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Meta-ground and amalgamation

Meta-fundamento e amalgamação

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ABSTRACT: Recently, there were several attempts (Rabin & Rabern (2016), Litland (2018), Berker (2018)) to prove that there are some cases in which the fact of the form [P grounds Q] could be itself a ground for Q. In the paper, I will consider the idea that we can prove that the fact that P grounds Q can be a ground for Q by giving up (Amalgamation) (if P grounds Q, and R grounds Q, then (P & R) grounds Q). I will provide the argument that if P and R are different facts such that P is a full ground for R, then grounding is amalgamating; I will also show that there are some cases in which we have that [P grounds Q] grounds Q, yet this fact fails to validate the popular view that P is a ground for [P grounds Q].

Keywords: grounding, meta-ground, Amalgamation, groverlapping, disjunctive grounding.

RESUMO: Recentemente, houve várias tentativas (Rabin; Rabern, 2016; Litland, 2018; Berker, 2018) de mostrar que existem alguns casos em que um fato da forma [P fundamenta Q] pode ele próprio ser um fundamento de Q. Neste artigo, considerarei a ideia de que podemos demonstrar que o fato de que P fundamenta Q pode ser um fundamento de Q ao abandonar (Amalgamação) (se P fundamenta Q e R fundamenta Q, então (P & R) fundamenta Q). Argumentarei que, se P e R são fatos distintos tais que P é um fundamento completo de R, então a relação de fundamentação é amalgamante. Mostrarei também que existem casos em que temos que [P fundamenta Q] fundamenta Q, e ainda assim esse fato não valida a tese amplamente aceita de que P é um fundamento de [P fundamenta Q].

Palavras-chaves: fundamentação, meta-fundamentação, Amalgamação, sobreposição de fundamentos, fundamentação disjuntiva.

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1 Meta-grounding problem and LCC-facts

Metaphysical grounding is one of the hottest topics in the contemporary philosophical literature. One of the most pressing challenges for theorists is the so-called “meta-grounding problem” (MGP) – that is, a question of what (if anything) grounds grounding facts. Suppose, for instance, that a fact Q is grounded[1] in the fact P. What than is a ground for the fact that [P grounds Q]?

When it comes to the question of why there must be a ground for “P grounds Q”, some philosophers may reply to (MGP) negatively in the sense that “P grounds Q” may be ungrounded. Consider, for instance, the following views: (N1) Suppose that not every true proposition expresses some fact (Audi 2012). It is then possible to reply to (MGP) in the following way: if P grounds Q, then there is such a true proposition as “P grounds Q”, but there is no such fact as [P grounds Q], so it is meaningless to ask what grounds it. In that case, however, we may simply reformulate the whole problem and ask, informally, the following question: if Q holds in virtue of P, then in virtue of what Q holds in virtue of P? (Litland, 2020, p. 136).

(N2) Many philosophers (for example, see Sider (2020) and Correia (2023)) hold the view that if P and Q are both grounded facts, then the fact that P grounds Q is also a grounded fact. However, the question of whether *any* fact of the form [P grounds Q] is grounded becomes much less obvious if P is taken to be fundamental (ungrounded) fact. Suppose, for instance, that P is a fact belonging to the fundamental level of reality[2] (say quantum-mechanical fact), and Q is some derivative (non-fundamental) fact grounded in P. Then a fact [P grounds Q] clearly indicates that there is a link connecting different levels of reality: fundamental level (represented by P) and non-fundamental level (represented by Q). However, this clearly poses the question as to which level of reality the fact [P grounds Q] belongs (Sider 2011). Those who believe that [P grounds Q] belongs to the non-fundamental level of reality must then explain how this fact could be a partial ground for the fact that that there is a grounding connection between fundamental and non-fundamental levels of reality. According to Sider`s (2011) argument from Purity (see below), no fact of the form [P grounds Q] must *be considered* as a fundamental fact, for this would entail that [Q] is also fundamental; but the other way is simply to deny that grounding could serve as a level-connector between different levels of reality and, correspondingly, to deny the claim that grounding is even able to represent correctly the layered structure of reality (for a discussion, see Wilson (2014) and Della Rocca (2014)).

There are various responses to the effect that every grounding fact concerning some derivative (grounded) fact must itself be grounded. Among them, I will mention two arguments: Sider`s (2011) argument from Purity and Loss`s (2016) argument from Recombination.

(PURITY) Any fundamental fact must include only fundamental notions. Thus, every fact about derivative entities is non-fundamental

(RECOMBINATION) All fundamental facts are freely recombinable. Let “Γ” be a plurality of (contingent) fundamental facts. It is thus possible that any fact in Γ can obtain without any another fact in Γ being obtained

(Argument from Purity) Suppose there is any fact of the form [P grounds Q]. [Q] is clearly a derivative entity. By Purity, since [P grounds Q] is a grounding fact concerning non-fundamental fact, [Q], then

[1] As it is common in the relevant literature, I take the notion of grounding as a sort of metaphysical dependence and accept that grounding is “in-virtue-of” relation. The fact that “P grounds Q” will mean thus that Q holds in virtue of P.

[2] Here “X belongs to the fundamental level of reality” means “X belongs to the plurality of fundamental facts”

this fact must itself be non-fundamental. By definition, "being non-fundamental" is equivalent to "being grounded". Thus, by generalization, every grounding fact is grounded. QED.

(Argument from Recombination) Let "Γ" be a plurality of contingent fundamental facts, and assume that there is a fact such that [Γ grounds P]. Suppose that [Γ grounds P] is fundamental. If it is so, then [Γ grounds P] belongs to Γ – that is, to the plurality of fundamental facts. By Recombination, then, [Γ grounds P] could obtain without any another fact in Γ being obtained. However, if grounding is assumed to be *factive,*

(Factivity) For any facts [P] and [Q], it is necessarily the case that if [P] grounds [Q], then both [P] and [Q] obtain then if [Γ grounds P] obtains, it is the case that both [Γ] and [P] obtain. It follows then that the fact [Γ grounds P] necessitates [Γ], and thus any fact belonging to [Γ][3]. Thus, [Γ] and [Γ grounds P] *are not freely recombinable*. Hence, if all fundamental facts are recombinable, [Γ grounds P] must not be considered as fundamental. It means that [Γ grounds P] is grounded. QED.

Both arguments from Purity and Recombination clearly support the idea that (MGP) plays important role in the debate concerning metaphysical grounding. Those theorists who tend to think that grounding facts are grounded must answer the question of *what* grounds grounding facts. Among various solutions on the market, two main competing accounts should be mentioned: Straight-forward Account (SFA) and Layered Account (LA)

(SFA) Whenever Γ (fully) grounds P, the fact that Γ grounds P is fully grounded in Γ
(LA) Whenever Γ grounds P, both Γ and P are partial grounds for the fact that Γ grounds P

(SFA) has been defended by Bennett (2011), deRosset (2013), and Litland[4] (2017). In turn, (LA) is substantiated by Raven (2009). As it has been argued in the literature, (SFA) is in many ways problematic. Consider, for instance, the following challenges for (SFA). (C1) Bennett (2011, p.32) claims that the grounding relation between Γ and [Γ grounds P] is "superinternal" in the sense that this relation holds in virtue of the "intrinsic nature of only one of the relata – or, better, one side of the relation". This view implies that whenever Γ (fully) grounds P, it belongs to the nature of Γ that if Γ obtain, then Γ is a full ground for the fact that Γ grounds P. In other words Γ itself must guarantee that Γ grounds P. Consider however the following counter-example (Carnino 2016). Assume that the fact that Socrates exists grounds the fact that Socrates`s singleton, {Socrates}, exists. Assuming that grounding facts necessitate what they ground, we have that if [Socrates exists] grounds [{Socrates} exists], then [[Socrates exists] grounds [{Socrates} exists]] grounds [Necessarily, [Socrates exists] grounds [{Socrates} exists]]. (SFA) tells us that the only ground for [[Socrates exists] grounds [{Socrates} exists]] is [Socrates exists]. But if grounding is transitive, then we have that [Socrates exists] is a full ground for [Necessarily, [Socrates exists] grounds [{Socrates} exists]] – in other words, the fact that it is *a matter of necessity* that the existence of Socrates grounds the existence of his singleton

[3] It follows then that the fact that [Γ grounds Q] cannot be necessary. Here is why. Assume that [Γ grounds Q], and that the fact that [Q] obtains. By Factivity, it follows that if [Q] obtains, then all facts in [Γ] do obtain. Suppose now that [Γ grounds Q] is a necessary fact, so it necessarily obtains. It would follow by Factivity that all facts belonging to [Γ] necessarily obtain. This contradicts our assumption that [Γ] is a plurality of contingent facts. Thus, [Γ grounds Q] is contingent (see Loss (2016, section 4)).

[4] It is of partial interest to mention that Litland`s account concerning (MGP) somewhat differs from Bennett`s one. According to Bennett (2011, p.32), the fact that Γ grounds P holds only in virtue of Γ. According to Litland, the fact that Γ *factively* grounds P is grounded in (1) Γ, and (2) in the fact that Γ *non-factively* grounds P (Litland, prop. 6).

obtains simply in virtue of mere existence of Socrates. This seems to be implausible[5]. Notice however that Bennett`s version of (SFA) requires not only that Γ is a full ground for [Γ grounds P], but also relies on much stronger principle (which is sometimes called "Internality"): *if* Γ *grounds P, then it is necessarily the case that whenever all facts in* Γ *obtain, and P obtains, then [*Γ *grounds P] obtains as well*. However, quite the opposite view concerning (MGP) has been defended in the literature, according to which (SFA) does not require us to accept (Internality) (Litland, 2015). But it should be noted that the argument against (Internality) relies on the idea that disjunctive facts are grounded in their true disjunct, which is not unproblematic by itself.

(C2) The second challenge strikes those theorists who accept *unionism* – the view that grounding is nothing more than metaphysical explanation. Assume that Γ fully grounds P. By (SFA), Γ is a full ground for [Γ fully grounds P]. The unionist is thus committed to the claim that [P] and [Γ fully grounds P] both have *the same explanation*. Intuitively, however, [P] and [Γ fully grounds P] are different facts; so those unionists who accept the principle "different facts require different explanations" can protest against (SFA). Notice also that the unionist can argue that [P] and [Γ fully grounds P] in fact have *the same explanation* – Γ – but Γ explains [P] and [Γ fully grounds P] in *two different ways* (Litland 2017, p. 302).

Finally, the following objection can be raised against (SFA). Assume that physical facts ground mental fact. Suppose that some physical fact, R, is a ground for the mental fact Q ("I have a headache"). By (SFA), R fully grounds that R fully grounds Q. By unionism, then, if R explains Q, then R explains that R explains Q. But many will find this implausible (see Wallner 2021, p. 51275): maybe it is true that physical facts explain mental facts, but only few will accept that physical facts explain *why they explain* mental facts.

Recently, however, there were several attempts to prove that there are some cases in which the fact of the form [P grounds Q] could be itself a ground for Q – for instance, the argument of Berker (2018) relying on the application of existential grounding, the argument of Litland (2018) relying on the application of disjunctive grounding, and the argument of Rabin and Rabern (2016) according to which, in some cases, it is plausible to assert that the answer to the question "why Q is the case?" is as follows: "Because P is the case, and because P grounds Q" (Rabin and Rabern (2016) call such cases in which facts of the form [[P grounds Q] grounds Q] obtain "Lewis Carroll Conditions". Following them, I will call facts of this form "LCC-facts" (or just "(LCC)" for short"). The possibility of (LCC) is of crucial importance for the debate between (SFA) and (LA) – if LCC-facts exist, it clearly invalidates (LA). For suppose that the fact [P grounds Q] is a ground for Q. By (LA), both P and Q are grounds for [P grounds Q], so Q is a partial ground for [P grounds Q]. However, if [P grounds Q] is a ground for Q then, by transitivity of grounding, we have that Q partly grounds Q[6], contradicting the claim that metaphysical grounding is irreflexive.

In this paper, I will not consider *all* these arguments in detail. Instead of that, I will focus on the argument which proves the existence of LCC-facts in *purely formal way* – Litland`s (2018) argument from disjunctive grounding. In the section 3, I will lay down the argument that either LCC-facts do not exist, or they fail to validate (SFA).

[5] As Carnino (2016, p. 27) puts it, "The fact that Socrates exists doesn`t itself explain the fact that Socrates` singleton must necessarily exist if he does. Indeed, the modal connection between the existence of a given singleton and the existence of the corresponding individual seems to have little to do with the contingent existence of the individual in question".

[6] It is also clear that (LCC) supports (SFA). Take the (LCC) fact of the form [[P grounds Q] grounds Q]. By (SFA), the only ground for [P grounds Q] is P. So, by transitivity of grounding, we have that P grounds Q, which was assumed to be true.

2 Disjunctive grounding and Amalgamation

Litland (2018) has offered the following argument to the effect that there are some cases in which the fact that A partly grounds B can be itself a partial ground for B. Consider the following construction, "φ":

(φ) $0=0 \lor (0=0 \prec T(\varphi))$
"0=0 or the fact that φ is true is partly grounded in 0=0"[7]

where "≺" denotes partial ground[8], and "<" will stand for full ground. The whole proof relies on the application of disjunctive grounding ("∨-grounding"), according to which φ (if true) is a full ground for $\varphi \lor \psi$:

(∨-grounding) $\varphi \rightarrow (\varphi < (\varphi \lor \psi))$

The argument goes as follows. Suppose that $0=0 \lor (0=0 \prec T(\varphi))$. Then, by (∨-grounding), $0=0 < (0=0 \lor (0=0 \prec T(\varphi)))$. Since $0=0 \lor (0=0 \prec T(\varphi))$ is φ, it follows that $0=0 < \varphi$. However, from (Sumbsumption) and (Truth-grounding)

(Subsumption) $(\varphi < \psi) \rightarrow (\varphi \prec \psi)$
"Every instance of full ground is the instance of partial ground"
(Truth-grounding) $\varphi \rightarrow (\varphi \prec T(\varphi))$
"If it is the case that φ, then φ is a partial ground for the fact that φ is true"

we have that $0=0 \prec T(\varphi)$[9]. Since $0=0 \prec T(\varphi)$ is thus a true disjunct of φ, we have, by (∨-grounding), that $(0=0 \prec T(\varphi)) < (0=0 \lor (0=0 \prec T(\varphi)))$, that is, $(0=0 \prec T(\varphi)) < \varphi$. Again, by (Subsumption) and (Truth-grounding) we have that $(0=0 \prec T(\varphi)) \prec T(\varphi)$ – that "0=0 is a partial ground for truth of φ" is itself a partial ground for truth of φ.

There are at least two immediate worries concerning this proof. The first one concerns the application of (∨-grounding) which is substantial for the whole argument. Following Fine (2010, p. 116-117), (∨-grounding) is not (in general) valid. For consider the sentence ψ such that

(ψ) $0=0 \lor T(\psi)$

Then 0=0 will be, by (∨-grounding), (Subsumption) and (Truth-grounding), a partial ground for ψ, and thus for $T(\psi)$. So $T(\psi)$. Since $T(\psi)$ is a true disjunct of ψ, we have that $T(\psi) < (0=0 \lor T(\psi))$, that is, $T(\psi) < \psi$. Again, by (Subsumption) and (Truth-grounding) we have that $T(\psi) \prec T(\psi)$, contradicting the irreflexivity of grounding

[7] So, φ is clearly self-referential. In this paper, I will not touch the question of whether such a self-referential construction can be produced at all. Instead, I will concentrate on the following question – *provided that φ can be legitimately produced (as Litland (2018) claims), does it follow that LCC-facts do exist (as Litland (2018) shows)*?

[8] A partly grounds B in the sense that there is some C such that A, C fully ground B

[9] This argument relies on the assumption that grounding is transitive: since 0=0 fully (thus, by Subsumption, partly) grounds φ and φ partly grounds T (φ) (by Truth-grounding), we have by Transitivity that 0=0 partly grounds T (φ)

(Irreflexivity) $\neg(\psi \prec \psi)$
"For no ψ ψ is a partial ground for ψ"

Litland agrees that (∨-grounding) is not generally valid and, in the case of the sentence (ψ), T (ψ) must not be considered as a ground for (ψ). He admits however that there is nothing wrong with the assumption that there could be (φ) such that (φ) is $(0{=}0 \vee (0{=}0 \prec T(\varphi)))$. It is true that $((0{=}0 \prec T(\varphi)) < \varphi)$ does not *immediately* entail the violation of (Irreflexivity), so here is a significant difference between (ψ) and (φ); however, in the case of (φ), both 0=0 and $0{=}0 \prec T(\varphi)$ are facts grounding (φ). Here where the problem for (φ) begins. A vast majority of theorists accept the principle of (Amalgamation) saying that if A is a ground for C, and B is a ground for C, then (A, B) is a ground for C:

(Amalgamation) $A \prec C, B \prec C \rightarrow A, B \prec C$
(Notice however that even if some theorists disagree with what (Amalgamation) says, the following principle is uncontroversial)

(Reduction) $(A, B \prec C) \rightarrow (B \prec C)$

Litland does not follow this common view and takes metaphysical grounding to be non-amalgamating (Litland 2018, p. 64); however, many may find this step suspicious and say that rejecting (Amalgamation) is a very high price for the possibility to defend some applications of (∨-grounding). Moreover, once (Amalgamation) is accepted, it can be immediately shown that, together with some plausible principles of grounding, (Amalgamation) implies that the application of disjunctive grounding to (φ) (which gives $(0{=}0 \prec T(\varphi)) \prec T(\varphi)$), when combined with (SFA), violates (Irreflexivity).

To show how (Amalgamation) invalidates $(0{=}0 \prec T(\varphi)) \prec T(\varphi)$), we need two additional premises. The first one is that grounding is transitive

(Transitivity) $A \prec B, B \prec C \rightarrow A \prec C$

The second one is the principle called (Strong Subsumption):

(Strong Subsumption) $\varphi, \Psi < \delta \rightarrow ((\varphi, \Psi < \delta) < (\Psi \prec \delta))$

Litland endorses both (Transitivity) (Litland 2018, p. 61) and (Strong Subsumption) (Litland 2018, p. 59). However, once (Amalgamation), (Transitivity) and (Strong Subsumption) are accepted, it can be immediately shown that we get circles of ground

(A-SFA)

1) $0{=}0 \vee (0{=}0 \prec T(\varphi))$ .... (φ)
2) $(0{=}0 \prec T(\varphi)) \prec T(\varphi)$ .... (Litland`s result)
3) $0{=}0 \prec T(\varphi)$ .... (2), (Factivity)
4) $(0{=}0, (0{=}0 \prec T(\varphi)) < T(\varphi)$ .... (2), (3), (Amalgamation)[10]

[10] Here one may ask the following question. It is clear that $(0{=}0 \prec T(\varphi))$ is a partial ground for T(φ). It is equally clear that 0=0 is a partial ground for T(φ). But why then $(0{=}0, (0{=}0 \prec T(\varphi))$ constitutes a *full* ground for T(φ)? However, the answer to this question will be clear for almost everyone who accepts the existence of (LCC) (at list in the sense of Rabin & Rabern (2016)), We have that T (φ), and we have that $0{=}0 \prec T(\varphi)$. By (LCC), the fact that it is true that (φ) is fully grounded in (1) the fact that 0=0 grounds T (φ), and (2) that 0=0. Hence, by (Amalgamation), (4) follows.

5) $((0=0, (0=0 \prec T(\varphi)) < T(\varphi)) < (0=0 \prec T(\varphi))$ .... (4), (Strong Subsumption)
6) $(0=0, (0=0 \prec T(\varphi)) < ((0=0, (0=0 \prec T(\varphi)) \prec T(\varphi))$ .... (4), (SFA)
7) $(0=0, (0=0 \prec T(\varphi)) < (0=0 \prec T(\varphi))$ .... (6), (5), (Transitivity)
8) $(0=0, (0=0 \prec T(\varphi)) \prec (0=0 \prec T(\varphi))$ .... (7), (Subsumption)
9) $(0=0 \prec T(\varphi)) \prec (0=0 \prec T(\varphi))$ .... (8), (Reduction)
10) $\bot$ .... (9), (Irreflexivity)

The problem with (Amalgamation) is that when grounding is systematically considered to be amalgamating, then we have, in the described scenario, two *distinct* facts each of which is a full ground for φ. So if (Amalgamation) is valid and there is a *single* grounding path from 0=0 and $0=0 \prec T(\varphi)$ to φ, it must be the case that a fact "$0=0 \ \& \ 0=0 \prec T(\varphi)$" is a full ground for φ. In the described scenario with φ, we have that $0=0 < \varphi$, so $0=0 \prec T(\varphi)$. Thus, by (∨-grounding), $(0=0 \prec T(\varphi)) < \varphi$. From this, by (SFA), we have that $(0=0 \prec T(\varphi)) < (0=0 \prec T(\varphi)) < \varphi$. But then 0=0 is not even a partial ground for $(0=0 \prec T(\varphi)) < \varphi$, contradicting (Strong Subsumption). On the other hand, 0=0, by (SFA), is at least a partial ground for $(0=0 \prec T(\varphi))$. By (Transitivity), thus, 0=0 is at least a partial ground for $(0=0 \prec T(\varphi)) < \varphi$. Contradiction! Hence, the motivation to reject (Amalgamation) could be summarized in the following way: there are *two distinct grounding paths* to (full ground of) φ – one from 0=0, and another one from $(0=0 \prec T(\varphi)$, but there is *no single grounding path* from both 0=0 and $(0=0 \prec T(\varphi)$ to (full ground of) φ[11].

Fine (2010, p. 116-117) considers the scenario in which the application of (∨-grounding) leads to the circles of ground, where "φ is true" is a partial ground for "φ is true". It follows then that T (φ), even being a true disjunct of φ, is not a ground for φ, so not every true disjunct can be a ground for the whole disjunction. In Fine`s scenario, we have a self-referential sentence referring to its own truth in its second disjunct. Litland (2018, p. 62) claims that there is nothing wrong with assuming that $0=0 < (0=0 \lor 0=0 \prec T(\varphi))$, so there is nothing wrong with concluding that $(0=0 \prec T(\varphi)) \prec T(\varphi)$. In Litland`s scenario, instead of having a fact that φ is true we have a *grounding* fact that includes φ as its "part". This justifies (∨-grounding), as long as the fact $(0=0 \prec T(\varphi)) \prec T(\varphi)$, as it stands, does not entail the violation of (Irreflexivity). So Litland (2018, p. 61) claims that it is sufficient to give up (Amalgamation) in order to preserve the validity of (∨-grounding). However, it seems that we can construct a relevant counter-example to (∨-grounding) that does not use (Amalgamation) and does not have the fact of the form "I am true" as its own disjunct.

Consider the following sentences

(δ) 0=0
(δ*) $\delta \lor \delta^* \prec \delta^{**}$
(δ**) $\delta^* \lor \delta^* \prec \delta^{**}$

It can be easily checked that all these sentences are true. Since 0=0, the sentence δ* is true. By the same reason, if δ* is true, then δ** is true. But δ* is then a true disjunct of δ**, so by (∨-grounding) and (Subsumption) $\delta^* \prec \delta^{**}$. Since $\delta^* \prec \delta^{**}$ is thus a true disjunct of δ*, (∨-grounding) gives us that $(\delta^* \prec \delta^{**}) \prec \delta^*$. From (SFA) we have that if $\delta^* \prec \delta^{**}$, then $\delta^* < (\delta^* \prec \delta^{**})$. But then, by (Transitivity)

[11] This view can be substantiated. Consider the fact of the form "(A V B) V C" (where "A" is true and "C" is arbitrary). It can be immediately checked that this fact is true. In that scenario, A is immediate full ground for "A V B", and "A V B" is immediate full ground for "(A V B) V C". However, it is not the case that both A and "A V B" are immediate grounds for "(A V B) V C". Here is how one can claim that is a (Amalgamation) fails for immediate ground.

and (Subsumption), $\delta^* \prec \delta^*$. Here we have a counter-example to (∨-grounding) that does not rely on the application of (Amalgamation).

Notice that, in our scenario, $\delta^* \prec \delta^{**}$ grounds δ^{**}. But $\delta^* \prec \delta^{**}$ is also a ground for δ^*, which is, in turn, is a ground for δ^{**} by itself. So to get an LCC-fact of the form $((\delta^* \prec \delta^{**}) \prec \delta^{**})$, δ^* should not be a ground for δ^{**}. Consider the sentence φ of the form $0{=}0 \vee (0{=}0 \prec \varphi)$. Suppose that $(0{=}0 \prec \varphi) \prec \varphi)$. What is then a reason to believe that 0=0 cannot be a ground for φ *together* with $0{=}0 \prec \varphi$? If $(0{=}0 \prec \varphi)) < \varphi)$, then by (SFA) $(0{=}0 < (0{=}0 \prec \varphi))$, which gives us, by (Transitivity), $0{=}0 < \varphi$. So, if (Amalgamation) is accepted, we have an implausible result that φ, in that scenario, has *two full grounds* (namely, 0=0 and $0{=}0 \prec \varphi$). This contradicts the notion of *full* ground.

Clearly, if two facts, δ and ψ, fail to ground φ *amalgamatively* despite the fact that both δ and ψ are grounds for φ, one possible scenario in which this is the case is that δ and ψ are *the same fact*. The same goes for such facts as φ and $0{=}0 < \varphi$. But even if φ and $0{=}0 < \varphi$ are different facts, they clearly share the common grounding "part" – 0=0 – or, as Dixon (2016) expresses himself, they *groverlap*:

Groverlap: x and y groverlap = df (i) x=y, or (ii) $x \prec y$, or (iii) $y \prec x$, or (iv) there is a z such that $z \prec x$ and $z \prec y$

The idea is that if two facts, x and y, are groverlap with respect to some fact z, x and y (taken separately) are grounds for some fact r, but x, y is not a ground for r (contra (Amalgamation)), then this is so because they have groverlapping part z which, clearly, will be used twice if x, y is a ground for r. So grounding is non-amalgamating if, for some x, y, z. z groverlaps x, and z groverlaps y, but z does not groverlap x & y.

The view that grounded facts do groverlap and so there is some interesting connection between metaphysical grounding and mereology is not new in the literature. For instance, Dixon (2016) uses the notion of "groverlap" to demonstrate that there are some cases in which a grounding counterpart of one of the basic principles of "core mereology", *Weak Supplementation* (according to which if A is a proper part of B, there must be some C such that C is a part of B and C is disjoint from A) fails. On the other hand, Loss (2016) uses (Groverlap) to validate the principle of (Recombination) – if fundamental facts are not grounded, they clearly do not share their "grounding parts" (that is, if fundamental facts are not grounded, they are not grounded in the same common fact). Hence, if there is no C such that, for any fundamental facts A and B, A and B are both grounded in C, then A and B are freely recombinable. By the way, there seems to be (as I will try to show in the next section) some interesting connection between (Groverlap) and (Amalgamation) – if there are facts A, B such A is a full ground for B, and both A and B are grounds for C, then grounding, by (Groverlap), appears to be *amalgamating* – (A & B) is a ground for C.

3 The argument

As before, " $<$ " will stand for partial and full ground correspondingly. "G" will stand for "groverlap". "G [ϕ, δ]" means that ϕ groverlaps δ.

I assume also that conjunctive facts are grounded in their conjuncts:

(C-grounding) (x & y) x, y < (x & y)[12]

[12] It is important to emphasize that (C-grounding) requires that x and y must be *different* facts.

(C-grounding) is widely endorsed in the literature concerning grounding (see Correia (2010, p. 268), Fine (2012, p. 58), and Schnieder (2011, p. 449)). Notice that (C-grounding), together with (Groverlap), also implies that for every *grounded* (non-fundamental) fact A there is a fact B such that A and B do groverlap. It should also be noted that if P and Q are *different* fundamental facts, they do not groverlap: P is not a ground for Q, Q is not a ground for P, and both P and Q *do not share* some grounding part R groverlapping them.

Consider now the sentence θ such that θ is $\Gamma \vee \Gamma \prec \theta$. The argument, in general, is as follows: if Γ is taken to be a full ground for $\Gamma \prec \theta$, then grounding is *amalgamating*, which means that $(\Gamma \,\&\, \Gamma \prec \theta)$ is a ground for θ.

Lemma 1. Consider a conjunctive fact $(\Gamma \,\&\, \delta)$ (where δ is the fact of the form "$\Gamma \prec \theta$") such that Γ is a full ground for δ. Then there is no φ such that φ is a ground for $(\Gamma \,\&\, \delta)$ and φ does not groverlap δ.

Proof[13]. Suppose, by way of contradiction, that there is a fact ϕ such that ϕ is both a partial ground for (& δ) and does not groverlap δ:

(1) $\exists\phi\, ((\phi \prec (\Gamma \,\&\, \delta\,) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\, [\phi, \delta]))$

By (C-grounding) and the fact that ϕ groverlaps (Γ & δ) we have that ϕ is either identical to Γ or δ, or ϕ partly grounds either Γ or δ:

(2) $\exists\phi\, ((\phi \prec (\Gamma \,\&\, \delta\,) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\, [\phi, \delta])) \rightarrow \phi = \Gamma \vee \phi = \delta \vee \phi \prec \Gamma \vee$
$\phi \prec \delta$

Suppose that ϕ is identical to either Γ or δ:

(3) $\phi = \Gamma \vee \phi = \delta$

Then, if ϕ is identical to δ, ϕ and δ do groverlap according to the definition of groverlap. But Γ is a full (and thus, by (Subsumption), a partial) ground for δ and hence, by the definition of groverlap, Γ and δ do groverlap. So, if ϕ is identical to δ and Γ and δ do groverlap, to say that ϕ does not groverlap δ is to say that δ does not groverlap δ. Contradiction! Hence, ϕ is not identical to δ. On the other hand, suppose that ϕ is identical to Γ. Γ and δ do groverlap because $\Gamma < \delta$. So, if $\phi = \Gamma$, then ϕ groverlaps δ. This contradicts the sentence (1) according to which ϕ and δ do not groverlap. Hence, neither $\phi = \Gamma$ nor $\phi = \delta$:

(4) ${\sim}(\phi = \Gamma) \,\&\, {\sim}(\phi = \delta)$

Suppose now that is there is such a fact as ϕ, then ϕ is grounded either in Γ or in δ:

(5) $\exists\phi\, (\, (\phi \prec (\Gamma \,\&\, \delta\,) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\, \phi, \delta)) \rightarrow \phi \prec \Gamma \vee \phi \prec \delta$

Consider first the possibility that δ is grounded in ϕ:

(6) $\exists\phi\, (\, (\phi \prec (\Gamma \,\&\, \delta\,) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\, [\phi, \delta])) \rightarrow \phi \prec \delta$

However, if δ is grounded in ϕ, then ϕ and δ do groverlap. This contradicts (1), according to which ϕ and δ must not groverlap. Hence, if there is such a fact as ϕ, ϕ is not a ground for δ:

[13] The proof of the (Lemma 1) is adopted from Dixon (2015, ch. 3).

(7) $\exists\phi\ ((\phi \prec (\Gamma \,\&\, \delta\ ) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\ [\phi, \delta])) \rightarrow {\sim}\ (\phi \prec \delta)$

Suppose now that if there is such a fact as ϕ, then this fact is a ground for Γ:

(8) $\exists\phi\ (\ (\phi \prec (\Gamma \,\&\, \delta\ ) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\ [\phi, \delta])) \rightarrow \phi \prec \Gamma$

By assumption, Γ fully grounds δ. By (Subsumption), Γ partly grounds δ. So if (8) is true, and ϕ partly grounds Γ then, by (Transitivity), ϕ partly grounds δ. This contradicts the sentence (7) according to which ϕ does not ground δ. So, contrary to (8), ϕ is not a ground for Γ:

(9) $\exists\phi\ (\ (\phi \prec (\Gamma \,\&\, \delta\ ) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\ [\phi, \delta)]) \rightarrow {\sim}(\phi \prec \Gamma)$

Hence, from (4), (7) and (9) we conclude that it is not the case that ϕ is either a ground for Γ or δ, or ϕ is identical to either Γ or δ:

(10) $\sim (\phi = \Gamma \vee \phi = \delta \vee \phi \prec \Gamma \vee \phi \prec \delta)$

Thus, from (10) and (2), by contraposition, we conclude that there is no fact ϕ such that ϕ grounds the conjunctive fact (Γ & δ) and does not groverlap δ:

(11) $\sim \exists\phi\ (\ (\phi \prec (\Gamma \,\&\, \delta\ ) \,\&\, (\Gamma < \delta) \,\&\, {\sim}G\ [\phi, \delta]))$

By generalization, we have that if there is such a fact as (Γ & δ), then every fact grounding this conjunctive fact groverlaps δ, and every fact groverlapping δ groverlaps (Γ & δ)[14]:

(12) $(\Gamma \,\&\, \delta) \,\&\, (\Gamma < \delta) \rightarrow \forall\ \Psi\ ((\Psi \prec (\Gamma \,\&\, \delta) \rightarrow G\ [\Psi, \delta\ ] \,\&\, (G\ [\Psi, \delta] \rightarrow$
$G\ [\Psi, (\Gamma \,\&\, \delta)])$

Lemma 2. Suppose that there is a fact of the form (Γ & δ) and a fact θ such that Γ < δ, Γ ≺ θ, δ ≺ θ, but ~ ((Γ & δ) ≺ θ). Then (Γ & δ) does not ground θ if there is a fact β such that β groverlaps (Γ & δ) and does not groverlap θ.

Proof. Suppose that (Γ & δ) grounds θ:

(13) $(\Gamma \,\&\, \delta) \prec \theta$

Since (Γ & δ), by (C-grounding), is a grounded fact, there must be some fact β such that β groverlaps (Γ & δ) :

(14) $G\ [\beta, (\Gamma \,\&\, \delta)]$

We have now by the definition of groverlap that there must be some γ such that γ is a ground for both (Γ & δ) and β:

[14] Consider some possible scenarios. (I) Clearly, if δ is taken to be a fact groverlapping δ, then δ, by (C-grounding), is a ground for (Γ & δ). (II) Since Γ is a full ground for δ, and Γ is a ground for (Γ & δ), every fact grounding δ will ground, and so groverlap, (Γ & δ). (III) Every fact grounded by δ will be grounded by Γ, which is itself an immediate ground for (Γ & δ). Hence, in all these scenarios δ will groverlap (Γ & δ).

(15) $G[\beta, (\Gamma \& \delta)] \rightarrow \exists \gamma (\gamma \prec (\Gamma \& \delta) \& (\gamma \prec \beta))$

We have thus from (15) that γ grounds (Γ & δ). From (13), (Γ & δ) grounds θ. So, by (Transitivity), γ grounds θ:

(16) $\gamma \prec \theta$

From (15), ($\gamma \prec \beta$). From (16), $\gamma \prec \theta$. Hence, by the definition of groverlap, β and θ do groverlap:

(17) $G[\beta, \theta]$

By conditional proof, from (14) and (17), we have that if β groverlaps (Γ & δ), then β groverlaps θ:

(18) $G[\beta, (\Gamma \& \delta)] \rightarrow G[\beta, \theta]$

From (13) and (18), by conditional proof and universal generalization, we have that if $(\Gamma \& \delta) \prec \theta$, then for every β, if β groverlaps (Γ & δ), then β groverlaps θ:

(19) $(\Gamma \& \delta) \prec \theta \rightarrow \forall\beta (G[\beta, (\Gamma \& \delta)] \rightarrow G[\beta, \theta])$

However, we have (by Lemma 1) that no fact grounding (Γ & δ) is such that it does not groverlap δ. Since δ grounds θ (see Lemma 2), the fact grounding (Γ & δ) must groverlap θ. By (C-grounding), δ grounds (Γ & δ). So, by (Transitivity), δ grounds θ. Thus, δ grounds both (Γ & δ) and θ. It follows then, by the definition of groverlap, that there are facts with respect to which (Γ & δ) and θ do groverlap. Since both Γ and δ fully ground θ while belonging to (Γ & δ), no fact groverlapping (Γ & δ) is such that it does not groverlap θ. This is what exactly the right side of conditional in (19) says – every fact β groverlapping (Γ & δ) groverlaps θ. Hence, given that both facts in (Γ & δ) are grounds for θ, if something groverlaps θ while groverlapping (Γ & δ), then (Γ & δ) is a ground for θ:

(20) $\forall\beta (G[\beta, (\Gamma \& \delta)] \rightarrow G[\beta, \theta]) \rightarrow (\Gamma \& \delta) \prec \theta$

Thus, from (19) and (20) we have that:

(21) $(\Gamma \& \delta) \prec \theta \leftrightarrow \forall\beta (G[\beta, (\Gamma \& \delta)] \rightarrow G[\beta, \theta])$

From (21) we can finally derive that (Γ & δ) does not ground θ if and only if there is some fact that groverlaps (Γ & δ) while not groverlapping θ:

(22) $\sim ((\Gamma \& \delta) \prec \theta) \leftrightarrow \exists\beta (G[\beta, (\Gamma \& \delta)] \rightarrow \sim G[\beta, \theta])$

Proposition. Assume that $(\Gamma \prec \theta) \prec \theta$. Then $(\Gamma \& (\Gamma \prec \theta)) \prec \theta$.

Proof. By assumption, δ (which stands for “$\Gamma \prec \theta$") grounds θ:

(23) $\delta \prec \theta$

By (Lemma 1) we have that every fact grounding (Γ & δ) groverlaps δ:

(24) $\forall\beta\ (\beta \prec (\Gamma\ \&\ \delta) \rightarrow G\ [\beta, \delta])$

Given that δ, by (C-grounding), is a ground for (Γ & δ), then if β is a ground for δ, β is a ground for (Γ & δ) (by Transitivity). By (23), $\delta \prec \theta$, so if β grounds δ, then β transitively grounds θ. From (Groverlap), if β grounds θ, then β groverlaps θ. It follows then that if β is a ground for (Γ & δ), then β groverlaps θ:

(25) $(\beta \prec (\Gamma\ \&\ \delta) \rightarrow G\ [\beta, \theta])$

Since θ is grounded in δ (by 23), θ and δ groverlap with respect to β:

(26) $G\ [\beta, \theta] \rightarrow G\ [\beta, \delta]$

By (12), if β groverlaps δ, then β groverlaps (Γ & δ):

(27) $G\ [\beta, \delta] \rightarrow G\ [\beta, (\Gamma\ \&\ \delta)]$

From (25), (26) and (27), by conditional proof, we have:

(28) $(\beta \prec (\Gamma\ \&\ \delta) \rightarrow G\ [\beta, (\Gamma\ \&\ \delta)]$

By (Factivity) of grounding, from (28), β is supposed to be a ground for (Γ & δ):

(29) $\beta \prec (\Gamma\ \&\ \delta)$

From (28) and (25) we have that if β grounds (Γ & δ), then if β groverlaps (Γ & δ), β groverlaps θ:

(30) $\beta \prec (\Gamma\ \&\ \delta) \rightarrow (G\ [\beta, (\Gamma\ \&\ \delta)] \rightarrow G\ [\beta, \theta])$

By modus ponens from (29) and (30) we have that if β groverlaps (Γ & δ), β groverlaps θ:

(31) $G\ [\beta, (\Gamma\ \&\ \delta)] \rightarrow G\ [\beta, \theta]$

From (31), by universal generalization we have:

(32) $\forall\beta\ G\ [\beta, (\Gamma\ \&\ \delta)] \rightarrow G\ [\beta, \theta]$

Finally, from (32) and (21) we have that the fact that every fact groverlapping (Γ & δ) groverlaps θ is equivalent to the fact that (Γ & δ) grounds θ:

(33) $(\Gamma \,\&\, \delta) \prec \theta$

That is, $(\Gamma \,\&\, (\Gamma \prec \theta)) \prec \theta$. So we have from (23) and (33), by conditional proof, that if $(\Gamma \prec \theta)$ grounds θ, then $(\Gamma \,\&\, \delta) \prec \theta$. QED.

So, we have (from the fact that δ is $\Gamma \prec \theta$) that $(\Gamma \,\&\, (\Gamma \prec \theta)) \prec \theta$. By assumption, θ is "$\Gamma \vee \Gamma \prec \theta$". It can be easily checked that we have then $(\Gamma \prec \theta) \prec (\Gamma \prec \theta)$ (see A-SFA from the section 2 of this paper). In sum, our argument entails that if θ is "$\Gamma \vee \Gamma \prec \theta$", and Γ is a ground for $\Gamma \prec \theta$ (this follows from (SFA)) then, if (∨-grounding) is accepted, we have that $(\Gamma \,\&\, \delta) \prec \theta$. But if $(\Gamma \,\&\, \delta) \prec \theta$, then we get circles of ground. Hence, what the (Proposition) proves is that, in the case of Litland-style sentence θ, grounding is amalgamating : if Γ grounds θ, and δ grounds θ, then (Γ & δ) grounds θ. However, by (A-SFA), it is not the case that $(\Gamma \,\&\, \delta) \prec \theta$. It follows then, by contraposition, that it must not be the case that Γ grounds θ and δ grounds θ (so either Γ or δ is not a ground for θ). So, consider first the possibility that δ is not a ground for θ:

(34) $\sim (\delta \prec \theta)$

But (34) is equivalent to "$\sim (\Gamma \prec \theta) \prec \theta$". Hence, either there is no LCC-fact of the form $(\Gamma \prec \theta) \prec \theta$, or Γ is not a ground for θ. Suppose then that Γ does not ground θ

(35) $\sim (\Gamma \prec \theta)$

But since Γ is a true disjunct of θ, it must be the case that $\Gamma \prec \theta$ (unless (∨-grounding) is invalid). By the way, if Γ does not ground θ, then how it is possible to claim that $\Gamma \prec \theta$ is the second true disjunct of θ in order to get a fact that $\Gamma \prec \theta$ grounds θ?

We have assumed so far that Γ and $\Gamma \prec \theta$ are *different* facts (clearly, if Γ fully grounds $\Gamma \prec \theta$, it must not be the case that $\Gamma = \Gamma \prec \theta$). However, the most obvious reason of why (Amalgamation) can fail is that one and the same fact is used twice in grounding some fact[15]. Suppose, for instance, that there are facts x, y, z such that x grounds z, y grounds z, and x=y. Obviously, if x=y, then if x grounds z, then y grounds z, but it is not true that x & y is a ground for z. However, if $\Gamma = \Gamma \prec \theta$ then, indeed, $(\Gamma \prec \theta) \prec \theta$, but Γ is not a ground for $\Gamma \prec \theta$. It makes the LCC-fact $(\Gamma \prec \theta) \prec \theta$ useless to validate (SFA)16.

4 Conclusion

Let us take the stock. Assuming that there is a sentence θ such that θ is $\Gamma \vee \Gamma \prec \theta$, and Γ is a full ground for $\Gamma \prec \theta$, we have, by (Lemma 1), that no fact β is such that β is a ground for $(\Gamma \,\&\, \Gamma \prec \theta)$ while not groverlapping $\Gamma \prec \theta$. By (Lemma 2) we have that $(\Gamma \,\&\, \Gamma \prec \theta)$ is not a ground for θ if and only if there is some fact β such that β groverlaps $(\Gamma \,\&\, \Gamma \prec \theta)$ while not groverlapping θ. (Lemma 1) and (Lemma 2) jointly entail that if Γ and $\Gamma \prec \theta$ are different facts and Γ grounds $\Gamma \prec \theta$, then grounding is amalgamating – that is, $(\Gamma \,\&\, \Gamma \prec \theta)$ grounds θ. But then we have circles of grounds (as (A-SFA) demonstrates), which gives us a good reason to deny that there is such a fact as $(\Gamma \prec \theta) \prec \theta$. However, if $\Gamma \prec \theta$ is taken to be the same fact as Γ (that is, $\Gamma \prec \theta$ is the only fact in Γ), then grounding is non-amalgamating in the

[15] Litland discusses this possibility in (Litland, 2016, ch. 5.1)

sense that $\Gamma \prec \theta$, $(\Gamma \prec \theta) \prec \theta$, yet it is not the case that $(\Gamma \,\&\, (\Gamma \prec \theta)) \prec \theta$, It follows then that $(\Gamma \prec \theta) \prec \theta$. But it does not follow that if Γ is a full ground for θ (by (∨-grounding)), then the fact that Γ is a full ground for θ is fully grounded in Γ. It means that even if there is such a LCC-fact as $(\Gamma \prec \theta) \prec \theta$, this facts by itself gives us no reason to reject (LA).[16]

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[16] To conclude: if [Γ grounds] and Γ are different facts, then Amalgamation holds, and so it is not the case that [Γ grounds] grounds []. If, instead, these two facts are identical, thennot a ground for grounds θ, - contrary to (SFA).

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