ORIGINAL RESEARCH

Reversing logical nihilism

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Abstract

Gillian Russell has recently proposed counterexamples to such elementary argument forms as Conjunction Introduction (e.g. 'Snow is white. Grass is green. Therefore, snow is white and grass is green') and Identity (e.g. 'Snow is white. Therefore, snow is white'). These purported counterexamples involve expressions that are sensitive to linguistic context—for example, a sentence which is true when it appears alone but false when embedded in a larger sentence. If they are genuine counterexamples, it looks as though logical nihilism—the view that there are no valid argument forms—might be true. In this paper, I argue that the purported counterexamples are not genuine, on the grounds that they equivocate. Having defused the threat of logical nihilism, I argue that the kind of linguistic context sensitivity at work in Russell's purported counterexamples, if taken seriously, far from leading to logical nihilism, reveals new, previously undreamt-of valid forms. By way of proof of concept I present a simple logic, Solo-Only Propositional Logic (SOPL), designed to capture some of them. Along the way, some interesting subtleties about the fallacy of equivocation are revealed.

Keywords Logical nihilism · Logical consequence · Validity · Linguistic context · Equivocation

1 Introduction

Consider a sentence which is true when it appears unembedded in a larger sentence, but false when it appears embedded. Or a sentence which is true when it appears

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as a premise of an argument, but false when it appears in the conclusion. There are undoubtably such sentences, for instance 'This sentence is unembedded' and 'This sentence is a premise'. Gillian Russell has recently shown that this kind of sentence can be used to argue for *logical nihilism*, the view that the relation of logical consequence is empty. The strategy is to use sentences with this kind of sensitivity to linguistic context to provide counterexamples to argument forms so elementary that if *they* aren't valid, probably nothing is.[1]

I don't accept the argument, for reasons I shall explain. But as Russell notes, even if we don't accept the argument, we have here an opportunity to learn more about logic. The plan for this paper is as follows. In Sect. 2 I rehearse a package of standard views about logical consequence. In Sect. 3 I present Russell's challenge and explain how it challenges the package. In Sect. 4 I consider the fallacy of equivocation, and argue that there are two kinds of equivocation, which I call bank-bank equivocation and here-here equivocation. (Traditional accounts tend to use an ordinary notion of 'meaning', which covers both. Roughly speaking, the ambiguity here is one of character vs. content, sense vs. reference, or intension vs. extension.) In Sect. 5 I argue that Russell's challenge fails because her purported counterexamples commit one of the two kinds of equivocation, and hence are not genuine counterexamples. Section 6 takes a more constructive turn: I argue that considerations like Russell's, if taken seriously, should—far from leading to logical nihilism—lead to the recognition of new valid forms, and I present a logic designed to capture some of them. I conclude in Sect. 7 by reconsidering the topic of equivocation in light of the developments of Sect. 6.

2 A standard package

Russell's challenge purports to show that the logical consequence relation is empty. But what is logical consequence? Logical consequence is a relation which holds between the premises and the conclusion of an argument if and only if that argument is valid. And what is it for an argument to be valid? A standard view, which I will adopt in this paper, is that an argument is *valid* when it is necessarily truth-preserving in virtue of its form. An argument is *necessarily truth-preserving* iff it is impossible for its premises to be true while its conclusion is false. Similarly, a statement is *logically true* iff it is true in virtue of form.[2] The notion of form is somewhat problematic,

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[1] See Russell (2017) and (2019). This work has already garnered some critical attention. Dicher (2021) goes along with the idea that the elementary argument forms targetted by Russell's challenge have counterinstances, but argues that this fails to establish logical nihilism, on the grounds that 'logics are best identified with metainferential consequence relations' (Dicher (2021), §1—for explanation see his article). Fjellstad (2020), going along with Russell's argument that there are counterinstances to 'A. Therefore A', formulates a non-reflexive logic in which there are nonetheless some valid forms. In contrast to these two authors, I argue that Russell's purported counterinstances are not genuine.

[2] As I say, these characterisations of validity, logical consequence and logical truth are standard. Witness, from the *Stanford Encyclopedia of Philosophy* article on 'Logical Consequence': 'We have characterized logical consequence as *necessary truth preservation in virtue of form*.' (Beall, Restall & Sagi (2019), §3.1.) We find the account in popular textbooks, e.g. in Smith (2012), pp. 14–20. Earlier, in Bertrand Russell's *Principles of Mathematics*, we find 'The fundamental characteristic of logic, obviously, is that

and has been explicated in various ways[3], but let me explain the 'in virtue of form' bit using two examples which are highly relevant to Russell's challenge. Consider the following two arguments:

Argument 1:
Grass is green.
Snow is white.
Therefore, grass is green and snow is white.
Argument 2:
Grass is green.
Therefore, grass is green.

Not only are they necessarily truth-preserving, they are so in virtue of form (or so goes the standard view of logic): their being necessarily truth-preserving does not turn on their content, e.g. on the meaning of 'grass' or 'green' or 'snow' or 'white'. This in contrast to an argument like:

Argument 3:
John is a bachelor.
Therefore, John is unmarried.

This argument is necessarily truth-preserving (at least given a standard assumption about the meaning of 'bachelor'), but in virtue of the specific meanings of particular expressions, rather than in virtue of form. Arguments 1 and 2 are not only necessarily truth-preserving, but valid, since if we replace 'Grass is green' or 'Snow is white' uniformly with any other statement-making sentences, we will still have necessarily truth-preserving arguments. Argument 1 is an instance of the following form (the capital letters below are functioning as metalinguistic variables standing for arbitrary statement-making sentences and '$\wedge$' expresses truth-functional conjunction):

A.
B.
Therefore, $A \wedge B$.
And Argument 2 is an instance of:
A.
Therefore, *A*.

Let's call these argument forms *Conjunction Introduction* and *Identity*. Now, the standard view is that Arguments 1 and 2 above are necessarily truth-preserving in virtue of being instances of these forms, and are hence valid arguments. We may then by extension call the forms themselves 'valid', meaning that all instances of them are valid arguments. This is all we need for present purposes. How to draw the boundary between form and content in logic is a fraught question and there are tricky cases, but Arguments 1 and 2 are standardly regarded as necessarily truth-preserving in virtue of form.

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which is indicated when we say that logical propositions are true in virtue of their form.' (Russell (1903), p. xvi.) Incidentally, you might notice the absence of 'necessarily' in this last quote from Bertrand Russell. I suspect this is as it should be, and that this goes for validity too; as I argue in my (forthcoming), we don't need the 'necessary' in 'necessary truth-preservation in virtue of form', since the 'in virtue of form' does all the required work. Since the point seems orthogonal to the concerns of the present paper, above I have stuck to current orthodoxy and kept 'necessarily' in.

[3] For an overview see MacFarlane (2017).

So, the package of views I want to defend from Russell's challenge comprises the view that the logical consequence relation may be explained, as above, in terms of necessary truth-preservation in virtue of form, together with the view that Conjunction Introduction and Identity are valid forms. Russell's challenge targets this second part of the package. It consists of purported counterinstances of these forms; arguments that are of these forms but which are not necessarily truth-preserving. (I will also speak of these as purported 'counterexamples to' these forms, i.e. to the thesis that the forms are valid.)

3 Russell's challenge

Here is Russell's challenge to Conjunction Introduction:
Consider […] the little-known atomic sentence 'SOLO'. 'SOLO' is true when it appears alone, as an atomic sentence, but false any time it embedded in a larger construction. Hence the atomic sentence 'SOLO' is always true, but the conjunction 'SOLO ∧ snow is white' is always false. So now consider the argument form conjunction introduction:
$\phi, \psi \vDash \phi \wedge \psi$ (∧I).
When ϕ is SOLO and ψ is *snow is white*, all the premises are true but the conclusion is false:
SOLO.
Snow is white.

SOLO ∧ snow is white.[4]

A similar strategy, involving an atomic sentence 'PREM', which is true when it appears in a premise of an argument, false otherwise, gives us the following apparent instance of Identity:

PREM.

PREM[5]

It is not hard to see that this threatens the package of views outlined in the previous section—in particular, the part about Conjunction Introduction and Identity being valid. If there really are sentences with the properties Russell says that 'SOLO' and 'PREM' have, then it may seem that we have genuine instances of Conjunction Introduction and Identity which are not necessarily truth-preserving—indeed, not even actually truth-preserving; it is actually the case that their premises are true and their conclusions false.

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[4] Russell (2018), p. 316.

[5] *Ibid.*, p. 316.

4 Two paradigms of equivocation

It is well known that, to get a genuine instance of a valid argument form, it is not enough that you replace, in a uniform way, any metalinguistic variables with expressions of the relevant category. Multiple occurrences of the same expression must also have the same *meaning*. Consider for example the following argument:

Emma Stone is a star.

Emma Stone is in our solar system.

Therefore, there is a star in our solar system.

While it may appear to be an instance of a valid form[6], if we interpret each sentence involved in the most natural way, we do not have a valid argument, because such an interpretation gives different meanings to 'star' in the first premise and in the conclusion. The argument so understood commits the *fallacy of equivocation*, and is not a genuine instance of the form.

But now consider this rather different sort of problematic argument, produced vocally:

I'm standing here.

(*The speaker moves one metre to their right.*)

Therefore, I'm standing here.

This is intuitively not a valid argument; the premise and conclusion were both true (provided the speaker was standing at the relevant times), but the conclusion does not follow from the premise. But this is not a genuine instance of Identity. This argument also equivocates, but not in the way the Emma Stone argument did. The speaker is not using the expression 'here' in different senses. The word is functioning in the same way both times. It is just that it *refers* to a different place each time. This suggests a contrast between two types of equivocation, which we might call *bank-bank* and *here-here* equivocation respectively.[7]

These two different paradigms of equivocation highlight an ambiguity in standard explanations. In one sense of 'means', the word 'today' has the same meaning every day (as long as it keeps playing the same role in the English language), but in another sense it means different things—namely, different days—on different days.

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[6] In standard notation (where 'F' and 'G', 'a' and 'x' are metalinguistic variables standing for arbitrary one-place predicates, an arbitrary name, and an arbitrary variable respectively): $Fa. Ga. \therefore \exists x (Fx \land Gx)$. A proof can be given in a standard natural deduction setting by applying a Conjunction Introduction rule to the two premises and then applying an Existential Generalisation rule to the result.

[7] The label 'bank-bank' is a nod to the well-worn example of the ambiguity of 'bank' in English between 'bank' as in 'river bank' and 'bank' as in 'money in the bank'. The label 'here-here' reflects the example used to introduce the second paradigm, but arguments involving 'here' are just one kind of example. The basic idea is that, with this sort of equivocation, the expressions in question are consistently governed by the same linguistic rules, but that their semantic properties nonetheless differ, for what may broadly be called contextual reasons. That here-here equivocation *is* a form of equivocation is acknowledged by Kaplan ([1989](#)) in his 'Afterthoughts' about his influential work on demonstratives. He writes: The same demonstrative can be repeated, with a distinct directing intention for each repetition of the demonstrative. This can occur in a single sentence, "You, you, you, and you can leave, but you stay", or in a single discourse, "You can leave. You must stay." Such cases seem to me to involve an exotic kind of ambiguity, perhaps unique to demonstratives […]. Where different intentions are associated with different syntactic occurrences of a true demonstrative, we would want to use distinct symbols in our formal language in order to avoid equivocation. (Kaplan ([1989](#)), p. 586, footnote omitted.)

Let me quote some standard explanations of the fallacy of equivocation in order to illustrate what I mean:

> If we charge high fees for university, only the rich will enroll.
> We charge high fees for university.
> Therefore, only the rich will enroll.

> There are many different things one can say about this argument, but many agree that if we do not equivocate (if the terms mean the same thing in the premises and the conclusion) then the argument is *valid*, that is, the conclusion follows deductively from the premises.[8]

> **Equivocation** Equivocation is an informal fallacy which occurs when a word with more than one meaning is used within an argument twice, with each occurrence having a different meaning.[9]

The following examples also exhibit some of this ambiguity, but contain material which suggests bank-bank rather than here-here equivocation:

> **Equivocation** is any fallacy arising from ambiguity of a word, or of a phrase playing the role of a single word in the reasoning in question, the word or phrase being used at different places with different meanings and an inference drawn which is formally correct if the word or phrase is treated as being the same word or phrase throughout.[10]

> Most words have more than one literal meaning, and most of the time we have no difficulty keeping those meanings separate by noting the context and using our good sense when reading and listening. Yet when we confuse the several meanings of a word or phrase—accidentally or deliberately—we are using the word equivocally. If we do that in the context of an argument, we commit the **fallacy of equivocation**.[11]

Now, this intuitive contrast between bank/bank and here/here equivocation could be developed in various ways, and the details will be sensitive to one's choice of metasemantic framework. There are probably multiple interesting distinctions one could draw here. But all of the following pairs of notions are reasonable candidates for drawing an interesting and more precise distinction: sense/reference[12], character/con-

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[8] Beall, Restall & Sagi (2019), Introduction.

[9] Cook (2009) (a dictionary of philosophical logic), p. 108.

[10] Alonzo Church's definition in Runes (1964) (a dictionary of philosophy), p. 96.

[11] Copi, Cohen & McMahon (2013) (14th ed. of a popular logic textbook), p. 144.

[12] See Frege (1892/1969).

tent[13], intension/extension[14]. Bank-bank equivocation plausibly occurs at the level of sense, character, or intension, whereas here-here equivocation occurs at the level of reference, content, or extension. (A wrinkle is that some[15] are skeptical about sense, character, or intension—but for our purposes it doesn't matter if they in effect treat what I have called bank-bank equivocation in a similar way as they treat what I have called here-here equivocation, as long as they have *some* way of making sense of the latter. Skepticism about reference, content or extension is what would make trouble here, but fortunately this is not so widespread.)

5 The diagnosis

Russell's arguments involving 'SOLO' and 'PREM' are not genuine instances of Conjunction Introduction and Identity because they commit the fallacy of equivocation. Granted, it doesn't look like an instance of bank-bank equivocation: Russell has given just *one* explanation of 'SOLO' and *one* explanation of 'PREM', and all occurrences of them in her purported counterexamples are to be read as governed by that explanation. Rather, it looks like an instance of here-here equivocation. But it's equivocation nonetheless.

What is the equivocation *over*, so to speak? What are the two different *meanings* here which are at play in Russell's arguments? Here we must remember that we are in a special, quite technical situation where 'SOLO' and 'PREM' themselves are atomic sentences (I am tempted to put scare quotes around 'sentences' to emphasise this point) which have had truth-conditions stipulated for them, but which have not explicitly been expanded out or articulated. We may, however, regard 'SOLO' and 'PREM' as statements to the effect that their truth conditions, as explained by Russell, are fulfilled. We might for instance think of 'SOLO' as an abbreviation of 'I am unembedded' where the personal pronoun refers to the token of 'I am unembedded' (or of 'SOLO' if it's being abbreviated). Similarly, tokens of 'PREM' may be regarded as saying of themselves 'I am a premise in an argument'. If we are prepared to construe 'SOLO' and 'PREM' in this way, we can diagnose the equivocation in terms of 'I' meaning different things at different points in the argument.[16]

If we are not expanding out 'SOLO' and 'PREM', on the other hand, then we can simply say that the equivocation is over truth-value. Granted, equivocation is generally explained in terms of 'meaning', and it sounds a bit funny to call a sen-

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[13] See Kaplan (1989).

[14] This traditional distinction has been explicated in many different ways, but influential modern developments include Carnap (1947), Montague (1969) and Lewis (1970).

[15] Most notoriously Quine. See for instance Quine (1960).

[16] 'SOLO' and 'PREM' are from Russell (2018). In the earlier Russell (2017), a framework of predicate logic is used, and special predicates are defined which take different extensions in different linguistic contexts: 'Imagine, for instance, that we had a predicate "con-white" which took the same extension as 'white' while embedded in a conjunction, but the null-set when not so embedded.' (Russell (2017), p. 129.) But here there is a similar sense that the key expression, 'con-white', has not been expanded out or articulated: one wants to ask 'But what does it mean to call something con-white?'. For simplicity I stick with the more recent propositional presentation from Russell (2018).

tence's truth-value an aspect of its meaning. But our being led to say this somewhat odd-sounding thing is just an artefact of the rather austere, technical presentation of 'SOLO' and 'PREM'. If we allow ourselves a traditional notion of the proposition expressed by a sentence, then we can say that the two occurrences of 'SOLO' in Russell's argument express different propositions—as they must, if one is true and one is false. Talking about expressing different propositions in terms of 'different meanings' is quite normal. And again, if we expand 'SOLO' and 'PREM' out into articulate sentences with the relevant truth-conditions, then we may find subsentential components whose different meanings we can talk about.

In sum: there is something called here-here equivocation, and Russell's arguments involve it. As our original 'I'm standing here' example makes clear, here-here equivocation in an argument can disqualify it as an instance of a form. We don't count *that* argument as a counterinstance to Identity, and so similarly we shouldn't count Russell's arguments as counterinstances to Identity and Conjunction Introduction.

The strategy behind this diagnosis is to draw on resources of the standard conception of validity which are often left implicit. When, working with the standard conception, we indicate an argument in which given extra-logical terms occur multiple times and call it 'valid', we do not literally mean that it is necessarily truth-preserving *solely* in virtue of its linguistic form. Rather, we allow that arguments of the given linguistic form may equivocate, but refuse to count them as genuine instances of the form. This treatment, I argue, extends to the arguments involving 'SOLO' and 'PREM'. I fully grant that other conceptions of validity are possible, and that the diagnosis I have offered may not be available for them. And I am not here trying to mount a full-scale defense of the standard conception. I am just arguing that the standard conception has the resources to block the threat of nihilism.

I now turn to consider three worries about this diagnosis.

5.1 Is the diagnosis question-begging?

When beginning to consider the potential logical significance of context-sensitivity, Russell outlines three types of response that logicians might have to the phenomenon:

> Logicians usually handle this in one of three ways. (1) they ignore the phenomenon (much as one might ignore self-reference to focus on simpler languages) and deal only with languages which do not contain context-sensitive expressions, or (2) they stipulate that the context is not allowed to change over the course of an argument, or (3) logicians who are especially interested in context-sensitivity (e.g. Kaplan (1989)) may turn such expressions into logical constants, thus removing them from the scope of the interpretation function (…).[17]

Russell sets aside responses 1) and 3):

> But context-sensitivity is extremely widespread and we don't—at least for practical reasons—want to make every context-sensitive expression into a logi-

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[17] Russell (2018), p. 315.

cal constant. So let us suppose that such expressions [are] within the domain of the interpretation function.[18]

Response 2) is then considered, and 'SOLO' is introduced precisely in resistance to it:

> We might still pursue 2) and stipulate that the context never changes over the course of an argument, but this looks less acceptable if we think that there is a special kind of context-sensitive expression whose interpretation is sensitive to *linguistic context*. Consider, for example, the little-known atomic sentence 'SOLO'.

(Then follows the explanation, which I presented in Sect. 3 above, of how 'SOLO', together with 'PREM', might lead to logical nihilism.) Now, you might worry that my diagnosis of the purported counter-instances to Identity and Conjunction Introduction is question-begging, in the sense that it is a version of response 2). Let me explain why I think this worry is misplaced.

The diagnosis is *not* that the purported counter-instances fail to count as genuine because the context changes over the course of the argument. It is that they fail to count as genuine because they commit the fallacy of equivocation. At the very least, this is a conceptually distinct diagnosis: it utilises the concept of equivocation rather than the concept of change in context. I think it is also an extensionally distinct diagnosis in both directions, in the sense that (i) there are arguments which equivocate but where this equivocation does not arise in any systematic way from changes of context—consider the Emma Stone argument from Sect. 4 which used the word 'star' in two different senses—and (ii) there are arguments which do not equivocate but where the context changes during the course of the argument.

When looking for examples of this second category, we run into the question of what counts as a change in context, and it begins to seem as if any ordinarily spoken argument must involve at least some change in context. After all, the word 'now' can be context-sensitive in such a way that it changes its reference from moment to moment: consider an utterance like 'Starting…. now! No, wait! I didn't have my stopwatch ready. Starting… now!'. So perhaps all normally spoken arguments involve change in context, in which case examples of category (ii) are ready to hand; just read out any paradigmatic textbook example of a valid argument. Perhaps there is something wrong with my reasoning here, and context changes over the course of an argument less often than it would suggest. Still, it seems there is plenty of room for context to change over the course of an argument where, because none of the expressions used in the argument change their meaning as a result, the argument doesn't equivocate.

So, my diagnosis is not question-begging in the sense of being a version of response 2) in Russell's taxonomy. Let me add here the related point that my diagnosis does not involve any ban on context-sensitive expressions. It does not even involve a ban on expressions which exhibit the peculiar sensitivity to *linguistic context* that Russell

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[18] *Ibid.*, p. 315. Footnote omitted. The '[are]' is inserted to fix a presumed typo.

sets up with 'SOLO' and 'PREM'. The problem is equivocation, and only arguments which actually equivocate need to be rejected as non-genuine instances of argument forms. We can happily allow, for instance, that:

SOLO.

SOLO.

is a legitimate instance of the valid form Identity. Consider in this connection the fact that one can apply standard logic to ordinary sentences involving indexicals, provided one doesn't equivocate (indeed, many examples in logic textbooks involve indexicals, especially personal pronouns like 'I' and 'you').

5.2 Aren't you saddled with repugnant ambiguity claims?

I say that Russell's purported counterexamples to Identity and Conjunction Introduction do not count as genuine instances of those argument forms because they equivocate. Doesn't this commit me to the potentially repugnant claim that 'SOLO' and 'PREM', and words in English like 'here' and 'now', are ambiguous?

I agree that this can sound repugnant, but I don't think there is a deep problem here with my diagnosis. Roughly, it depends on whether an expression having different *content* or *reference* in different occurrences is regarded as sufficient by itself for ambiguity, or whether difference in *character* or *sense* is required.

I suggest that there is ambiguity in the broad sense (where difference in content/reference counts as ambiguity) and ambiguity in the narrow sense. Ambiguity is sometimes contrasted with indexicality.[19] Then we are dealing with ambiguity in the narrow sense. When it sounds repugnant to say that 'SOLO' and 'PREM', or 'here' and 'now', are ambiguous, we're thinking of ambiguity in this narrow sense. (When in this mood, it may seem as though it will invariably sound repugnant to say these things—but a bit of reflection of the wide range of cases where people use the word 'ambiguous' undermines this impression, at least for me.) I am not committed to saying that these terms are ambiguous in the narrow sense.

My own view is that there's no fact of the matter here about what ambiguity really is. But against this, it might be maintained that the only true ambiguity is ambiguity in the narrow sense. This is compatible with the view I am arguing for in this paper: the way to adopt the view I'm arguing for if you are of this persuasion is to hold that Russell's arguments equivocate but do not thereby involve ambiguity.

What I *am* committed to maintaining is that the notion of equivocation in logical theory should *not* be wedded to the notion of ambiguity in the narrow sense; it should include what I call here-here equivocation. This can be maintained quite independently of consideration of 'SOLO' and 'PREM', since it enables us to diagnose the problem with saying 'I'm standing here', moving one metre to the right, and then saying 'Therefore, I'm standing here'. That's a bad argument because it equivocates.

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[19] See for example Soames (2002), Ch. 4 and Braun (2017), §1.

5.3 Is the diagnosis Ad Hoc?

You might worry that my diagnosis is *ad hoc*. In this connection, Russell writes of the 'danger of disallowing interpretations because they provide counterexamples to a theorem we wish to defend, as if we're refining "interpretation" in the face of these problems to save our familiar theorems. Call this […] the *monster-barring* response'.[20]

It is important to note that the present diagnosis is not a version of the monster-barring response. Rather, it involves discerning a sort of equivocation which we already detect and on the basis of which screen out purported instances of argument forms; the 'I'm standing here' argument does not lead to logical nihilism, so neither should 'SOLO' or 'PREM'.

I am sympathetic to Russell's reason for wanting to avoid an *ad hoc*, monster-barring response, namely that it 'fails to use the opportunity presented by the monsters to learn more'[21]. In this connection let me also quote the closing of her paper:

> The counterexamples to (ID) and (∧I) can make one curious about regularities in truth-preservation over sentences whose truth-value can change in the course of an argument—an under-explored topic, and perhaps one that has been under-explored because of the fear of logical nihilism.[22]

I share the underlying sentiment. I just think we can have our cake and eat it too; I agree that the *purported* counterexamples can make one curious about regularities in truth-preservation over sentences whose truth-value can change in the course of an argument. But we don't need to accept the purported counterexamples as genuine in order to get the intellectual benefit. Once we realise that the purported counterexamples are covered by our already-in-place injunction against equivocating, and our associated practice of ruling out arguments which equivocate as potential counterexamples to valid forms like Conjunction Introduction and Identity, we see that there is nothing to fear, *and* we are free to explore the interesting territory that has come into view.

In this spirit, I attempt in the next section to turn the threat of logical nihilism on its head. I will argue that taking sentences like 'SOLO' and 'PREM' seriously should lead us to recognise *more* valid forms than are dreamt of in standard logic, not fewer. As proof of concept I will present a simple logic designed to capture some.

For clarity's sake it is important to note that this next part of the paper is *not* concerned with neutralizing the threat of logical nihilism. I have used the considerations about equivocation above to do that. Having now done that (although whether successfully may of course be debated), I turn to arguing that, interestingly, the kinds of considerations Russell marshals can be re-purposed so as to lead us in the opposite direction.

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[20] Russell (2018), pp. 316–317.

[21] *Ibid.*, p. 321.

[22] *Ibid.*, p. 321.

6 New valid forms?

Above I argued that, from the point of view of whether or not arguments involving them furnish us with counterexamples to Conjunction Introduction and Identity, 'SOLO' and 'PREM' are in the same boat as sentences like 'I'm standing here'. But with regard to the question of whether studying sentences like 'SOLO' and 'PREM' might uncover *more* valid forms, the case is different. For as Russell emphasises, the sort of context-sensitivity they exhibit is sensitivity to *linguistic* context, and this sort of linguistic context is a matter of form.[23]

'SOLO' and 'PREM' are particular sentences, but consider now a whole *category* of sentences: solo-only sentences. A solo-only sentence may be true or false when unembedded, but is always false when embedded. We could introduce the convention that a sentence, when written in italics, is solo-only, and is true when unembedded just in case the unitalicized version of it is true.[24] '*Snow is white*' would then be roughly tantamount to 'Snow is white and this conjunction is unembedded'.

The apparent pointlessness of this kind of sentence may give the reader pause. To be clear, I freely admit that to have solo-only sentences in our language may serve no practical purpose. As I see it, that does not matter in the present context, where our interest is theoretical. But there is a deeper objection which may be made here, about the theoretical usefulness of admitting the category of solo-only sentences. Unless this category can earn its keep in some way, it might be argued, we have no reason to take it seriously from the point of view of logic.[25] An alternative view is that the mere intelligibility of the category means that it must be taken seriously from the point of view of logic. While this is an interesting methodological difference of outlook worthy of further attention, I will not try to adjudicate here. I present the following considerations conditionally: *if* you take 'SOLO' and 'PREM' seriously from the point of view of logic, then you should take solo-only sentences seriously as well, and this should lead you to the recognition of new valid forms.

Consider the following arguments involving solo-only sentences:

Snow is white ∨ grass is green.
Therefore, grass is green.
Snow is white ↔ grass is green.
Therefore, ¬grass is green.

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[23] This is not to say that logical methods cannot be used to study extra-formal deduction as well. See for instance Zardini (2014), in which a formal theory of *intercontextual logic* is given, designed to capture phenomena such as the following: 'It will be sunny tomorrow' seems to entail in some sense that 'It is sunny' is true when said the following day.

[24] If observed everywhere, this might clash with other uses of italics, but let's suppose that the convention just governs the presentation of arguments where italics are not otherwise used.

[25] This is not to say that we have no reason to take mid-argument changes of content on the part of expressions seriously from the point of view of logic. See Yagisawa (1993) and Georgi (2015) for developed approaches to logic which take seriously the idea that words like 'that' may have different contents within the same argument, indeed within the same sentence (imagine someone saying 'That is different to that', pointing at two different objects). But it may yet be thought that the category of solo-only sentences is different in being *ad hoc* and artificial, and that the sort of changes of content *they* are allegedly capable of need not be taken seriously.

Grass is green → *snow is white.*
Therefore, ¬grass is green.

These are all necessarily truth-preserving. Consider the first argument: given that '*Snow is white*' is solo-only, the occurrence of it in the first premise must be false. And so by the meaning of '∨', the only way the first premise can be true is if 'Grass is green' is also true, and it is the conclusion. Similar reasoning shows the second and third arguments to be necessarily truth-preserving as well.

Not only that—I submit that they are necessarily truth-preserving in virtue of form, i.e. valid. Their being necessarily-truth preserving does not turn on the particular contents of the atomic statements involved. Rather, it turns just on the meanings of the connectives, the fact that the italicized sentences all belong to the general, topic-neutral category of solo-only sentences, and the positions of the italicized sentences. The familiar textbook heuristic of pretending that you don't know the meanings of the relevant non-logical expressions applies. To see that the arguments are necessarily truth-preserving, there's no need to know what 'snow', 'grass', 'green' or 'white' mean. All you need to know is how the connectives work and how solo-only sentences work.

Similarly, I suggest that the following statements are logically true, i.e. true in virtue of form:

¬(*Snow is white* ∧ grass is green).
¬*Snow is white.*
Snow is white → grass is green.

Let us now formulate, model-theoretically, a propositional logic which captures these new validities in addition to the validities of classical propositional logic.
Solo-Only Propositional Logic (SOPL).
Vocabulary:
Propositional letters:
    Normal: a, b, c, …., a_1, b_1, c_1, ….
    Solo-only: *a, b, c*, …, a_1, b_1, c_1, ….
Connectives: ¬, ∧, ∨, →, ↔.
Brackets: (,)
Syntax:

–   Propositional letters (both normal and solo-only) are wffs.
–   If A and B are wffs, then so are:
    ¬A
    (A ∧ B)
    (A ∨ B)
    (A → B)
    (A ↔ B)
–   Nothing else is a wff.

Semantics:

Call any wff that is not a solo-only propositional letter a *normal* wff.
For any two normal wffs A and B:

¬A is true iff A is false.

(A ∧ B) is true iff A and B are both true.

(A ∨ B) is true iff A is true or B is true (or both).

(A → B) is true iff it is not the case that A is true and B is false.

(A ↔ B) is true iff A and B are both true or both false.

Where A is a normal wff and *a* and *b* are solo-only wffs:

¬*a* is true.

(A ∧ *a*) is false.

(*a* ∧ A) is false.

(*a* ∧ *b*) is false.

(A ∨ *a*) is true iff A is true.

(*a* ∨ A) is true iff A is true.

(*a* ∨ *b*) is false.

(A → *a*) is true iff A is false.

(*a* → A) is true.

(*a* → *b*) is true.

(A ↔ *a*) is true iff A is false.

(*a* ↔ A) is true iff A is false.

(*a* ↔ *b*) is true.

More formally, call a total function from the set of all propositional letters (both normal and solo-only) to {0,1} a *model*. Given a model M, we can define a valuation function *v*—a total function from the set of wffs of PL to {0,1}—as follows (where *neg* is the obvious one-place function from {0,1} to {0,1} and *conj, disj, cond* and *bicond* are the obvious two-place functions from {0,1} to {0,1}):[26]

For all propositional letters **a**, let v(**a**) = M(**a**).

For all normal wffs A and B, let

$v(¬A) = neg(v(A))$.

$v(A ∧ B) = conj(v(A),v(B))$.

$v(A ∨ B) = disj(v(A),v(B))$.

$v(A → B) = cond(v(A),v(B))$.

$v(A ↔ B) = bicond(v(A),v(B))$.

Where A is a normal wff and *a* and *b* are solo-only wffs, let

$v(¬\underline{a}) = neg(0)$, i.e. 1.

$v(A ∧ \underline{a}) = conj(v(A),0)$ i.e. 0.

$v(\underline{a} ∧ A) = conj(0,v(A))$ i.e. 0.

$v(\underline{a} ∧ \underline{b}) = conj(0,0)$ i.e. 0.

$v(A ∨ \underline{a}) = disj(v(A),0)$ i.e. $v(A)$.

$v(\underline{a} ∨ A) = disj(0,v(A))$ i.e. $v(A)$.

$v(\underline{a} ∨ \underline{b}) = disj(0,0)$ i.e. 0.

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[26] A note on terminology: some authors would call the complete valuation *v* the model here, rather than the atomic valuation I have labelled M for 'model'. But it is more consistent with the way we talk about higher forms of logic, such as first order predicate logic and propositional modal logic, to call the atomic valuation the model, and to regard *v* as encoding the rules for *truth on* such a model.

$v(A \rightarrow \underline{a}) = \text{cond}(v(A),0)$ i.e. 1 - $v(A)$.
$v(\underline{a} \rightarrow A) = \text{cond}(0,v(A))$ i.e. 1.
$v(\underline{a} \rightarrow \underline{b}) = \text{cond}(0,0)$ i.e. 1.
$v(A \leftrightarrow \underline{a}) = \text{bicond}(v(A),0)$ i.e. 1 - $v(A)$.
$v(\underline{a} \leftrightarrow A) = \text{bicond}(0,v(A))$ i.e. 1 - $v(A)$.
$v(\underline{a} \leftrightarrow \underline{b}) = \text{bicond}(0,0)$ i.e. 1.

We may denote the valuation v arising in the above way from a model M v_M. If a wff α is mapped to 1 by a valuation v_M we shall say that α is *true on M*. Otherwise we shall say that α is *false on M*.

Definition of consequence and tautology:

For any set of wffs of Γ and any wff α, Γ ⊨ α (i.e. α is a *consequence of* Γ) iff there is no model M on which all members of Γ are true and α is false.

α is a *tautology* iff Ø ⊨ α.

It is easy to verify that the arguments (and statements) that I used to motivate SOPL come out valid (and logically true) when translated into the language of SOPL by replacing the italicized atomic sentences with solo-only propositional letters and the unitalicized atomic sentences with normal propositional letters. That is, the conclusions of the arguments are, in the technical sense just defined, consequences of the sets containing the premises, and the statements are, in the sense just defined, tautologies.

Thus we have the following valid forms:

$\underline{a} \vee A$.
Therefore, A.
$\underline{a} \leftrightarrow A$.
Therefore, ¬A.
$A \rightarrow \underline{a}$.
Therefore, ¬A.

And the following forms of logical truth:

$\neg(\underline{a} \wedge A)$.
$\neg\underline{a}$.
$\underline{a} \rightarrow A$.

Consider for instance the first argument form. There is no model M on which a wff $(\underline{a} \vee A)$ is true while A is false, because by the semantics for wffs of the form $(\underline{a} \vee A)$, $(\underline{a} \vee A)$ has the same value as A, and hence is true only if A is also.

7 What becomes of the injunction not to equivocate?

The threat of logical nihilism was defused above by showing that Russell's arguments commit a kind of equivocation (here-here equivocation), and so do not count as genuine counterexamples. From that discussion, it may appear that for a given category of expression—in our case, sentences—we may identify a semantic aspect such as *truth-value* or *proposition expressed* and then simply require that any argument, if it is to count as a genuine instance of a form, must not involve any sentences which have one truth-value (or express one proposition) in one occurrence and another in another. But once we consider the possibility of things like solo-only

propositional logic, this begins to seem too strict. Now it looks as though we need to allow for semantic value to differ in different places in an argument, *if* this is part of *what makes the argument work* so to speak.

This issue does not affect the sample arguments that we have just been looking at. *They* cannot be accused of here-here equivocation, since they each only contain *one* occurrence of a solo-only sentence. But it would seem that there are other validities of a similar kind, and which can be captured in SOPL, where this accusation could be made—but inappropriately. Consider for example:

> *Snow is white.*
>
> Therefore, ¬(*snow is white* ∧ grass is green).

This argument ought to come out as valid, as indeed it does when translated and assessed using SOPL. Sure, the premise isn't needed—the conclusion is a logical truth—but it doesn't do any harm.[27] But given what I have said about equivocation, it might look like I ought to deny that it is a genuine instance of the valid form:

> *a*.
>
> Therefore, ¬(*a* ∧ A).

But if this isn't an instance, what is? So what is going on here? What we are seeing is that a blanket ban on having occurrences of a single sentence which differ in truth-value (or proposition expressed), while it might be appropriate in the context of assessing whether an argument is a genuine instance of a valid form of the sort we are used to from classical logic, becomes inappropriate once we allow validities of the sort SOPL was designed to capture; validities that depend on the workings of expressions that are sensitive to linguistic context.

It may have seemed as though, when we say an argument is valid, we are as it were saying 'This argument is necessarily truth-preserving in virtue of its form (*and* the fact that all occurrences of any given expression have the same meaning)'. (And as shown by the example of someone saying 'I'm standing here' before moving and saying 'Therefore, I'm standing here', 'meaning' here doesn't always mean character or sense or the like. Sometimes *external* factors of meaning are what we need to pay attention to.) But what the above argument reveals is that, in light of the possible new kinds of validities we have been looking at, which depend on systematic linguistic context sensitivity, it isn't strictly right to state the proviso about not equivocating quite so simply. That's alright though. The traditional injunction not to equivocate is, as we have seen, not very precise. But in the context of a particular logical theory incorporating linguistic context sensitivity, e.g. in working with SOPL, it can be made clear what is allowable. In assessing arguments for being genuine instances of one of the valid forms codified by SOPL, we may—indeed must—allow a given italicized sentence to be true in some occurrences (unembedded ones) and false in others (embedded ones). Despite possible appearances, I do not think there is a problem here whereby my diagnosis above of what goes wrong with Russell's arguments gets undermined by the proposal that, if we take solo-only sentences seriously, we get new valid forms which are captured by SOPL. Rather, we are discerning a further subtlety about what it means to equivocate in an argument. Whether a particular

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[27] At least it doesn't do any harm given the classical conception of validity we are working with; I am putting aside issues associated with relevance logic.

type of 'change of meaning' constitutes an equivocation is relative to the type of form of argument in question; what's not OK relative to the valid forms of ordinary propositional logic is *sometimes* OK relative to other valid forms such as we have seen. Roughly, we may say that a 'change of meaning' is OK if, in virtue of the form of the argument, nothing could possibly go wrong. But the details of *which* (if any) 'changes of meaning' are OK will depend on the type of form in question.

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