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Fundamental Yet Grounded

by

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Abstract: Grounding is claimed to offer a promising characterization of the fundamental as that which is ungrounded. Detractors of this view argue that there can be fundamental and yet mutually grounded entities. Such a possibility undermines the definition of the fundamental as the ungrounded. I aim to show, however, that the possibility of fundamental mutually grounded entities does not force us to renounce the prospects of characterizing fundamentality in terms of grounding. To accomplish this aim, I defend a grounding-based view that accommodates fundamental mutually grounded entities straightforwardly. My definition of fundamentality is similar to, but importantly different from, one that Karen Bennett discusses. I conclude by resisting two objections raised by Jessica Wilson against the Bennettian framework that also target the proposed view.

Keywords: fundamentality, grounding, symmetric grounding, ungroundedness, non-asymmetric grounding

1. The Inadequacy Objection Against the Fundamental *qua* the Ungrounded

Grounding is a form of non-causal constitutive determination with explanatory import. It captures the idea that some things obtain *because* or *in virtue of* other ones. I shall assume that to say that an entity x grounds an entity y is to say that y obtains because/in virtue of x. The orthodox view holds that grounding has a significant merit among others: it enriches our metaphysical theorizing with a promising characterization of the fundamental as that which is ungrounded – where an entity is ungrounded just in case it is not grounded in anything.[1]

In the literature, such a definition enjoys a steady popularity. As Leuenberger (2020, p. 2) puts it, thinking of the fundamental as the ungrounded is one out of "two obvious strategies for defining the fundamental in terms of ground".[2] For example, Schaffer (2009, p. 373) defines a fundamental entity as one which nothing grounds. In a similar vein, Rosen (2010, p. 112) says that "a fact is fundamental (or brute) if it does not obtain in virtue of other facts, and that a

1 It is worth noting, however, that we need not define the fundamental as the ungrounded. We should distinguish between the view that entities that lack grounds are ungrounded and the view that defines the fundamental as the ungrounded. My focus is on the latter.

2 The other strategy, which I shall not discuss here, is to define the fundamental as that which grounds everything else.

thing is fundamental if it is a constituent of a fundamental fact". Likewise, Bennett (2011, p. 1) defines the fundamentality of something as follows: an entity "is ungrounded if and only if it is fundamental full stop – absolutely fundamental". Sharing a similar view, Audi (2012, p. 710) claims that "if a fact has no ground, then it is fundamental in one perfectly good sense: there is no explanation of why it obtains". Similarly, Wallner (2018, p. 5) submits that "a fact *f* is fundamental iff it is ungrounded; equivalently *f* is non-fundamental or derivative iff it is grounded in some other fact(s)". Let us regiment this conception of the fundamental *qua* the ungrounded in the following principle.

Fundamentality–ungroundedness link (FUL). An entity *x* is fundamental if and only if *x* is ungrounded.

It has been recently argued that there can be fundamental and yet mutually grounded entities. Detractors of **FUL** claim that by ruling out this possibility, **FUL** is an inadequate definition of the fundamental. Here is a suggestive passage from Wilson (2014, pp. 560–561) that conveys this objection:

> These alternative understandings of the fundamental – as self- or mutually grounding – seem to be live possibilities, so it is inadvisable to rule them out of court in metaphysically characterizing the fundamental, even if one is not personally inclined to accept such possibilities. After all, we are here not engaged in an ordinary philosophical investigation into some specific phenomenon, but rather in identifying general categories suited to illuminate and investigate metaphysical dependence. In so doing, we should be maximally (i.e. insofar as we can) ecumenical; in particular, we should reject accounts of these general categories that import clearly controversial assumptions about which forms of metaphysical dependence are possible.

Elsewhere, Wilson (2016a, pp. 192–193) expresses similar considerations against **FUL**:

> But, I argue, we should not understand the fundamental as the un-Grounded, both because doing so inappropriately metaphysically characterizes basic entities in non-basic (indeed, relational negative) terms, and because such a characterization rules out of court various live metaphysical views on which the fundamental goings-on are self-grounding (as per, e.g., a self-sustaining god) or mutually grounding (as per, e.g., Leibnizian monads).

According to Wilson (2014, p. 561), **FUL** is "inappropriately theoretically loaded" because it does not permit relevant live metaphysical options. Therefore, we should reject it. Let us call this the *Inadequacy Objection*. In what follows, let us restrict our attention to the possibility of fundamental mutually grounded entities.[3]

3 Wilson (2014, p. 560) mentions God as a possible candidate for being a fundamental self-grounded entity. If there were a God who is fundamental and self-grounded, then **FUL** would fail to accommodate Hir. I will return to the irreflexivity of grounding in section 3.

Tahko (2018, section 1.1) raises a similar Inadequacy Objection against **FUL**. He claims that a definition of the fundamental as the metaphysically independent, of which **FUL** is an instance, has a problematic feature: "many things that we might normally regard as fundamental turn out to be dependent on other things in one sense or another". Tahko illustrates this claim by discussing how quarks, which someone might regard as fundamental physical entities, are dependent on each other because of the phenomenon of quark confinement. If we adopt **FUL**, and if the dependence among quarks is grounding, then quarks would not count as fundamental.[4]

The Inadequacy Objection put forward by Wilson and Tahko undermine **FUL** on the basis that it rules out the possibility of fundamental and yet mutually grounded entities.[5] Since it threatens the orthodox view of grounding, which I shall outline below, let us call this metaphysical possibility the *Heresy*.

Heresy. It is metaphysically possible that there are some fundamental entities x and y such that x grounds y and y grounds x.

Putative examples of fundamental yet mutually grounded entities such as Leibnizian monads or quarks are unsurprisingly controversial. However, they do not discredit the **Heresy**, which ought to be taken seriously.[6] Fairly obviously, if we do so, then we should reject **FUL**. An immediate question arises: can we characterize the fundamental in terms of grounding in a way that accommodates the **Heresy**?

I aim to defend a positive answer. In this article, I will argue in favour of the adoption of a grounding-based definition of the fundamental that accommodates the **Heresy**, thereby escaping the Inadequacy Objection. As will become apparent in due course, my definition is similar to, but importantly different from, one that Bennett discusses in *Making Things Up* (2017). My conclusion will be that the **Heresy** does not give us a reason to abandon the prospects of characterizing the fundamental in terms of grounding.

Here is the plan. In the remainder of this section, I will clarify the scope of the article and offer a few preliminary remarks. In section 2, I will consider Bennett's (2017, p. 136) formulation of fundamentality that accommodates the **Heresy** and reformulate **FUL** accordingly. As I will explain, the proposed strategy accommodates possible non-asymmetric cases of grounding. Namely, this view accepts that it can be that for some x and some y, x grounds y and y grounds x. In

4 Wilson (forthcoming) discusses the same case against the asymmetry of essential dependence.

5 Similar considerations against a conception of the fundamental as a form of ontological independence are raised by Barnes (2018).

6 Some grounding theorists would claim that facts only stand in grounding relations. The Inadequacy Objection against **FUL** and the discussion that follows can be reframed to accommodate this claim.

the same section, I will stress the differences between the Bennettian framework and the proposed one. Section 3 will be devoted to showing the workings of the revised version of **FUL**. I will do so by considering some representative grounding structures. As will become clear there, the proposed non-asymmetric version of **FUL** allows the grounding theorist to avoid the Inadequacy Objection. Lastly, in section 4, I will discuss two objections raised by Wilson (2019) against Bennett's characterization. These objections carry over to the proposed approach. However, I will show that they do not represent a fatal threat.

Let us start with some necessary clarifications. First, the possibility of fundamental and yet mutually grounded entities is not the *only* strategy to argue against **FUL**. For example, Wilson (2014, 2016a), who endorses a *primitivist conception* of the fundamental, discusses a battery of arguments against **FUL**. My aim here is different and more self-contained. I endeavour to show that we can define the fundamental in terms of grounding in such a way that it captures the **Heresy**. It is not my aim to discuss whether a primitivist framework about the fundamental is preferable to a grounding-based approach. Therefore, I will not evaluate the arguments in favour of a primitivist conception of fundamentality. It is worth stressing, however, that the Inadequacy Objection does not suffice *on its own* to establish the primitivist view. The Inadequacy Objection alone only shows that a definition of the fundamental as the ungrounded is problematic.

Second, I wish to remain neutral on whether grounding is best understood as a relation or a sentential operator (e.g., Fine, 2012). My strategy to accommodate the **Heresy** does not require us to choose sides. To facilitate the discussion, I will treat grounding as a relation obtaining between entities. Since there is no consensus on the relata of grounding relationships, I shall maintain a liberal stance. Talk of entities should be interpreted as picking out whatever entities of suitable categories can entertain grounding relations.

Third, it is useful to flag a distinction between *full* and *partial* grounding. Roughly, x fully grounds y if x on its own fully accounts for y, and x partially grounds y if x on its own partially accounts for y. That is, x partially grounds y if x with some other entities taken together fully ground y. To give a familiar example, A partially grounds the conjunction A&B, whereas A and B taken together fully ground A&B. As is now standard, I assume that full grounding entails partial grounding, but not *vice versa*. In what follows, my focus will be on full grounding unless specified otherwise.

Fourth, the Inadequacy Objection targets what I understand to be the orthodox view of grounding. On this view, grounding is irreflexive, asymmetric and transitive (e.g., Schaffer, 2009, p. 376; Rosen, 2010, pp. 115–116; Audi, 2012, pp. 692–693). As I will explain in more detail in section 2, my proposal to accommodate the **Heresy** is to embrace a non-asymmetric conception of

grounding. Thus, this strategy clashes with grounding orthodoxy. However, if grounding is not asymmetric, it cannot also be irreflexive and transitive. We must choose between (i) irreflexivity and non-transitivity and (ii) non-irreflexivity and transitivity. I will discuss these options in section 3. For now, it is worth registering that what motivates the asymmetry of grounding is the idea that it is an explanatory relation. On this conception, grounding relationships are asymmetric *because* explanations are (e.g., Raven, 2015, p. 327). Of course, this a contentious claim. It is wise to avoid diving into the intricate debate of how grounding and explanation relate (for an extensive discussion about the connection between these notions, see Maurin, 2019). For the purposes of this article, two considerations in favour of the coherence of renouncing the asymmetry of grounding will suffice. The first consideration: one could argue that there are symmetrical explanations and, therefore, grounding ought to be regarded as non-asymmetric (e.g., Thompson, 2016). The second consideration: one could say that the centrality of grounding in our metaphysical theorizing (e.g., Schaffer, 2009, pp. 373–377; Fine, 2012, pp. 40–42) gives us reasons for privileging how it permits a definition of the fundamental even if this requires us to deny its asymmetry. To put it differently, the approach I will defend in section 2 will suit any grounding theorist who is willing to give up the asymmetry of grounding for the sake of the fundamental. Of course, these considerations do not establish the non-asymmetry of grounding. Yet they offer us a way to defend the coherence of denying the asymmetry of grounding.

The last remark: for the sake of argument, I assume the truth of the **Heresy**. The assumption is crucial. An effective strategy to block the Inadequacy Objection is to deny the truth of the **Heresy**. For example, the advocate of the orthodox view could invoke the asymmetry of grounding to rule out the possibility of fundamental mutually grounded entities. While it remains an available option for the defender of **FUL**, there are two good reasons to eschew this approach.

First, the denial of the **Heresy** implies a theoretically loaded restriction on the realm of metaphysical possibilities (Wilson, 2014, pp. 560–561). we should rule out what it seems to be a genuine option, namely that there can be fundamental and yet mutually grounded entities. This move makes **FUL** less ecumenical and, therefore, less methodologically attractive than one might initially believe.

Second, I aim to persuade the reader that even if the **Heresy** *were* true, it *would* still be possible to define the fundamental in terms of grounding. This result is significant in a few respects. The proposed definition does not require us to make any restrictions, *from the armchair*, on what is metaphysically possible. More generally, it leaves open the possibility of symmetric grounding – be it among fundamental or non-fundamental entities. Therefore, methodologically speaking, it is more permissive. Lastly, this approach is ideologically

parsimonious. If we can maintain a definition in terms of grounding, then we could avoid invoking another primitive notion to characterize the fundamental. It is fair to say that such theoretical unity is a desirable virtue.

Having clarified these preliminary remarks, I will now turn to revising **FUL** in such a way that it enables us to accommodate the **Heresy** and, therefore, escapes the Inadequacy Objection. After that, I will put the revised version of **FUL** to work.

2. Reformulating FUL

To escape the Inadequacy Objection, I submit a two-fold strategy. The first step is to embrace the possibility of *non-asymmetric* grounding. The second consists of reformulating **FUL** (section 1) in a way that permits us to capture the possibility of fundamental mutually grounded entities. I shall consider each step in turn.

To accommodate possible cases of non-asymmetric grounding, we need to endorse a non-asymmetric conception, one which countenances the possibility that *some* entities x and y are such that (1) x grounds y and (2) y grounds x. An example will illustrate. Consider a magnet. It seems plausible that the fact that the magnet has a north magnetic pole grounds the fact that the magnet has a south magnetic pole (Priest, 2014, p. 178, and Bliss, 2018, p. 73, offer the same example). Similarly, we can claim that the fact the magnet has a south magnetic pole grounds the fact that it has a north magnetic pole. Thus, it appears plausible that these facts are mutually grounded.[7]

Why adopt a non-asymmetric conception of grounding? Because of the theoretical benefits it brings us. By welcoming the non-asymmetry of grounding, we can enjoy two major advantages.

The first, which I shall unpack in the next section, is that we can define the fundamental in terms of grounding in such a way that it evades the Inadequacy Objection.

The second is that we can account for possible cases of symmetric grounding straightforwardly. The mutual grounding of the magnetic poles of a magnet is one example. Another one has been presented by Thompson (2016) who suggests, borrowing from Fine (2001, p. 11), that the parameters of mass, density and volume of a homogeneous fluid are mutually related in a way such that they can be regarded as grounded in each other. The value of any two parameters

7 Presumably, someone might protest that the grounding relationship between the magnetic poles in question is only partial. For example, one might argue that the poles are also partially grounded on the magnetic field of the magnet itself (cf. Bennett, 2017, p. 37). However, the example is simply meant to illustrate how symmetric grounding looks. Here the example focuses on *facts* to help the reader. But nothing relevant hangs on this choice.

might be said to ground the other one. The volume of a portion of a homogeneous fluid is grounded in its mass and density; its density is grounded in its mass and volume, and its mass is grounded in its density and volume. On the orthodox view, which takes grounding to be asymmetric, we are seemingly forced to privilege one of these grounding relationships over the others. But nothing seems to give us a principled way to make our decision. By contrast, the grounding theorist who accepts that sometimes grounding can be symmetric escapes this difficulty. Of course, the question of whether the mass, volume, and density of a homogeneous fluid are *really* symmetrically grounded remains. The point here is different, namely that if we grant that symmetric grounding is at least metaphysically possible, then a theory that can accommodate it is preferable to one that does not.

Suppose these advantages convince you. Now let us consider the second step of the strategy, namely the reformulation of **FUL**. To do so, we can draw from a formulation that Bennett discusses in her *Making Things Up* (2017, pp. 102–136). As will become clear in due course, my definition of fundamentality is similar to, but importantly different from, the one that Bennett proposes to capture the possibility of fundamental mutually *built* – in her terminology – entities. Here is the Bennettian formulation:

Independence*. *x* is independent* just in case for all *y* such that *y* builds *x*, *x* builds *y*. (Bennett, 2017, p. 136)

According to Bennett (2017, p. 136), **Independence*** is an "easy replacement" of her preferred definition of the fundamental, which I outline below, to deal with the **Heresy**. Accordingly, an entity is fundamental just in case it is independent*. In a similar fashion, I submit the following definition of fundamentality, which is a suitably revised version of **FUL**:

Reformed FUL. An entity *x* is fundamental if and only if for every entity *y*, if *y* grounds *x*, then *x* grounds *y*.

There is a striking similarity between **Independence*** and **Reformed FUL**. So, let me stress some noteworthy differences between the proposed approach and the Bennettian one.

To start, Bennett *does not adopt* **Independence***. For example, Bennett claims that she does "not endorse the claim that absolute fundamentality is **Independence***" (2017, p. 136; original emphasis). Instead, Bennett's preferred definition of the absolutely fundamental is **Independence**.

Independence. *x* is independent if and only if *x* is not built by anything (Bennett, 2017, p. 105).

From the viewpoint of the Bennettian framework, something is fundamental just in case it is unbuilt. The notion of *building* captures a diverse family of relations of metaphysical dependence which share some individuating features: they are irreflexive, asymmetric, necessitating and generative (in the sense that *builders* produce what is *built*). Some examples of building relations are mereological composition, constitution, set formation, realization, causation and grounding (Bennett, 2017, pp. 6–16). **Independence** can be interpreted in a restricted or unrestricted sense. In the restricted sense, to be fundamental is to be independent with respect to some specific building relation. In the unrestricted sense, to be fundamental is to be independent with respect to *any* building relation.

Like **FUL**, **Independence** is inconsistent with the **Heresy**. However, Bennett (2017, pp. 44–47) defends the normative claim that we ought not to accept the possibility of symmetric building. Bennett contends that if we sanction cases of symmetric building, then the following principle that regiments *relative fundamentality relations* of "being more fundamental than", where *B* denotes some building relation, turns out to be false:

B → MFT. For all *x* and *y*, and all building relations *B*, if *x* at least partially *B*s *y* then *x* is more fundamental than *y*. (Bennett, 2017, p. 40)

Since this consequence is unattractive, Bennett says, we should preserve the asymmetry of building and, thus, of grounding.

In response, the advocate of non-asymmetric grounding could argue that even if we concede that this is a problematic upshot, the possibility of amending **B → MFT** is unscathed. For example, on the non-asymmetric conception of grounding, it is tempting to revise **B → MFT** as follows:

G → MFT. For all *x* and *y*, if *x* partially grounds *y* and *y* does not partially ground *x*, then *x* is more fundamental than *y*.

While **G → MFT** might face some unexpected complications, it represents a way to preserve a linking principle between grounding and relative fundamentality.[8] Thus, the falsity of **B → MFT** does not score a decisive point against the non-asymmetry of grounding.

We should note two further but related points. First, if we accommodate non-asymmetric cases of grounding, the falsity of **B → MFT** is a feature, not a bug. To put it differently, the advocate of the non-asymmetric conception would disagree with Bennett about the unacceptability of the falsity of **B → MFT.** Another plausible motivation for denying **B → MFT** is that this principle does not hold in

8 Rabin (2018, p. 43) proposes a similar principle. Since my focus is on the *absolute* sense of fundamentality, I shall not explore **G → MFT** further.

in symmetric cases. Think again of the magnetic poles of the magnet. At least intuitively, neither magnetic pole should be more fundamental than the other. By contrast, **B** → **MFT** yields the implausible result that one magnetic pole is more fundamental than the other, and *vice versa*. Second, the adoption of **Independence** faces the Inadequacy Objection again. By ruling out the **Heresy**, **Independence** demands a theoretically loaded restriction on what is metaphysically possible.

To summarize the difference with the Bennettian framework, the proposed approach accommodates the possibility of non-asymmetric grounding. That is, on this view, grounding is not a building relation. Relatedly, the claim here is that **Reformed FUL** is not just an "easy replacement" of **FUL**. Rather it is that **Reformed FUL** is a more suitable definition of the fundamental for it captures the **Heresy**.

3. Putting Reformed FUL to Work

Now I turn to illustrate how **Reformed FUL** works. Unfortunately, this part is somewhat clunky. It is necessary, however, to persuade the reader of the appeal of the proposed strategy. For the sake of keeping the focus on the mechanics of **Reformed FUL**, I shall consider some toy examples.

Imagine a possible world where only entities A and B exist and are such that (1) A grounds B and (2) B grounds A. We can visually represent this situation as follows (Figure 1), where the bidirectional arrow represents the symmetric grounding relationship between A and B.

In this world, A is fundamental: the conditional on the right-hand side of **Reformed FUL** ("for every entity *y*, if *y* grounds *x*, then *x* grounds *y*") is true. Namely, it is true that A grounds B and B grounds A. By parity of reasoning, B is also fundamental in this world. Therefore, **Reformed FUL** accommodates the

Figure 1. A grounding structure in which two entities are mutually grounded.

Table 1. The truth table for the grounding structure illustrated in Figure 1.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = A, *y* = B	T	T	T	T
x = B, *y* = A	T	T	T	T

possibility of fundamental mutually grounded entities. In this grounding structure, A and B are fundamental and yet mutually grounded. A truth table (Table 1) will help the reader (the column on the far left represents the assignment of A and B to the variables).

The most important consequence of this result is that **Reformed FUL** allows us to escape the Inadequacy Objection (section 1). Recall that the objection is that a definition of the fundamental as the ungrounded should be resisted because it rules out the **Heresy** from the armchair, thereby restricting the realm of metaphysical possibilities inappropriately. **Reformed FUL** not only permits the **Heresy**, but it also provides us with a necessary and sufficient condition for the fundamentality of mutually grounded entities. It is, therefore, a better characterization.

Now let us consider a different possible world, where only A, B and C exist. In this world, A and B ground each other, and C grounds only A. Figure 2 depicts the grounding structure in question, where the arrows represent the relevant grounding relationships (the bidirectional arrow represents the symmetric grounding between A and B; the unidirectional arrow represents the asymmetric grounding of A upon C).

Are A and B fundamental in this world? It is useful to consider the relevant truth tables in which A, B and C replace the variables in **Reformed FUL**. Since more entities are involved in this structure, the task of assessing which of them are fundamental is slightly more complicated: it requires us to consider all the grounding relationships that one entity bears to the other ones.

Consider the question of whether A is fundamental in this possible world. This time, two entities can replace *y* in **Reformed FUL**, namely B and C. Bearing this point in mind, let us have a look at the relevant truth table (Table 2).

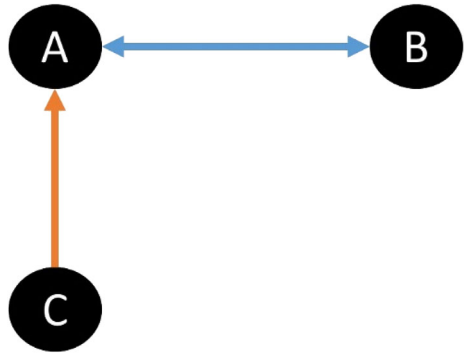

Figure 2. A grounding structure in which two entities are mutually grounded and of them is asymmetrically grounded in a further entity.

Table 2. The truth table for the entity A in the grounding structure illustrated in Figure 2.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = A, *y* = B	T	T	T	T
x = A, *y* = C	F	T	F	F

Table 3. The truth table for the entity B in the grounding structure illustrated in Figure 2.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = B, *y* = A	T	T	T	T
x = B, *y* = C	F	T	F	F

Table 4. The truth table for the entity B in the grounding structure illustrated in Figure 2 if grounding were not transitive.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = B, *y* = C	F	F	T	T

Reformed FUL yields that A is *not* fundamental: it is not true that for every *y* in this grounding structure, if *y* grounds A, then A grounds *y*. As the bottom line of the truth table tells us, C grounds A but A does not ground C. Therefore, **Reformed FUL** is false for A.

Now consider B and its truth table (Table 3). It should not be surprising to discover that B, like A, is not fundamental.

The conditional on the right-hand side of **Reformed Ungroundedness** is false: it is not the case that for every *y* in this grounding structure, if *y* grounds B, then B grounds *y*. Assuming that grounding is transitive, C transitively grounds B, but B does not ground C. Interestingly, B *would be* fundamental per **Reformed FUL** if grounding *were not* transitive. The bottom line of the truth table would be as represented by Table 4 (the top line is the same as in Table 3). Both antecedent and consequent of the conditional on the right-hand side of **Reformed FUL** would be false for C; so the conditional would be true.

Now let us consider C. Is it fundamental? If we run **Reformed FUL**, the answer is positive: the conditional on the right-hand side of **Reformed Ungroundedness** is true for both A and B as illustrated by the relevant truth table (Table 5).

Table 5. The truth table for the entity C in the grounding structure illustrated in Figure 2.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = C, *y* = A	T	F	T	T
x = C, *y* = B	T	F	T	T

Table 6. The truth table for the entity C in the grounding structure illustrated in Figure 2 if grounding were not transitive.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = C, *y* = B	F	F	T	T

Figure 3. A hierarchical grounding structure in which there are two asymmetrically grounded entities and an ungrounded one.

Note that if grounding is not transitive, the consequent "C grounds B" is false. But of course, the conditional on the right-hand side of **Reformed Ungroundedness** is true. Thus, C remains fundamental. The bottom line of Table 5 would be replaced by the following one (Table 6).

Now let us consider another possible world where there are only three entities that form a paradigmatic hierarchical grounding structure: F grounds G, and G grounds R (see Figure 3).

In this structure, F is the terminating entity. According to **FUL**, F would be fundamental as it is ungrounded. Fortunately, as illustrated by the relevant truth table (Table 7), **Reformed FUL** maintains this result: for every *y* in this grounding structure, it is true that if *y* grounds F, then F grounds *y*.

Table 7. The truth table for the hierarchical grounding structure illustrated in Figure 3.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = F, *y* = G	T	F	T	T
x = F, *y* = R	T	F	T	T

Note that if grounding is not transitive, then "F grounds R" is false. But the conditional "if R grounds F, then F grounds R" is true. Therefore, F is still fundamental.

Lastly, let us consider a possible world where only F exists. **Reformed FUL** gives us that F is fundamental: since there are no *y*s, the conditional on the right-hand side of **Reformed FUL** is vacuously true for F. Thus, **Reformed FUL** captures the original sense of the fundamental as the ungrounded.

The previous cases are admittedly simple. More complex grounding structures may be more challenging to assess, for we need to evaluate the conditional on the right-hand side of **Reformed FUL** for each entity in the grounding structure under scrutiny. However, the recipe is the same: to assess whether an entity *x* of a grounding structure is fundamental, we run **Reformed FUL** and ascertain whether the conditional "for every entity *y*, if *y* grounds *x*, then *x* grounds *y*" is true.

Unsurprisingly, **Reformed FUL** is sensitive to the formal features of grounding. By accepting non-asymmetric cases of grounding, it is not possible to maintain both irreflexivity and transitivity – as the orthodox view of grounding dictates.

The logic of relations presents two options to us: one is to preserve transitivity while renouncing irreflexivity, the other is to keep irreflexivity while rejecting transitivity. It is important to note that the decision hangs on various considerations. Some might be tightly connected with the project of defining the fundamental in terms of grounding. For example, someone could argue that we ought to leave open the possibility of fundamental self-grounded entities (e.g., Wilson, 2014, p. 560) and, therefore, we should deny irreflexivity. Others might relate to connections that grounding has with explanation. For example, one could argue that we should preserve irreflexivity because grounding is a form of "metaphysical" explanation: given the principle that nothing explains itself, we should not allow for the possibility that something can ground itself (e.g., Raven, 2013, p. 193). Of course, these claims are controversial. Here I will not attempt to adjudicate the choice between irreflexivity and transitivity. An exhaustive assessment of the considerations for and against each of these options would be the topic of a separate investigation. However, it is worth stressing that both options are compatible with the definition of the fundamental as **Reformed FUL**.

Let us consider the option of preserving irreflexivity while rejecting transitivity first. Fairly obviously, this approach does not permit the possibility of self-

grounded entities, be they fundamental or not. However, the resulting view allows for the possibility of circular grounding structures that, in their simplest form, take the following shape: A grounds B and B grounds A. The attentive reader will note that this structure is the first one which has been discussed in this section (see Figure 1 and Table 1). Recall that **Reformed FUL** gives us that both A and B are fundamental. For the sake of brevity, I shall not repeat the discussion.

Now consider the option of preserving transitivity while rejecting irreflexivity. By opting for this view, we also accept the possibility of circular grounding structures of the form A grounds A (of course, grounding loops of this sort could be more complicated). If there is an entity A that grounds itself, and nothing else grounds A, **Reformed FUL** yields that A is fundamental. **Reformed FUL** is therefore compatible with the possibility of fundamental self-grounded entities.[9]

Someone might wonder which of the previous options is preferable. Of course, a complete non-asymmetric theory of grounding should take a stance on this matter. But here I shall not attempt to decide the choice between irreflexivity and transitivity. My aim is not to elucidate the logic of grounding. Rather my goal is to show how to accommodate the **Heresy**. Accordingly, there are two key points of this section:

(1) Once we embrace the possibility of non-asymmetric grounding, it is possible to formulate a definition of the fundamental, such as **Reformed FUL**, which eschews the Inadequacy Objection.
(2) **Reformed FUL** is compatible with other non-orthodox views about the formal features of grounding, such as those that deny irreflexivity or transitivity or both.

To sum up, **Reformed FUL** is a more suitable definition of the fundamental in terms of grounding than **FUL**. If we adopt this definition, the **Heresy** does not undermine the project of characterizing the fundamental in terms of grounding.

4. Two Objections Addressed

Lamentably, **Reformed FUL** is not exempt from difficulties. In the remainder of the article, I shall consider two of them that are worthy of consideration and are raised by Wilson (2019, pp. 502–503) against Bennett's **Independence***. Given the similarity of the formulations, the same objections also target **Reformed FUL**. Let us call them the *Strong Emergence Objection* and the *Selection*

9 It is worth acknowledging the possibility that some grounding theorists might combine arguments for rejecting *both* transitivity and irreflexivity. On the emerging view, grounding is non-asymmetric, non-irreflexive and non-transitive. For a more detailed treatment of circular grounding structures and their variants, see Bliss (2018) and Nolan (2018).

Objection, respectively. I will argue that these can be successfully resisted, or at least mitigated significantly.

The Strong Emergence Objection goes as follows: **Independence*** "won't accommodate the fundamentality of strongly emergent goings-on, which may be partly and *asymmetrically* constituted by fundamental physical goings-on" (Wilson, 2019, p. 502; emphasis added).

As a starter, let me say a few words about the notion of emergence. In broad strokes, an emergent entity is typically a higher-level, complex entity which is, in some sense, *over* and *above* – ontologically and causally – the lower-level, less complex entity (or entities) upon which it depends synchronically. A *strongly emergent* entity is a higher-level, complex entity (an oak tree, a human being, a mental state) that is synchronically dependent upon some lower-level, less complex physical entities (some organized group of cells, arrangements of molecules, a neuronal state) and yet ontologically irreducible to, and causally distinct from, the lower-level physical entity upon which it depends (see Wilson, 2016b, for a detailed analysis of metaphysical emergentism). This conception is usually taken to imply that strongly emergent entities are irreducible to their physical bases. For example, the claim that a conscious state of a person is strongly emergent can be understood as implying that it is ontologically and causally irreducible to the neuronal state upon which it depends at that time.

Now let us observe that the Strong Emergence Objection applies to **Reformed FUL** as well. If a strongly emergent entity is grounded *asymmetrically* in some fundamental physical entities, then **Reformed FUL** yields that the strongly emergent entity is *not* fundamental. Suppose, for example, that E is a strongly emergent entity which is asymmetrically grounded in some entity F – as illustrated in Figure 4. Since it is false that "if F grounds E, then E grounds F", E is not fundamental by **Reformed FUL**.

Therefore, **Reformed FUL** fails to accommodate the view that strongly emergent entities are fundamental and yet asymmetrically dependent. Here someone could raise an Inadequacy Objection against **Reformed FUL**: we should reject this definition of the fundamental because it rules out a metaphysical live option – namely, the possibility that there are fundamental yet emergent entities.

The Strong Emergence Objection has some teeth, but it does not represent a fatal threat to the proposed account. Indeed, **Reformed FUL** (or **Independence***) does not permit fundamental strongly emergent entities if these are supposed to be asymmetrically grounded in something else. But this is not to say that the advocate of **Reformed FUL** (or **Independence***) has no room for strongly emergent entities in their view. We have, therefore, a way to

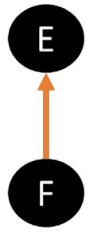

Figure 4. A grounding structure in which one emergent entity is asymmetrically grounded in another one.

lessen the charge of inadequacy.[10] For example, the advocate of **Reformed FUL** could argue that the "fundamentality" of strongly emergent entities is neither ungroundedness nor mutual groundedness.

As Wilson notes elsewhere (2016b, p. 347), there are several ways of thinking of the "fundamentality" of strongly emergent entities (the British Emergentists, Cunningham, 2001; O'Connor, 2002; Wilson, 2002; Barnes, 2012). The Strong Emergence Objection establishes only that **Reformed FUL** and **Independence*** are incompatible with one conception among many. Other options remain available (see Wilson, 2016b, for an overview of theories of metaphysical emergence). For example, the grounding theorist who holds **Reformed FUL** could think of the "fundamentality" of strongly emergent entities *à la* Wilson (2016b, pp. 353–363; see also Wilson, 1999, 2005, 2011) – namely, in terms of the *causal novelty* of the features of the strongly emergent entity as compared to the causal profile of the lower-level entities upon which they depend. We could adopt Wilson's *new power condition* and say that a feature of a strongly emergent entity is novel with respect to the features of an entity P on which it depends on a certain occasion just in case "it has at least one token power not identical with any token power of P on that occasion" (Wilson, 2016b, p. 356).[11] Here, we can think of a power as a "shorthand for talk of what causal contributions possession of a given feature makes (or can make, relative to the same laws of nature) to an entity's bringing about an effect, when in certain circumstances" (Wilson, 2016b, p. 354). To use the previous example, the conscious state in question is strongly

10 By contrast, note that the Inadequacy Objection against **FUL** does not seem to permit a similar mitigation. The advocate of the orthodox view of grounding cannot admit fundamental mutually grounded entities.

11 A respectable discussion of Wilson's theory of strong emergence would demand a separate investigation. Here I am presenting Wilson's idea of causal novelty to illustrate an alternative conception of the fundamentality of strongly emergent entities. See Yates (2016, 2018) for another powers-based approach to strong emergence.

emergent just in case it has one power that is not identical with any power of the neuronal state upon which it depends on that occasion.

The grounding theorist, who is persuaded by this strategy, can maintain that a strongly emergent entity E is grounded asymmetrically in some entity F and yet E is "fundamental" in the sense that E's causal profile comprises some non-identical, and thus novel, power as compared to F (Wilson, 2016b, p. 362).[12] Bennett (2017) could appeal to a similar strategy to defend **Independence***.

Now let us consider the Selection Objection. As Wilson (2019, p. 502) puts it: "since many mutually dependent goings-on are not fundamental, something besides building or its absence must be wheeled in to select dependent goings-on that are fundamental". As I understand it, the objection is that **Independence*** does not distinguish *on its own* between fundamental and non-fundamental mutually dependent entities.

One might think that **Reformed FUL** is within the firing range of the same objection. Consider two mutually grounded entities A and B. According to **Reformed FUL**, A and B are fundamental (see Figure 1 and Table 1). But if we embrace the possibility of symmetric grounding among fundamentalia, then we should also accommodate the possibility of mutually grounded entities that are *not* fundamental. Said differently, it should not *always* be the case that two mutually grounded entities, such as A and B, are fundamental. Otherwise, this result would undermine the claim that **Reformed FUL** is an adequate definition of fundamentality.

On closer inspection, however, it seems that **Reformed FUL** escapes the Selection Objection: *only* mutually grounded entities that satisfy the conditional "for every entity *y*, if *y* grounds *x*, then *x* grounds *y*" on the right-hand side of **Reformed FUL** are fundamental (section 2). Here is the crucial consequence. It follows from the definition of **Reformed FUL** that an entity *x* is *not* fundamental if there is at least an entity *y* such that *y* grounds *x*, but not *vice versa*. Accordingly, the non-fundamental entities are those that are asymmetrically grounded in something else. Of course, this applies to mutually grounded entities as well. Thus, two mutually grounded entities are not fundamental if there is at least another entity that asymmetrically grounds them.

These logical considerations are important because they offer a response to the Selection Objection. **Reformed FUL** is already capable of discriminating between fundamental and non-fundamental mutually grounded entities without any extra support: the quantifier on the right-hand side of the definition serves

12 As Wilson (2016b, p. 350) notes, the lower-level entities on which emergent ones depend are typically taken to be physically acceptable relational entities such as a system of molecules or a neuronal state.

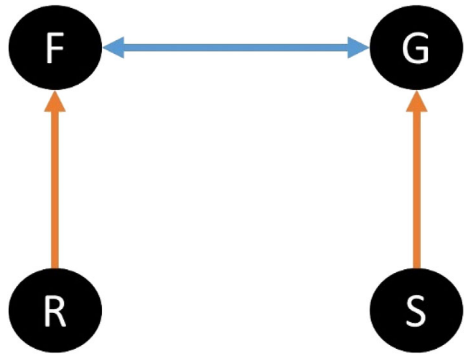

Figure 5. A grounding structure in which two mutually grounded entities are asymmetrically grounded, respectively, in two other entities.

this purpose well. In short, it is not the case that **Reformed FUL** renders *all* mutually grounded entities fundamental (I shall discuss **Independence*** and the Selection Objection in a moment).

To illustrate how **Reformed FUL** escapes the Selection Objection, let us consider the following grounding structure. Suppose that two entities F and G are mutually grounded and, in turn, that F and G are asymmetrically grounded in two other entities R and S, respectively. Figure 5 represents this structure.

Now recall that if the Selection Objection were sound, then **Reformed FUL** alone would not yield that F and G are not fundamental. But if we run **Reformed FUL**, then we obtain this very result as the relevant truth tables illustrate (Tables 8 and 9). Table 8 is the truth table for F.

F is *not* fundamental in this structure because it is not true that for every *y*, if *y* grounds F, then F grounds *y*. F grounds neither R nor S (here I am assuming that S grounds F transitively; if grounding is not transitive, then the conditional in the bottom line would be true because "S grounds F" is false).

Now let us consider G. The recipe is the same and gives us the resulting truth table (Table 9).

G is also *not* fundamental in this structure because, like F, G grounds neither R nor S (here I am assuming that R grounds G transitively; if grounding is not transitive, then the conditional in the middle line would be true because "R grounds G" is false). Thus, it appears that this is a structure in which two entities, F and G, are mutually grounded and yet *not* fundamental. A theory that adopts **Reformed FUL** does not jeopardize the possibility of non-fundamental yet mutually grounded entities.[13]

13 Since I have illustrated at length how mutually grounded entities can be fundamental in accordance with **Reformed FUL** in the previous section, I shall not repeat the discussion.

Table 8. The truth table for the entity F in the grounding structure illustrated in Figure 5.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = F, *y* = G	T	T	T	T
x = F, *y* = R	F	T	F	F
x = F, *y* = S	F	T	F	F

Table 9. The truth table for the entity G in the grounding structure illustrated in Figure 5.

	x grounds *y*	*y* grounds *x*	If *y* grounds *x*, then *x* grounds *y*	*x* is fundamental
x = G, *y* = F	T	T	T	T
x = G, *y* = R	F	T	F	F
x = G, *y* = S	F	T	F	F

Importantly, **Reformed FUL** can distinguish between fundamental and non-fundamental mutually grounded entities without demanding foreign manoeuvres. We do not need to invoke extra resources in our framework to assess whether some mutually grounded entities are fundamental or not. Thus, **Reformed FUL** evades the Selection Objection. However, I grant that the previous case might be slightly far-fetched. My claim is not that *all* non-fundamental mutually grounded entities stand in grounding relationships in the same fashion that F and G do. Instead, my claim is that it suffices that two mutually grounded entities are asymmetrically grounded in some other entity for them being not fundamental.

What about **Independence***? It seems that the strategy I have just outlined is also available to the advocate of such a definition. If we define the fundamental in terms of **Independence***, then an entity is not fundamental if it is asymmetrically built by something else. Similarly, two mutually built entities are not fundamental if they are asymmetrically built by some further entity. We could think of a structure as the one illustrated in Figure 5 in terms of building. The statement "for all *y* such that *y* builds *x*, *x* builds *y*" of **Independence*** would be false for both F and G. As illustrated by the truth table (Table 8), it is not the case that "for all *y* such that *y* builds F, F builds *y*". R and S are not built by F. Likewise, as illustrated by truth table 9, it is not the case that "for all *y* such that *y* builds G, G builds *y*". Once again, R and S are not built by G. Therefore, it seems that **Independence*** could also avoid the Selection Objection.

Overall, it appears that we can alleviate much of the strength of the Strong Emergence Objection and that **Reformed FUL** does not suffer the Selection Objection. These objections, therefore, should not persuade us to despise

Reformed FUL. However, it is worth noting that Wilson is right in thinking that the Bennettian framework is under threat. While someone who endorses **Independence*** can resist the two objections that Wilson (2019) raises in a similar fashion to that just described, we must recall that Bennett (2017) *does not* embrace this definition. To stress, Bennett (2017, pp. 103, 105, 107) endorses **Independence**, which defines the fundamental as the unbuilt. **Independence** does not tolerate fundamental yet built entities. Nor does it permit mutually built entities – be they fundamental or not. As should be clear by now, **Reformed FUL** can claim three major advantages over unbuilt-ness:

(1) **Reformed FUL** is articulated from the viewpoint of a non-asymmetric conception of grounding, which can accommodate possible cases of symmetric grounding straightforwardly.
(2) **Reformed FUL** captures the **Heresy**, thereby escaping the Inadequacy Objection.
(3) **Reformed FUL** is compatible with the possibility that some mutually grounded entities are not fundamental.

It is therefore fair to conclude that **Reformed FUL** is preferable to **FUL** as well as **Independence**. Let me summarize what I have done so far. In section 1, I illustrated the Inadequacy Objection against **FUL**, which is based on the possibility of fundamental mutually grounded entities. In section 2, I defended an alternative definition of fundamentality that draws on Bennett's **Independence*** which escapes the Inadequacy Objection, namely **Reformed FUL**. In the same section, I explained the difference between the Bennettian framework and the proposed one. In section 3, I discussed the workings of **Reformed FUL** by showing how it regiments the fundamentality of mutually grounded entities. In this last section, I outlined two responses to the Strong Emergence Objection and the Selection Objection that have been raised against **Independence***. I argued that the former could be mitigated, and the latter resisted. Consequently, it appears that **Reformed FUL** is preferable to **FUL** for it allows the grounding theorist to resist the Inadequacy Objection without denying the possibility of fundamental and yet mutually grounded entities. As I have shown in this article, this possibility undermines only a definition of the fundamental as the ungrounded. Yet it does not force us to abandon the prospects of characterizing, in a more suitable way, the fundamental in terms of grounding.

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