard list can naturally be extended. For now, two kinds suffice.

It is obvious that metaphysicians have emphasized ontological parsimony. It is less obvious why they have. Historical debates of this sort are notoriously intractable, but I suspect that Quine’s influence is at least partially responsible.

Explicitly anti-metaphysical positions dominated analytic philosophy throughout the 1930’s and 40’s. Logical positivists argued that metaphysical assertions lacked content while ordinary language philosophers thought that they betrayed a misunderstanding of typical language usage. To the extent that metaphysics was discussed, it was largely derided—an historical remnant from a less-rigorous time. Metaphysical simplicity was uninteresting because metaphysics itself was confused.

No philosopher influenced the discipline’s recovery from its positivist tradition more than Quine. This is partially due to his canonical attack on the distinction between analytic and synthetic truths—a distinction that his positivist mentor, Carnap, regarded sacrosanct—(Quine 1951), and partially due to the return of ontology as a legitimate subject of inquiry. The ensuing methodology takes metaphysics to be continuous with the natural sciences. Best scientific theories are translated into the language of first order logic, and the entities the resulting quantifiers range over are adopted into ontology. This methodology thus specifies conditions for positing entities.

Some have claimed that—according to Quineanism—metaphysics aims only to uncover what exists (e.g. Schaffer 2009). This is somewhat misleading. In defending philosophy’s continuity with science, Quine held that philosophical theories ought to be attuned to more than science’s existential claims (see Quine 1968 & 1981). However, one need look no further than ‘On What There Is’ to recognize the central role existence played in Quine’s philosophy (1948). His discussions affected debates over the existence of numbers, properties and rights. Under his influence, questions about existence robustly occupied the center-stage of metaphysical discussions. It is unsurprising, given this approach, that philosophers emphasized ontological parsimony—a type of simplicity tailor made for debates over existence. Indeed, criteria for ontological parsimony were largely developed by Quine

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3This is not a deep objection to Schaffer. Take, by way of analogy, the connection between Hume and Humeanism. Very roughly, Humeanism is the thesis that everything supervenes on the distribution of micro properties. It is doubtful that Hume accepted a thesis along these lines—leading some to conclude that Hume was not a Humean. ‘Humean,’ took a distinct meaning from ‘believed by Hume.’ If Hume need not be Humean, Quine need not be Quinean.

3 Grounding

Standard discussions of parsimony can be extended in the ways mentioned above, but their sole concern remains existence. Ontological parsimony concerns what there is—nothing more.

Metaphysical theories do not merely posit that entities exist. Many philosophers believe that ontology is structured. Entities depend on one another in a distinctly metaphysical way. Some have argued that minds depend on brains (e.g. Schaffer, forthcoming), that normative facts depend on non-normative facts (e.g. Correia & Schneider 2012) and that conjunctions depend on their conjuncts (e.g. Fine 2012). Of course, these particular claims may be false, but the dependence relations they assert seem both intelligible and at least somewhat plausible. Some dub this dependence ‘grounding.’

There is considerable dissent over the relata of the grounding relation. Some take grounding to relate entities quite generally (e.g. Schaffer, 2009). Others, perhaps holding that grounding is an explanatory relation—and that many entities are unsuited to stand in explanatory relations—take grounding to relate facts (e.g. Audi 2012, Rosen 2010 and deRosset 2013). Still others prefer to remain as ontologically neutral as possible and treat grounding as a purely sentential operator (e.g. Fine 2001, Correia 2010 and Dasgupta 2015). In this paper, I assume that entities ground other entities. Should facts count as entities, they can stand in grounding relations. And if, as Wittgenstein said, the world is the totality of facts, the distinction between the first two conceptions of ground may collapse.

Philosophers discussed structure long before ‘grounding’ came in vogue. In the Aufbau, Carnap defends the view that qualia are constructs of time-slices of experience (1928). In The Structure of Appearance, Goodman proposes that concrete individuals are constructions of micro moments and the primitive relation togetherness (1951). I strongly suspect that both Carnap and Goodman would resist describing their respective structures as ‘grounding relations.’ Given their anti-metaphysical scruples, they would surely cringe at the mere suggestion. No matter. In attempt to articulate my position precisely, I will restrict the term ‘structure’ for ground-theoretic structure in this paper.

More worryingly, grounding has garnered a reasonable number of detractors (see Della Rocca 2014 and Wilson 2014). A satisfactory defense of ground goes far beyond the scope of this paper, but one is not needed at present. Philosophers, with laser-like focus on ontological parsimony, have overlooked the relative simplicity of structures. There remains

4 Given the recent explosion of the literature on grounding, it can be difficult to accurately describe how all philosophers conceive of the grounding relation. Some understand grounding as a metaphysical explanatory relation. Still others describe grounding as the relation which underwrites metaphysical explanation. I will not attempt to reconcile all of the conceptions of ground here.

5 This possibility is overlooked by Loss in ‘Parts Ground the Whole and are Identical To It’ (2016).
an important and unanswered question in metaphysics: what makes one theory structurally simpler than another? This is fundamentally a question about theories, not about grounding. There may or may not be a grounding relation—reasonable philosophers can disagree. But surely there are theories that posit grounding relations. The theories exist, even if the relation does not. Reasonable philosophers cannot disagree about that. Regardless of whether the theories are correct, we can investigate how simple or complex the grounding relations they posit are.

There is widespread agreement over some formal features of ground (among those who countenance the relation, anyway). Most believe that grounding is a many-one relation such that pluralities ground individuals. A water molecule is grounded in its constituent hydrogen and oxygen atoms, \{Socrates, Plato\} is grounded in Socrates and Plato, etc. Further, many believe that grounding is transitive, irreflexive and antisymmetric. The grounding relation thus forms a strict partial order over entities. Various philosophers question these features. Dasgupta argues that grounding is a many-many relation (2015), Schaffer argues that grounding is intransitive (2012) and Jenkins argues that grounding is reflexive (2011). For my part, I find the consensus position quite plausible. But I make no assumptions about the formal features of grounding here. Even if theories posit incorrect features of grounding, the relative simplicity of the theories warrants assessment. Indeed, if an account of structural simplicity were restricted to correct theories, it would be fairly uninteresting. Why bother comparing the relative simplicity of theories antecedently known to be correct? Surely an account of simplicity is desirable precisely because it may prove helpful in theory selection. If it only accurately assesses true theories, its utility is questionable, at best. Further, as we shall see, theories that (in my opinion) seem implausible have interesting implications for the nature of simplicity.

In discussing structural simplicity, I will rely on graphical representations of theories. It is important, when relying on such visualizations, to clearly specify what the figures depict. Here, I use directed hypergraphs like the following:\footnote{I am indebted to Selim Berker, whose use of directed hypergraphs clarified debates on coherentism (2015).}

\begin{figure}[h]
  \centering
  \begin{tikzpicture}
    \tikzstyle{dot}=[circle,fill,inner sep=1.5pt,outer sep=0pt]
    \node[dot, label={left:{$F$}}] (F) at (0,0) {};
    \node[dot, label={right:{$G$}}] (G) at (1,0) {};
    \draw[->] (F) to (G);
  \end{tikzpicture}
  \caption{Theory 1 ($T_1$)}
\end{figure}

Figures depict metaphysical theories. Dots represent particular entities, letters represent types and arrows represent grounding relations. Figure 1 represents theory $T_1$. $T_1$ posits the existence of two entities—an $F$ and a $G$—and that the $F$ grounds the $G$.

Such figures display the number of grounding relations that theories posit. $T_1$ posits precisely one grounding relation. Conditions under which figures depict a theory which posits that the $Fs$ ground the $Gs$ are less obvious. The sentence ‘The $Fs$ ground the $Gs$’ syntactically appears to be a generic. The semantics of generics are highly contested.
Nevertheless, I doubt that philosophers intend to express generics with these sorts of sentences. ‘Lions have manes’ is true although some lions are maneless. Philosophers who assert ‘brains ground minds,’ in contrast, would be highly dissatisfied if some minds were completely ungrounded. Here, I take the truth-conditions for ‘The Fs ground the Gs’ to be the following: that all Gs are at least partially grounded in some Fs and that there are Gs. Vacuously entailing that the Fs ground the Gs by denying the existence of Gs will not do. ‘The Fs ground the Gs,’ as used by metaphysicians, expresses a universal claim with existential import. According to T₁, the Fs do indeed ground the Gs.

Grounding relations may be complete or partial. The distinction is best grasped through examples, and perhaps mostly commonly through an example involving facts. Take facts F₁ and F₂. F₁ completely grounds the disjunctive fact F₁ ∨ F₂. Were things different—such that F₁ held but F₂ did not—the disjunctive fact would still hold in virtue of F₁. In contrast, F₁ is a mere partial ground of the conjunctive fact F₁ ∧ F₂. The conjunction partially depends on F₁, but F₂ remains required as well. Were things different—such that F₂ did not hold—the conjunction would not hold either. Collectively, F₁ and F₂ completely ground the conjunction. Philosophers who take grounding to relate entities other than facts also employ the distinction. Quite plausibly, Socrates is a complete ground of the set {Socrates} but merely a partial ground of the set {Socrates, Plato}.

This is a distinction that graphical representations of grounding ought to reflect. I distinguish the possibilities in the following way:

![Figure 2]

Each arrow depicts a complete grounding relation. According to T₂, each F completely grounds the G. According to T₃, there is one arrow that branches. Collectively, the two Fs completely ground the G. Individually, however, they are only partial grounds.

Some might argue that T₁, T₂ and T₃ do not count as metaphysical theories. After all, they merely posit a few entities and one or two grounding relations. Surely most theories do more. This is fair enough. But T₁, T₂ and T₃ may well posit more than depicted. These graphical representations are simplifications; they do not exhaust the subject matter of metaphysical theories. My aim is only to depict theories’ structural relations: relations, I take it, that are understood in terms of which entities ground one another. It is my hope that both the conception and the graphical representation of grounding are, at this point,

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7 Some might contend that Socrates does not completely ground the set. Facts about set membership matter as well. Such philosophers may hold that Socrates and set membership collectively completely ground {Socrates}, and collectively partially ground {Socrates, Aristotle}. 

7
4 Structural Simplicity

Theories differ structurally, and some structures are simpler than others. Take the following:

Before delving into a lengthy discussion of parsimony, allow me to clarify what kinds of theories $T_4$ and $T_5$ are. I intend $T_4$ and $T_5$ to represent metaphysical theories. They may also be the sorts of diagrams that can represent some physical theories (I take the distinction between physical and metaphysical theories to be somewhat loose). Theories like $T_4$ and $T_5$ do several things. Minimally, they posit that certain entities exist, that certain kinds of entities exist, and that the entities are structured in a certain way. If ‘$F$’, ‘$G$’, ‘$H$’ and ‘$I$’ denote ‘neutron,’ ‘atom,’ ‘mind,’ and ‘chair’, then both theories posit the existence of neutrons, atoms, minds and chairs. $T_4$ posits that each neutron grounds two atoms, while $T_5$ posits many more grounding relations. The entities posited in $T_4$ and $T_5$ may stand in further relations to one another. They may causally interact, account for various intuitions, etc. The arrows depict only the grounding relations that the entities stand in. Other types of relations, although perhaps interesting in other contexts, are not relevant here.

$T_4$ and $T_5$ are equally ontologically parsimonious. Each posits the existence of sixteen entities and of four types of entities. Each even posits the same number of each type of entity. There are two $F$s, four $G$s, six $H$s and four $I$s. However, the theories differ structurally. $T_4$ posits a far simpler structure than $T_5$ does. According to $T_4$, there are four instances of grounding. Each $F$ completely grounds two $G$s. $T_5$, in contrast, posits
an extremely complex array. A notable difference between the two theories is that \( T_5 \) posits that more entities stand in grounding relations than \( T_4 \) does. This might suggest the following quantitative criterion:

**Naïve Account (NA):**

Among metaphysical theories, the most quantitatively structurally parsimonious one is that which entails that the fewest entities stand in grounding relations.

There are several potential objections to this criterion. Some warrant its modification. First, however, consider several that do not.

With sufficient finessing, structural parsimony may appear to be a type of ontological parsimony. After all, \( T_4 \) and \( T_5 \) disagree about whether instances of the grounding relation exist. Criteria of ontological parsimony already address disagreements over existence, so there is no need to investigate structural parsimony.

I follow Schaffer’s response to a similar objection (2009). With sufficient finessing, all claims can be twisted into claims about existence. ‘Some roses are red’ asserts that red roses exist and ‘Napoleon was short’ asserts that a short Napoleon existed. Similarly, ‘brains ground minds’ asserts that brains that ground minds exist.

On this conception, structural parsimony is nothing more than ontological parsimony. This, however, is not peculiar to structure. Ontological simplicity captures all of the relevant sorts only because it captures absolutely everything. I urge readers not to be deceived by clever rephrasing. The question ‘Are there other minds?’ is of a different sort than ‘Do brains ground minds?’ Theories can agree about ontology while disagreeing about ontology’s structure. This possibility is lost if structural claims are ontological ones.

Nevertheless, I do not begrudge others their use of ‘ontological parsimony’ (at least, I do not begrudge them very much). Perhaps some will continue to use the term quite liberally. For them, ‘ontological parsimony exhausts the subject matter of simplicity’ is true, but rather trivial. Nevertheless, philosophers have largely disregarded the simplicity of metaphysical structures—whether or not they are construed as ontological features. For the remainder of this paper, I employ the use of ‘ontological parsimony’ such that structural claims are not ontological ones.

There is another way in which structural claims might seem to be ontological. Perhaps some hold that ontology limits the possible extent of structure. Such philosophers may claim that theories that posit two entities—say an \( F \) and a \( G \)—contain, at most, four grounding relations. The \( F \) grounds the \( G \), the \( G \) grounds the \( F \), and each entity grounds itself. So one can infer that a theory that posits only two entities is more structurally parsimonious than any that posits more than four grounding relations.

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\(^8\)As I discuss below, some prefer \( T_5 \) over \( T_4 \) (see Bennett 2014 and Schaffer 2015). That is not the present concern. For now, what matters are conditions of structural simplicity: conditions, according to which, \( T_4 \) is simpler than \( T_5 \).
This worry is mistaken. Theories with two entities can—in principle—posit more than four grounding relations. One entity can ground another in numerous ways. Consider the relationship between Socrates and \{Socrates, \{Socrates\}\}. Arguably, Socrates grounds the set twice over. He partially grounds it both immediately and in virtue of grounding \{Socrates\}, which itself is a partial ground of \{Socrates, \{Socrates\}\}. Because an entity can ground another numerous times, the number of entities poses no restriction on the number of grounding relations that a theory can posit.

In other respects, NA is inadequate. Take the following two theories:

\[\begin{align*}
F & \rightarrow \ G \\
G & \rightarrow \ F
\end{align*}\]

Theory 6 (T₆) \hspace{2cm} Theory 7 (T₇)

Figure 4

T₇ posits a symmetric grounding relation. Philosophers who take grounding to be antisymmetric would reject this theory on those grounds. Nevertheless, an adequate theory of simplicity ought to evaluate theories like T₇.

T₆ and T₇ are extremely similar. They differ in one key respect. While T₆ posits only one grounding relation, T₇ posits two. An F and a G each ground each other. Intuitively, T₇ has a more complicated structure than T₆ has. According to NA, however, the theories are equally structurally parsimonious. After all, precisely the same entities stand in grounding relations.

Perhaps it is tempting to shift from counting entities to counting arrows. Appearances aside, T₇ contains two arrows, while T₆ contains only one. Unfortunately, this too is inadequate. Take the following comparison:

\[\begin{align*}
F \\
F & \rightarrow \ G \\
F
\end{align*}\]

Theory 8 (T₈) \hspace{2cm} Theory 9 (T₉)

Figure 5

Clearly, T₉ is more complicated than T₈ is. However, each posits a single grounding relation. Counting instances of the grounding relation also is inadequate. Nor will it suffice to count the entities appearing in each instance of the grounding relation, before combining these sums. Take the following:
Figure 6

T₁₁ violates classical assumptions about the formal structure of ground (in particular, that it is irreflexive). Nevertheless, it remains important to evaluate the relative simplicities of theories that violate this assumption. If the simplicity of structure were determined by summing together the entities that appear in each instance of the grounding relation, and by adding these sums together, T₁₀ would be more complex than T₁₁ is. Such a sum, for T₁₀ is 2, while for T₁₁ it is only 1. But surely this is incorrect. T₁₁ wins no points, as far as parsimony is concerned, by stipulating that an F grounds itself rather than that it grounds another entity. That sort of difference could not plausibly account for an increase in simplicity.

Nor will it suffice to sum, for each instance of the grounding relation, the grounding entities and to entirely ignore the grounded entities, before combining these sums. Although such a proposal correctly diagnoses the relative simplicity of T₈–T₁₁ it misdiagnoses the following:

Figure 7

T₁₃ posits that one entity grounds a plurality. That is to say, F does not completely ground each G in isolation. Rather, it grounds the G’s collectively (see Dasgupta 2015) for a defense of grounding along these lines). Clearly, T₁₃ is less structurally parsimonious than T₁₂ is. Because the proposal above only considers the number of grounds (and ignores the grounded), it ranks T₁₂ and T₁₃ on a par. It thus misdiagnoses this example.

So much for unsuccessful alterations. I believe that the following accommodates previously mentioned considerations. The following is a method of assigning a parsimony ‘score’ to a given metaphysical theory. The scores vary based on how parsimonious a the-
ory is. Complex theories receive higher scores, while simple theories receive lower scores. If one were to select a theory based on how structurally parsimonious it is, she would select the theory with the lowest score.

Scores are determined in the following way. Take a theory that posits grounding relations. Begin by considering each instance of the grounding relation in isolation. The graphical depictions employed here depict each instance of the grounding relation as an individual arrow. For each instance, sum together the number of grounded entities and the number of grounding entities. Then, combine the sums for the various grounding relations. Call the result ‘the total ground sum’ for the theory.

This methodology allows entities to be counted several times if they stand in several grounding relations. For $T_4$, each $F$ stands in two distinct grounding relations, as each grounds two $G$s. So, each $F$ is counted twice. The total ground sum for $T_4$ is 8. In contrast, the total ground sum for theory $T_5$ is 34. The following is a condition of qualitative structural parsimony:

**Quantitative Structural Simplicity (QuanSS):**

Among metaphysical theories, the most quantitatively structurally parsimonious one is that with the smallest total ground sum.

The primary motivation to accept this criterion is that it correctly diagnoses cases tricky enough to threaten alternative accounts. $T_4$, with a total ground sum of 8, is quantitatively structurally simpler than $T_5$, with a total ground sum of 34. $T_7$ posits symmetric grounding and has a total ground sum of 4, making it more structurally complex than $T_6$, which has a total ground sum of 2. $T_8$ has a sum of 2 while $T_9$ has a sum of 4—making $T_8$ the structurally simpler theory. $T_{10}$ and $T_{11}$ both have scores of 2, making them equally structurally parsimonious. And $T_{12}$, with a sum of 2, is structurally simpler than $T_{13}$, with a sum of 4.

Successful diagnoses are well and good, but an alternative remains. Perhaps grounding relations themselves do not fix the facts about structural simplicity. Consider, for example, $T_{14}$ and $T_{15}$:
According to the criterion of Quantitative Structural Simplicity given above, $T_{15}$ is more structurally complex than $T_{14}$ is. This may seem suspect. While it is true that $T_{14}$ posits fewer grounding relations than $T_{15}$ does, it posits the same number per entity. Each $F$ grounds precisely two $G$s. Perhaps we ought to revise our theory of simplicity to reflect the grounding relations per entity.

I believe that this would be mistaken. The number of grounding relations per entity is unrelated to how structurally parsimonious a theory is. Consider the following:

$T_{17}$ differs from $T_{16}$ in only one respect: it posits the existence of an additional $F$. Of course, this makes $T_{17}$ less ontologically parsimonious than $T_{16}$, but that is not currently at issue. If structural simplicity is evaluated by calculating the grounding relations per entity that a theory posits, $T_{17}$ is more structurally parsimonious than $T_{16}$. After all, there are
fewer grounding relations per entity according to T_{17}. This result is not peculiar to T_{16} and T_{17}. For any metaphysical theory, positing an additional, superfluous entity that does not stand in any grounding relations increases the structural parsimony of the theory if ‘structural parsimony’ is understood in terms of the grounding-relations per entity.\textsuperscript{9} This is implausible.

The fact that QuanSS accommodates the difficult examples mentioned above constitutes a substantial mark in its favor. However, as should be clear from discussions of ontological parsimony, philosophy is not only concerned with quantitative issues. Qualitative criteria matter as well.

Recall that a theory \( T \) posits that the \( F \)'s ground the \( G \)'s just in case there are \( G \)'s, and every \( G \) is at least partially grounded in an \( F \). For a given metaphysical theory, take the kinds of entities that the theory posits. For each \( F \) (i.e. for each kinds of entity), sum together the number of properties \( F \) such that ‘The \( F \)'s ground the \( F \)'s’ is true. Combine that sum to the number of properties \( F \) such that ‘The \( F \)'s ground the \( F \)'s’ is true. Add these sums together for all \( F \) that the theory posits, and refer to it as ‘The Type Ground Sum’ of \( T \). The following is a criterion for qualitative structural simplicity:

\textbf{Qualitative Structural Simplicity (QualSS):}

Among metaphysical theories, the most qualitatively structurally parsimonious one is that with the smallest type ground sum.

This criterion accommodates considerations for qualitative structural simplicity analogous to those discussed for quantitative structural simplicity previously discussed.

\section{Does Structural Simplicity Matter?}

Philosophers could, in principle, agree with everything that I have claimed until this point, while maintaining that structural simplicity ought to play no role in theory selection. A theory is no better in virtue of containing simple structural relations. I believe that this would be a mistake.

Recently, Jonathan Schaffer proposed modifying the classical Ockham’s Razor (2015). He contends that primitive entities are ontologically costly, but that derivative entities ‘come for free.’ He provides several arguments; one concerns a model for scientific progress. Suppose that Esther is a physicist who posits 100 types of entities capable of explaining all facts of foundational physics. Later, Feng constructs a theory ontologically committed to all of the entities that Esther is committed to. However, they disagree over the fundamental

\textsuperscript{9}This is so in all but two sorts of cases. Theories that do not posit any grounding relations are, presumably, maximally structurally parsimonious. If additional entities are posited that fail to stand in grounding relations, the number of ‘ground relations per entity’ remains the same—0. Similarly, theories that posit infinitely many entities retain the same number of grounding relations per entity even when a superfluous entity is posited.
structure. Feng posits an additional 10 entities which collectively explain all of the features of Esther’s 100. Intuitively, it seems, Feng’s model constitutes scientific progress. A theory with fewer fundamentals is simpler than one with more. However, if fundamental entities are equally costly to derivative entities, Esther’s model is preferable to Feng’s. After all, it posits 10 fewer entities than Feng’s does.

If Schaffer is correct, adding grounding relations to a theory can increase its parsimony in a respect that matters. Consider two theories which each posit 10 entities. The first contends that there are no grounding relations, while the second maintains that nine of the entities are grounded in one. The first theory is structurally simple, while the second is more structurally complex. However, according to Schaffer, considerations of simplicity indicate that the second theory is preferable. Structural simplicity may seem to be, if anything, a theoretical cost.

This is too quick. Suppose that Schaffer is correct, and that Ockham’s Razor ought to be modified to apply only to fundamental entities. Derivate entities constitute an ontological free lunch. Grant, even, that the modified Ockham’s Razor is more important than structural simplicity: whenever the two conflict, modified Ockham’s Razor settles the issue. Nevertheless, structural simplicity could matter in theory selection. Consider two theories, each of which posits ten entities. According to both, nine entities are grounded in one. The first maintains that those are the only grounding relations, while the second contends that the nine entities stand in a convoluted array of grounding relations to one another. Schaffer’s Ockham’s Razor provides no motivation for selecting one theory over the other. After all, the theories agree about the ontology of fundamental entities. The derivative entities, already coming for free, receive no further discount when additional grounding relations are posited. Here, I take no stand on whether or not Schaffer is correct about the virtue of the modified Ockham’s Razor. Regardless of whether or not he is correct, there are cases in which considerations of structural simplicity alone are relevant.

Philosophers typically provide two reasons to prefer ontologically simple theories over ontologically complex ones. Both of these reasons apply equally well to structural simplicity.

The first reason concerns superfluous posits. Consider two theories: the second of which posits one additional entity that the first does not. This additional entity performs no theoretical work. It does not accommodate any intuitions, is explanatorily irrelevant to everything that philosophers seek to explain, etc. It is an entirely superfluous entity. This is case about which there is widespread consensus—considerations of parsimony motivate abandoning the latter theory in favor of the former.

Suppose that an analogous situation were established for grounding. Consider two theories with identical ontological commitments. They differ in only one respect: the latter posits a grounding relation that the former does not. This grounding relation performs no theoretical work. It does not accommodate any intuitions, and is explanatorily irrelevant to

\footnote{Indeed, Barnes suggests that the motivation for Ockham’s Razor just is an antisuperfluous principle (2000).}
everything philosophers seek to explain (perhaps, the entities involved are already completely grounded). The grounding relation, in the second theory, is superfluous. It would be equivalent to considering two theories—the first of which posits that brains entirely ground minds, and the latter posits that rocks supply additional grounds for the already fully grounded minds. Surely, in this situation, considerations of structural simplicity motivate rejecting the latter entity in favor of the former.

The second motivation concerns the razor of agnosticism (see Sober 2015). Many philosophical discussions (including much of this paper), concern the razor of denial. When an entity is superfluous, considerations of parsimony motivate denying that it exists. The razor of agnosticism, however, maintains that philosophers ought to be agnostic about whether or not such entities exist. The reason for agnosticism is given in probabilistic terms. Assuming that the probability that the entity exists is neither one nor zero, the probability of the conjunction of philosopher’s theoretical commitments is lower than that conjunction conjoined with either the claim that the entity exists or that it does not. Philosophers thus maximize their chance of correctness by remaining agnostic about whether or not unnecessary entities exist.

This motivation applies equally well to structural parsimony. Assuming that the probability that one entity grounds another is neither one nor zero, the conjunction of theoretical commitments with either has a higher probability of accuracy than such a conjunction conjoined either with the claim that the entity does ground another or that it does not. Philosophers thus maximize their chance at accuracy by remaining agnostic with respect to whether or not a grounding relation obtains.

6 Conclusion

There are a few points that I hope readers leave with. Perhaps the most important is that criteria for structural simplicity, while apparently innocuous, are far more complicated than first appear. Conditions that seem initially tenable have unintuitive implications. The second point concerns the particular accounts of structural simplicity I have advanced. As with ontological parsimony, structural simplicity comes in two sorts: quantitative and qualitative. These types are understood, not in terms of the total instances of grounding, but in terms of the number of entities that stand on either side of each instance of the grounding relation. Lastly, this sort of simplicity that matters in theory selection. Theories can be dismissed because the structure they posit is unnecessarily complex.
References


