Grounding and Analyticity

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1. A Plea for Ideological Toleration

Much has been written about grounding. Much has been written about analyticity. Very little has been written about grounding *and* analyticity. Why?

I suspect that part of the answer is that philosophers who work with the notion of ground (groundnuts?) think of it as a *replacement* for the older notion of analyticity. Grounding is the smartphone; analyticity is the telegraph. Think of the question of how 'physicalism' should be defined in the philosophy of mind. It was once common to define 'physicalism' as the doctrine that every psychological sentence is synonymous with some sentence in physical language (e.g. Carnap 1959). Today, metaphysicians are more likely to define 'physicalism' as the thesis that every fact is grounded by some physical facts (Bryant XXX; Dasgupta 2015).

While I agree that the ground-theoretic definition of 'physicalism' is preferable to Carnap's definition, I don't think we should jump to the conclusion that the notion of analyticity has *no* role to play in philosophy today. I think, for example, that there are good epistemological reasons to think that the truths of elementary arithmetic are analytic.[i] And this is of course consistent with the point that 'physicalism' is properly defined in ground-theoretic terms.

Perhaps another reason why philosophers who study ground are wary of the notion of analyticity is that they often maintain that facts are highly structured and fine-grained. For example, Gideon Rosen writes:

> I shall suppose that facts are structured entities built up from worldly items – objects, relations, connectives, quantifiers, etc. – in roughly the sense in which sentences are built up from words. … Facts are individuated by their constituents and the manner of their composition. This yields a very fine-grained notion. If *p* and *q* are distinct propositions, then the fact that $p \vee \sim p$ is distinct from the fact that $q \vee \sim q$. And this is as it should be. The fact that $p \vee \sim p$ might obtain in virtue of the fact that *p*. But *p* cannot possibly ground the fact that $q \vee \sim q$, except in special cases.[ii]

This clashes with the claim – common among theorists of analyticity – that a fact is like a block of jelly which can be "carved up" into constituents in different ways.[iii] (An appealing claim, by the way, to those of us who have a taste for desert landscapes.)

Does this imply that theorists of ground and theorists of analyticity cannot work together? I think not, though we *do* have an indication that if philosophers from the two factions are to work together, some concessions may have to be made, on one side or the other.

In this chapter, I will begin to explore the question of what happens if we take seriously *both* the notion of analyticity *and* the notion of ground. I will do this by revisiting the old idea that analytic truths are "true in virtue of meaning." One warning is necessary before we start. I will indulge in the convenient but questionable practice of assuming that ground is a relation

among *facts.* Nothing of consequence hangs on this, however, so readers who are wary of this way of thinking about grounding can make suitable adjustments as they read. See Raven XXX for discussion.

2. Ayer's Thesis

A.J. Ayer famously claimed that when a sentence is analytically true, it is true "solely in virtue of the meaning of its constituent symbols" (Ayer 1946, pg. 16). Let's give this thesis a name:

> *Ayer's Thesis*
>
> When a sentence is true, its truth can be explained wholly by appeal to semantic facts.

Even those who are skeptical of the analytic/synthetic distinction should admit that Ayer's Thesis has some *prima facie* appeal. Suppose, for example, that we are asked to explain why "Every moon is a satellite" is true. We will naturally reply simply that "moon" just means *natural satellite of a planet*, and so *of course* "Every moon is a satellite" is true. And if we are asked for more details, it is hard to understand why more details would be needed.

So, as I say, Ayer's Thesis has some *prima facie* appeal. And yet powerful objections have been raised. One of these objections is that the phrase "in virtue of" is obscure, or that it is unclear what species of explanation is at issue. The theorist of ground will of course be tempted to give "in virtue of" a ground-theoretic interpretation.

Ayer's Thesis then becomes:

> *Ayer's Thesis (Ground-Theoretic Version)*
>
> When a sentence *S* is analytic, the fact that *S* is true is fully grounded by semantic facts.

In what follows, I will present some objections to this ground-theoretic version of Ayer's Thesis, and discuss how a proponent of the thesis should respond.

I begin the discussion in the next section by discussing one particularly prominent objection to Ayer's Thesis – what Jared Warren calls the "master argument" (Warren 2016). Because the master argument is both complex and important, I break down my discussion into two parts. In section 3, I introduce the master argument, and consider some replies. In section 4, I reconsider the master argument ground-theoretically. In sections 5 and 6, I consider putative counterexamples to Ayer's Thesis.

3. The Master Argument[iv]

Consider the German sentence "Schnee ist weiß." This sentence is true, one might say, because it means that snow is white, and because snow is indeed white. Hence, to fully explain the truth of the sentence, one would have to explain two things: why it means that snow is white, and why snow is indeed white. Similarly, the sentence "Gras ist grün" is true because it means that grass is green, and because grass is, in fact, green.

We might put the point, more generally, as follows:

> Suppose that a sentence S expresses a true proposition p. Then a complete explanation of the truth of S must contain (a) an explanation of why S expresses the proposition p, and (b) an explanation of the truth of p.

This formulation, however, is apt to lead us to into difficult debates about the nature of propositions, so I suggest an alternative, schematic formulation. In what follows, "S" is to be replaced by a term for a sentence[v] and "S^T" with the translation of this sentence into English:

> Suppose that S is true. Then a complete explanation of the truth of S must contain (a) an explanation of why S means that S^T, and (b) an explanation of why S^T.

Boghossian (1996) calls this a "truism" – let's adopt the label.

Let's apply the Truism in the case of a paradigmatic analytic truth, "Every moon is a satellite." The proponent of Ayer's Thesis will insist that the truth of the sentence can be explained wholly by appeal to semantic facts. However, the objector will insist that to explain the truth of the sentence fully one must explain the following two things:

> (a) The sentence means that every moon is a satellite.
> (b) Every moon is a satellite.

But, the argument goes on, it is simply not plausible that (b) is explained purely by semantic facts. The movements of the heavenly bodies are entirely independent of sublunary facts

about language. It is crazy to think (it is argued) that the movements of the Moon, or Io, or Ganymede, are explained by facts about the way we talk, write, or think.

In summary, the master argument is this. It is claimed that the Truism and Ayer's Thesis together lead to an Absurd Conclusion. It is then argued that we must reject Ayer's Thesis in order to avoid the Absurd Conclusion.

> *Ayer's Thesis*
>
> When a sentence is true, its truth can be explained wholly by appeal to semantic facts.
>
> *The Truism*
>
> Suppose that S is true. Then a complete explanation of the truth of S must contain (a) an explanation of why S means that S^T, and (b) an explanation of why S^T.
>
> *The Absurd Conclusion*
>
> One can explain why every moon is a satellite wholly by appeal to semantic facts.

How might the proponent of Ayer's Thesis reply?

Well, they might argue that the so-called "Absurd Conclusion" doesn't deserve its name. While it might seem obvious at first glance that the Absurd Conclusion is untenable, on reflection it is not straightforward to articulate a compelling argument against the claim. Some have attempted to show that the Absurd Conclusion is indeed absurd by arguing that it has obviously false *modal* consequences. For example, it might be suggested that the Absurd

Conclusion implies that if our linguistic practices had been different, moons would not have been satellites.[vi] Brett Topey (2019), building on earlier work by Wright (1985), has argued that the Absurd Conclusion does *not* have such obviously silly modal consequences.

If the proponent of Ayer's Thesis does not wish to accept the Absurd Conclusion, they may decide instead to deny the so-called "Truism". This response has a more radical and a more moderate form. According to the more radical form of the response, the "Truism" is a core commitment of a *representationalist* meta-semantic theory, which should be rejected in favor of an *anti- representationalist* or *use based* theory.[vii] Since groundnuts are unlikely to be sympathetic to this response, I will not discuss it. Instead, I will focus on a more moderate view, according to which the Truism is correct in the usual run of things, but there are exceptions. Allow me to explain …

Suppose that someone asks you *why* Hesperus is Phosphorous. You might in response review the evidence that we have for the claim that Hesperus and Phosphorous are identical. Alternatively, you might reply by talking about how the names 'Hesperus' and 'Phosphorous' were introduced, explaining how these two different names became attached to the same planet. But suppose your interlocutor insists that these are misinterpretations of the question, saying:

> You misunderstand me. I am fully acquainted with all of the evidence, and I am totally convinced that Hesperus is indeed Phosphorous. And I understand how this planet came to have two different names. My question is not meta-semantic or epistemological. Rather, my question is metaphysical: I want you to explain why the planet Hesperus is identical with the planet Phosphorous.[viii]

You may feel at this point that there is something defective about this question. There is simply nothing to be explained here – there is no "Why?" about it. Agustín Rayo puts the point in the following way:

> Suppose it is agreed on all sides that Hesperus (and Phosphorus) exist. Someone says: 'I can see as clearly as can be that Hesperus is Phosphorus; what I want to understand is *why*.' It is not just that one wouldn't know how to comply with such a request – one finds oneself unable to make sense of it. The natural reaction is to either find a charitable reinterpretation of the question ('Why does one planet play both the morning-star and the evening-star roles?') or reject it altogether ('What do you mean *why*? Hesperus *just is* Phosphorus'.)[ix]

Rayo introduces a useful term for such cases: he says that a sentence φ is 'why-closed' if and only if "one is unable to make sense of the question ⌜ Why is it the case that φ? ⌝". In our example, the why-closed sentence is "Hesperus is Phosphorous" (or, if you prefer, "If Hesperus exists, then it is Phosphorous").

Now, why-closed sentences are counterexamples to the so-called "Truism." The Truism implies that to explain the truth of the sentence "Hesperus is Phosphorous" one must explain the following two facts:

> (a) "Hesperus is Phosphorous" means that Hesperus is Phosphorous.
>
> (b) Hesperus is Phosphorous.

However, in this case we can't make sense of the demand for an explanation of (b) – there is simply nothing to explain here. Thus, in this case, an explanation of (a) is sufficient to explain the truth of the sentence "Hesperus is Phosphorous". So the Truism fails in this case.

There are certain logical truths which are plausibly why-closed. If you ask an ethicist to explain why it is wrong to lie, they are likely to have an answer ready. However, if you ask an ethicist to explain the truth of the conditional, *if it is wrong to lie, then it is wrong to lie,* the likely response is a puzzled squint. Similarly, if you ask a philosopher of mind to explain why stones aren't capable of having beliefs, you will likely receive an articulate and thoughtful answer. If you ask why *if a thing is conscious, it's conscious*, you will be ushered out of her office.

The point bears emphasis. It's plausible that to explain ($p \rightarrow q$) it is sufficient to provide what must be *added* to an explanation of p to produce what is also an explanation of q. For example, suppose we have two balls, one on the left and one on the right, both of which are red. Consider the fact that *if the left-hand ball is red, both balls are red;* plausibly, we can explain the truth of this conditional by pointing out that the right-hand ball is red.[x] With this thought in mind, consider ($p \rightarrow p$). What needs to be added to an explanation of p to produce an explanation of p is: *precisely nothing!* Hence, instances of the schema ($p \rightarrow p$) are why-closed. A similar argument can be used to motivate the claim that ($p \rightarrow (q \rightarrow (p \wedge q))$) and ($(p \wedge q) \rightarrow p$) are similarly why-closed.[xi]

Back to analyticity. It is plausible, I think, that analytic sentences such as "Every moon is a satellite" are why-closed in Rayo's sense. For suppose we are asked to explain why every

moon is a satellite. We are likely to reply that "moon" just means *natural satellite of a planet,* and so *of course* every moon is a satellite. But suppose our interlocutor goes on:

> You misunderstand me. I didn't ask for an explanation of the truth of the English sentence "Every moon is a satellite", I asked you to explain an astronomical fact – viz. that every moon is a satellite. And you can't explain this astronomical fact by reference to facts about the English language: the movements of the heavenly bodies are independent of facts about how we talk. So, again, why is it the case that every moon is a satellite?

No doubt a well-trained metaphysician will be able to dream up some answer to this question. One might suggest that the fact that every moon is a satellite is explained by facts about Titan, Ganymede, Io *etc.*. Or one might suggest that the fact is explained by facts about the essences of the properties involved. But it is hard to escape the thought that this is to give our interlocutor's bizarre question more respect than it deserves. If one understands what "Every moon is a satellite" means, one ought to be able to see that no explanation is needed of the fact that every moon is a satellite. There is no "Why?" about it.

In summary, we can reply to the master argument by insisting on two points. First, why-closed sentences are exceptions to the Truism. Second, analytic sentences are why-closed. I should stress that this reply to the master argument is not new: it has appeared several times in the literature, variously clothed. It is implicit in Rayo (though Rayo prefers to avoid the word "analytic"). It is prominent in the literature on truthmaker theory – see for example the work of Jamin Asay and Amie Thomasson.[xii] As far as I know, however, it has not yet been given a ground-theoretic treatment: this is my task in section three.

3. The Master Argument, in Ground-Theoretic Terms

Let's take a look at the Master Argument again, this time taking a ground-theoretic approach. Some notation will be helpful.[xiii] I will represent facts by putting the corresponding sentences is square brackets. For example, [Snow is white] is the fact that snow is white.

Let S_0 be the sentence "Every moon is a satellite." Giving the Truism a ground-theoretic interpretation, we claim that [S_0 is true] is fully grounded by [S_0 means that every moon is a satellite] and [Every moon is a satellite]. Now [S_0 means that every moon is a satellite] is a semantic fact. But what about [Every moon is a satellite]? What grounds *this* fact? Some will suggest that it is a universal generalization, and it is therefore grounded by its instances – including facts about Titan, Ganymede, and Io. Perhaps others will suggest that it is grounded by facts about the essences of the properties involved. No doubt other answers are possible. But what may seem clear is that [Every moon is a satellite] is grounded by non-linguistic facts. It is, after all, a fact of astronomy, not a fact about language. But then we seem to be stuck with the conclusion that [S_0 is true] is *not* fully grounded by linguistic facts after all.

How might we reply?

We could, of course, simply accept the conclusion that [Every moon is a satellite] is grounded by semantic facts. But I think that this is a non-starter. There might something to be said for the view that semantics facts explain [Every moon is a satellite] *in some sense of 'explain'*; however, the claim that semantic facts *ground* [Every moon is a satellite] is beyond

far-fetched. To claim that astronomical facts are *grounded* by facts about language would be to endorse a bizarre kind of linguistic idealism.

And so, I suggest, proponents of the ground-theoretic version of Ayer's Thesis should instead insist that "Every moon is a satellite" is why-closed, and hence it is a mistake to ask for a ground for the fact it expresses. This fact, we may say, simply doesn't require explanation.

But this reply is puzzling. If [Every moon is a satellite] is not grounded, it would seem to follow that [Every moon is a satellite] is a *fundamental* fact. And this is extremely implausible, if only because moons are not fundamental objects.[xiv]

This brings us, I think, to the crux of the issue. If we are to sustain the ground-theoretic version of Ayer's Thesis, I suggest, we must maintain that facts such as [Every moon is a satellite] are in some sense trivial or empty, that they "don't require explanation" – but it is not easy to make sense of this claim within the ground-theoretic framework.

At this point, intransigent ground-theorists may think that Ayer's Thesis must be rejected. For my part, I think that this would be too hasty. The claim that there are why-closed sentences in non-fundamental vocabulary is widely shared and highly intuitive. If this point cannot be accommodated within the theory of ground, many will see this as a defect of groundology. Theorists of ground would do well to explore the idea that there are non-fundamental facts which "do not require explanation."

My own suggestion is this: the proponent of Ayer's Thesis should say that [Every moon is a satellite] is *zero-grounded.* The notion of zero-grounding is due to Kit Fine (2012), and perhaps deserves some explanation. Some facts have a ground that consists of three facts; for example:

[A ∧ B ∧ C] is grounded by [A], [B] and [C].

We might say that [A ∧ B ∧ C] is "three-grounded." Some facts have a ground that consists of two facts; these are "two-grounded." For example:

[A ∧ B] is grounded by [A] and [B].

Some facts are one-grounded; for example:

[∃x *Dog*(x)] is grounded by [*Dog*(Fido)]

Now. Fine claims that some facts have a ground that consists of *no facts at all.* Such facts are said to be "zero-grounded". Here is one of Fine's examples. Suppose that our language contains a conjunction operator ⋀ which operates on any number of sentences A, B, C, … . We might then maintain that a conjunction is always grounded by its conjuncts, thus:

[⋀(A, B, C, …)] is fully grounded by [A], [B], [C], …

Now consider the empty conjunction, ⊤ ≔ ⋀(). ⊤ (like all conjunctions) is grounded by its conjuncts – though in this case there are none of them. So ⊤ is zero-grounded.

As Fine puts it:

> There is a … distinction to be drawn between being zero-grounded and being ungrounded. In the one case, the truth in question simply disappears from the world, so to speak. … But in the case of an ungrounded truth … the truth is not even generated and simply stays in place.[xv]

Now, back to those moons. If it is granted that [Every moon is a satellite] is zero-grounded, and that [S_0 means that every moon is a satellite] and [Every moon is a satellite] fully ground [S_0 is true], it will follow by the cut principle[xvi] that [S_0 expresses p_0] fully grounds [S_0 is true] – thus, [S_0 is true] is fully grounded by a semantic fact, just as the ground-theoretic version of Ayer's Thesis requires.

More generally, I suggest, the proponent of Ayer's Thesis should say that the facts expressed by analytic sentences are zero-grounded. This is, I suggest, the best way to incorporate into the theory of ground the claim that analytic sentences are why-closed. In sections 4 and 5, we'll consider putative counterexamples this to this position, due to Timothy Williamson and Louis DeRosset.

4. Analyticity and the Logic of Ground

Timothy Williamson has offered[xvii] the following sentence as a problem case for Ayer's Thesis:

> (B) Either Barbara is a lawyer or Barbara is not a lawyer.

Suppose that Barbara is indeed a lawyer. Now it may seem obvious that (B) is an analytic truth. So if my discussion so far has been on track, the proponent of the ground-theoretic version of Ayer's Thesis will say that the fact that (B) expresses is zero-grounded. However, this conflicts with the standard account of the logic of disjunction, according to which this fact is *not* zero-grounded; it is, rather, grounded by [Barbara is a lawyer].[xviii]

I see two possible replies to this complaint.

First, one might doggedly insist that the fact that (B) expresses *is* zero-grounded, and that our theories of the logic of ground must be modified to accommodate this point. This is perhaps not out of the question. Groundology is a young science, and it's not implausible that some of our views about the logic of ground need revision. What's more, theorists of ground often present their account of the logic of disjunction with very little argument, as McSweeney emphasizes in her chapter in this book. However, to accept that the fact that (B) expresses is zero-grounded would be a significant concession for the theorists of ground. If you flick through this book, you will see that much in the theory of ground is controversial – but there is very little controversy on the question of how disjunctive facts are grounded.

Perhaps, then, it is the theorists of analyticity who should make a concession. Perhaps the proper conclusion is that (B) is not analytic, in the requisite sense,[xix] even though it is a classical logical truth. In support of the move, we may point out that there have been *independent* arguments for the claim that instances of the law of excluded middle are not analytic.[xx]

Having denied that (B) is analytic, we may reasonably be asked to give some positive characterization of the class of analytic truths. I will return to this issue in section 6.

5. DeRosset's Objection

Now for another alleged counterexample to Ayer's Thesis. Louis deRosset[xxi] defines "grassgreen" in the following way:

> Suppose we stipulate that "grassgreen" is to be a predicate that expresses the property *being green* if, as a matter of fact, grass is green, and *not being green* otherwise.

Now, consider this sentence, (G):

> (G) Grass is grassgreen.

Now we can show that (G) is true, using the following simple argument:

> Suppose that grass is in fact green. Then "grassgreen" expresses the property *being green* and so "Grass is grassgreen" is true. Suppose on the other hand that grass is not green. Then "grassgreen" expresses the property *not being green* and so "Grass is grassgreen" is again true. So, either way, "Grass is grassgreen" is true.

Thus, we can see that (G) is true, just by reflecting on the meanings of the words that comprise the sentence. Thus, (G) is analytic.

Now, as we all know, grass is in fact green, and so "grassgreen" expresses the property *being green.* Thus, (G) expresses the fact [Grass is green]. But this is obviously a substantive, contingent, botanical fact. It is not zero-grounded. Thus, we seem to have a counterexample to the suggestion that analytic sentences are why-closed, and express zero-grounded facts.

It seems to me very clear that the fact expressed by deRosset's sentence is not zero-grounded. Thus, if we are to rescue Ayer's Thesis we must somehow restrict Ayer's Thesis, or exclude deRosset's sentence from the class of analytic sentences.

In a discussion of this issue, David Chalmers defends a relative of Ayer's Thesis by restricting it to so called "super-rigid" sentences.[xxii] If we follow him, our thesis would become:

> *Ayer's Thesis (Chalmersian Version)*
> When a super-rigid sentence *S* is analytic, the fact that *S* is true is fully grounded by semantic facts.

Chalmers' definition of "super-rigid" is complex, but what's important here is that every super-rigid sentence is comprised entirely of "epistemically rigid" words, where a term is "epistemically rigid" just in case one can know *a priori* what it refers to. Now "grassgreen" is not super-rigid because one cannot know *a priori* whether it refers to the property *being green* or the property *not being green.*[xxiii] Thus, (G) is not a counterexample to the new Chalmersian version of Ayer's Thesis.

This maneuver may save Ayer's Thesis – but at a significant cost. As Chalmers recognizes,[xxiv] natural kind terms such as "swan" are not super-rigid. Thus, paradigmatic analytic sentences

such as “Every cygnet is a juvenile swan” and “Every ewe is a female sheep” are not covered by the Chalmersian version of Ayer’s Thesis.

My view, then, is that the proponent of Ayer’s Thesis should respond to de Rosset’s example by arguing that “Grass is grassgreen” is not analytic, in the requisite.

6. A Proposal

In sections four and five, we looked at two putative counterexamples to Ayer’s Thesis:

(B) Either Barbara is a lawyer or Barbara is not a lawyer.

(G) Grass is grassgreen.

In both cases, I recommended that the proponent of Ayer’s Thesis should reply that the given sentence is not analytic, in the relevant sense. But this leaves them with the task of providing some *positive* characterization of the class of analytic truths.

It will help to describe the task slightly differently. Our goal is draw a line around a class of truths, to be called “analytic”. The class should be not so large as to introduce counterexamples to Ayer’s Thesis. At the same time, it should not be so small as to strip Ayer’s Thesis of theoretical interest. In this section, I will present my own response to this problem – but I hope that others will do better in the future.

In section three, I introduced Kit Fine's sentence "⊤", the empty conjunction, which expresses a zero-grounded fact. Using this sentence as a starting point, we can introduce a number of schemas all instances of which will be zero-grounded:

$\top \vee p$

$\neg\neg(\top \vee p)$

$\neg(\neg\top \wedge p)$

I would now like to conjecture that certain schemas involving conditionals have the same property, including perhaps these:

$p \rightarrow p$

$p \rightarrow (q \rightarrow (p \wedge q))$

$\forall x\ (p \rightarrow p)$

Now if this conjecture is true, then the following sentences express zero-grounded facts:

If Edith is an adult female sheep, Edith is an adult female sheep.

If Hugo is a male, then if Hugo is a sibling then Hugo is a male sibling.

Every juvenile swan is a juvenile swan.

Now I suppose that if you take a sentence, and substitute a phrase in that sentence with a synonym, the resulting sentence has the same meaning as the original, and expresses the same fact.[xxv]

So if the three sentences just listed indeed express zero-grounded facts, so do these:

> If Edith is an adult female sheep, Edith is a ewe.
>
> If Hugo is male, then if Hugo is a sibling then Hugo is a brother.
>
> Every cygnet is a juvenile swan.

This brings me to my proposal. As I say, I conjecture that further research in the logic of ground will deliver a number of schemas each instance of which expresses a zero-grounded fact. Let's say that a sentence is "analytic" if it can be obtained from an instance of such a schema by substituting synonyms for synonyms. My proposal is that Ayer's Thesis is true when "analytic" is interpreted in the manner I have suggested.

7. Conclusion

I hope to have convinced you of two things. First, that Ayer's Thesis, when formulated in a sufficiently restricted form, may be true. Second, and more importantly, that theorists of ground and theorists of analyticity need not be locked in a permanent antagonism. Indeed, there is interesting work to be done at the intersection of these two areas of research.

In particular, I would like to mention a few open problems that we've come across:

- What grounds conditional facts?
- Can there be non-fundamental facts which nevertheless "don't require explanation"?
- What is the *best version* of Ayer's Thesis? That is, what is the *strongest* version of the thesis that is not susceptible to counterexample?

Related Topics:

- Ground's Application to Physicalism
- Granularity
- Grounding Logically Complex Facts

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[i] Perhaps the most detailed defence of this position is that developed by the "neofregeans". Wright 1983 was an influential early presentation of the neofregean position; for more recent work, see Hale and Wright 2001. See also Rayo 2014.

[ii] Rosen 2010, pg. 114 – 5. It's worth noting that theorists of ground differ to some extent on the question of granularity; for discussion, see Correia XXX.

[iii] Surely the most influential statement of this idea is in §64 of Frege 1974 (though Frege doesn't mention jelly, and focuses on *thoughts* rather than facts). See also the discussion of whether states of affairs are "crystalline" or "plastic" in Macbride 2003. For more recent discussion see Rayo's (2013) discussion of "metaphysicalism".

[iv] Boghossian 1996 is probably the most well-known statement of the master argument. See also Sider 2011, Williamson 2007, Yablo 1992, and Sober 2000. Topey (2019) and Warren (2016) claim to have found versions of the master argument in much earlier sources.

[v] For simplicity, we'll suppose that S contains no context-sensitive expressions.

[vi] For example, Blackburn (1986) claims that one can't explain a necessary truth by appeal to contingent facts about language, because "the explanation, if good, would undermine the original modal status: if that's all there is to it, then [for example] twice two does not have to be four". Quoted in Topey 2019.

[vii] This approach is recommended in Warren 2016. Price (2013) explains the contrast between "representationalist" and "anti-representationalist" theories of language, and defends the latter.

[viii] Alternatively, when asked why Hesperus is Phosphorous, you might attempt to explain the "diagonal proposition" associated with the sentence "Hesperus is identical to Phosphorous" (see Stalnaker 1978). Let us suppose that your interlocutor insists that this too is a misinterpretation.

[ix] Rayo 2013, pg. 54. Papineau (1998) makes similar claims. It is worth noting that Rayo's claim that "Hesperus is identical to Phosphorous" is why-closed is not controversial. For another take, see Shumener's "Identity and Ground," in this volume, and her forthcoming.

[x] I have taken this example from Linnebo ms.

[xi] Mathematically inclined readers may at this point ask whether this idea can be implemented in a formal semantics. One approach is to extend Kit Fine's (2012) exact truthmaker-semantics for ground by adding a conditional. One may say that the following is sufficient for a fact f to verify $(p \rightarrow q)$:

Given any g such that g verifies p, the fusion $f \bullet g$ verifies $(p \wedge q)$.

We should also add that any falsifier for p will also verify $(p \rightarrow q)$. I leave the details for future work – this is not the place to explore the technicalities.

[xii] In particular, see Asay forthcoming and Thomasson 2007, ch. 2.

[xiii] I have taken this notational device from Rosen 2010.

[xiv] Perhaps some readers will say that moons *are* fundamental objects. I suggest that such readers come up with their own example of analytic sentence about non-fundamental objects, and work with this example instead.

[xv] Fine 2012, pg. 48. For further discussion of zero-grounding, see Litland XXX.

[xvi] See Fine 2012, pg. 56.

[xvii] See Williamson 2007, pg. 60. Williamson focuses on a truthmaker-theoretic version of Ayer's Thesis, but his point applies with equal force to the ground-theoretic version.

[xviii] To put the point with a little more precision: the claim that the fact that (B) expresses is zero-grounded conflicts with the elimination rule for disjunction presented in section eight of Fine 2012.

[xix] I add the qualification "in the requisite sense", because one might argue that the sentence in question is not analytic in the sense relevant to Ayer's Thesis, but *is* analytic in some other sense of that vexed term. For example, one might say that the sentence is "epistemically analytic" but is not "epistemically analytic" – for this distinction see Boghossian 1996.

[xx] Rumfitt (2012) argues that excluded middle is not justifiable on the basis of the "sense" of the negation and disjunctions signs – which amounts, I think, to saying that it is not analytic. Tennant 1996 is another important article – though Tennant adopts an anti-realist stance quite foreign to grounding-theory.

[xxi] See deRosset 2015.

[xxii] Chalmers 2012, Pg. 453. The "relative of Ayer's Thesis" that Chalmers discusses is the claim that, given true sentences A and B, if A "conceptually grounds" B then A metaphysically grounds B.

[xxiii] In more detail: a word is "super-rigid" if it is both "epistemically rigid" and "metaphysically rigid" (Chalmers 2012, pg. 474). A word is "epistemically rigid" if its "referent can be known *a priori*," or, to put it another way, if it "picks out the same referent in every epistemically possible scenario" (pg. 470). A word is "metaphysically rigid" if, by stipulation, it refers to same object with respect to every metaphysically possible scenario (Kripke 1980, pg. 21).

[xxiv] Chalmers 2012, pg. 453. Space does not permit a thorough discussion of the point that natural kind terms are not epistemically rigid. However, here is a short argument to motivate the point. Consider "dog" and "fox". You no doubt know that these two words refer to different kinds. However, this is something you know *a posteriori* – no amount of armchair reflection could establish that the terms don't refer to the same kind. Thus, there are some epistemically possible scenarios in which the two terms refer to the same kind. Thus, at least one of the terms refers to different kinds with respect to different epistemically possible scenarios. And so at least one of the two terms is not epistemically rigid.

The canonical presentation of the point that natural kind terms are not epistemically rigid is Putnam 1975, though Putnam himself did not use the term "epistemically rigid".

[xxv] This assumption is more substantial than it might first seem to be. For discussion see Schnieder 2010.