Something is True

Jamin Asay
University of Hong Kong
asay@hku.hk

Forthcoming in Philosophy and Phenomenological Research
[Please cite published version]

Abstract

The thesis that nothing is true has long been thought to be a self-refuting position not worthy of serious philosophical consideration. Recently, however, the thesis of alethic nihilism—that nothing is true—has been explicitly defended (notably by David Liggins). Nihilism is also, I argue, a consequence of other views about truth that have recently been advocated, such as fictionalism about truth and the inconsistency account. After offering an account of alethic nihilism, and how it purports to avoid the self-refutation problem, I argue that it avoids the problem at the expense of changing the subject. I then present other arguments against nihilism and responses to the considerations offered in defense of it. The only tenable position is that something is indeed true.

Introduction

My aim in this paper is to establish that something is true. Some readers, at least by the end of this sentence, will have concluded that my task is accomplished. Although I would be happy to have a paper join the ranks of philosophy’s delightfully pithy essays (e.g., Lycan 1984 and Goldschmidt 2016), my project here is more substantive. There are a number of contemporary philosophers who either defend or are committed to the claim that nothing is true, and it is against them that I am arguing. The thesis that there is no truth may instantly call to mind postmodernist views or radical interpretations of Nietzsche. But that’s not the intellectual space that frames and inspires the views of the contemporary alethic nihilists who deny (or are committed to denying) the existence of truth. Their motivation is largely derived from concerns over the alethic paradoxes such as the Liar (i.e., the fact that ‘This very sentence is false’ appears to be true if and only if it is false). Nevertheless, I suspect that the contemporary paradox-driven nihilists maintain a position that is no more defensible than their postmodern counterparts.
I begin by identifying the alethic nihilist position, its adherents, and its motivations. Because many have taken the view to be self-refuting, I then address the nihilist’s argument for why the view is self-consistent. I then argue that it earns consistency only at the expense of changing the subject. Then I challenge the arguments that have been offered in support of nihilism, and offer my own objections. Ultimately, the only tenable position in the philosophy of truth is that something is true.

1 Alethic nihilism and its motivations

1.1 Alethic nihilism and nihilists

There are several more-or-less equivalent ways of articulating alethic nihilism. Perhaps the most straightforward is to define it as the view that nothing is true. Alternatively, truth doesn’t exist. Alternatively, truths don’t exist. Alternatively, there is no property of truth—even in the “merely abundant” or deflated sense of ‘property’. Whether these formulations are adequate or equivalent turns on other background philosophical views: consider a nominalist who denies the existence of properties across the board, or a mereological nihilist who believes only in the existence of sub-atomic particles and so not any truth-bearers. I doubt there is a definitive and unambiguous way of stating the view I aim to challenge in a way that begs no question whatsoever. In general, stating a definition for a philosophical theory is bound to face counterexamples and invoke (what are, according to at least someone’s view) problematic or contentious presuppositions. So it goes.

Identifying one’s actual interlocutors is usually more straightforward. The philosophical landscape relevant to alethic nihilism includes three major camps. First there is Liggins, who is the major champion for alethic nihilism (2014, 2019). Because it is Liggins who is the primary defender of the view, much of my criticism below engages with him in particular. Liggins argues that alethic nihilism offers a non-ad hoc and revenge-immune solution to the liar paradox. A simple presentation of the liar paradox is as follows:

---


2 E.g., Kroon 2019: 106. Scharp (2013: 263, 2021) commits to this view, but denies that it entails that nothing is true. I challenge that denial below. Many deflationists about truth have been saddled with the denial that there is a property of truth (see, e.g., Kirkham 1992: 307), but they are best interpreted as denying that there is a substantive property of truth, which is consistent with there being a deflated property of truth. See Edwards 2013 and Asay 2014, and Lewis 1983 for the distinction between sparse and abundant properties.

3 One case I’m not sure about is the expressivist view trialed by Schroeder 2010. It treats ‘true’ as a “non-descriptive predicate”, but I’m unsure what the metaphysical fallout of the view is intended to be.
(1) \( (L) = \text{‘}(L)\text{ is not true’} \)

(2) ‘(L) is not true’ is true if and only if (L) is not true.

(3) (L) is true if and only if (L) is not true.

Step (1) defines a liar sentence. Step (2) is the instance of the T-schema corresponding to (L). Contradictory (3) immediately follows from (2) by the substitution allowed by the identity in (1). Liggins believes that attempts to show that liar sentences are meaningless or non-existent are *ad hoc*. Liggins instead rejects (2), and thereby blocks the inference to (3) without having to deny any tenet of classical logic. Liggins accepts that (L) is not true: nothing is. But he rejects that ‘(L) is not true’ is true (nothing is). Thus, because Liggins rejects its left-hand side and accepts its right-hand side, he rejects (2), the instance of the T-schema corresponding to (L). The nihilist thus has an explanation for why (2) is to be rejected, and thus why the liar argument is unsound.

Note that Liggins doesn’t deny *everything* by way of denying that anything is true. It’s not *true* that snow is white, but that doesn’t mean, for the nihilist, that snow isn’t white. With respect to “grounded” claims that don’t predicate truth, the nihilist carries on as before, alongside everyone else. Snow is white, and grass isn’t purple. What they refuse to do is semantically ascend, and attribute truth to the claims they are willing to assert.

The second major camp committed to alethic nihilism is fictionalism aimed specifically at discourse involving ‘true’ and truth. According to this view, “We talk *as if* there is a property of truth, but there is no reason to think that truth has anything beyond this ‘as if’ status” (Beall 2004: 210). Such forms of fictionalism are aimed only at predication of truth; they do not suppose that the content to which truth is predicated is also to be handled fictionally. Fictionalists tend to lead with their view about how ‘true’ operates in a fictional context, not with the commitment to nothing being true. But that commitment is presumably there; if truth isn’t imaginary in the first place, there’s no reason to pretend when talking about it. Regardless of the kind of fictionalism at issue, it is standard practice to distinguish between hermeneutic fictionalists and revolutionary fictionalists (Burgess & Rosen 1997: 6). Hermeneutic fictionalists about truth maintain that alethic discourse is already operating in fictional mode (e.g., Beall 2004, Woodbridge 2005, Armour-Garb & Woodbridge 2010, 2013, 2014, 2015, 2017). Revolutionary fictionalists about truth (e.g., Kroon 2019; see also Burgess & Burgess 2011: 129-131) argue that a discourse ought to operate in that mode. Strictly speaking, fictionalism of either variety is consistent with the existence of truth. One might think that although our alethic discourse operates under a guise of pretense, it doesn’t have

---

4 Cf. Devlin 2003.
to because truth is real; or one might think that even though truth is real, we should pretend it isn’t. Actual fictionalists about truth, however, are committed to alethic nihilism. It’s hard to see how to motivate their fictionalism otherwise.

Finally there are the inconsistency theorists, who believe that TRUTH is an inconsistent concept. Inconsistency theorists hold that a concept like TRUTH is inconsistent because reasoning in accordance with it leads one to draw false or contradictory inferences. Mainly whom I have in mind here are theorists like Eklund (2007, 2014) and Scharp (e.g., 2013, 2021), who are leading defenders of TRUTH being inconsistent. But at least some of the theorists I’ve canvassed already also believe that TRUTH is inconsistent (e.g., Kroon 2019). What distinguishes Eklund and Scharp for my purposes is that they don’t think the inconsistency view leads to nihilism. So it will be worthwhile to pause to show how any inconsistency theorist is committed to alethic nihilism, despite their protests to the contrary.

Consider Scharp’s own example of an inconsistent concept: RABLE. On Scharp’s view, concepts have constitutive principles that provide the meaning for the words that express that concept. The word ‘rable’ is made meaningful by Scharp because he defines RABLE’s constitutive principles as follows (2013: 36):

‘rable’ applies to x if x is a table.
‘rable’ disapplies to x if x is a red thing.

The concept RABLE is inconsistent because its constitutive principles falsely entail that the red tables in the furniture shop don’t exist. But here’s the relevant metaphysical question, which Scharp never addresses: are there any rables? Let’s assume that there is a consistent answer to this question. (Alethic nihilism is, after all, an alternative to dialetheism, and all parties to the current discussion are aiming for a consistent worldview.) To be a rable is to be the sort of thing that has the property that matches RABLE. What else could a rable be than something that satisfies the rules associated with RABLE? So suppose there are rables. What are they? One answer is that the rables are just the tables, including the red ones. This answer respects the first constitutive principle at the expense

---

5 Small caps denote concepts.


7 By comparison, Azzouni (2003) argues that natural languages like English are inconsistent, and consequently that every sentence of such languages is both true and false. Patterson (2009) offers the view that natural languages are inconsistent, and consequently full of meaningless sentences that are neither true nor false. But that leaves the door open for there to be truths in a non-natural language that doesn’t produce any paradoxical sentences.
of the second, which tells us that the red tables aren’t rables. A second answer is that the rables are the non-red tables. This answer respects the second constitutive principle at the expense of the first, which tells us that red tables are rables. The only way of respecting both principles is to conclude that the red tables both are and aren’t rables, which is the inconsistent option off the (proverbial) table. Choosing one of these answers over the other is *ad hoc* there is no tie-breaker on offer between them. Furthermore, both answers effectively reduce rablehood to either tablehood or non-red tablehood, and, *ex hypothesi,* that’s not what it is to be a rable. So there is no principled stance according to which there are rables, precisely because of the inconsistency inherent to RABLE. There is a principled stance according to which there are no rables, however. That is the view that there is no property of being a rable, and so nothing is a rable. There’s just no way a thing could be such that it ends up being a rable. After all, RABLE is an inconsistent concept, and here we are seeing the metaphysical fallout of a concept being inconsistent. If some concept is inconsistent, then there is nothing in the world that corresponds to it. Inconsistent concepts have empty extensions.

If TRUTH is inconsistent, then a parallel argument shows that it, too, is empty. If there is a property of truth, such that something is true, then it must be the property that corresponds to TRUTH’s constitutive principles. For Scharp, those principles are the ones invoked by the T-schema: ‘p’ is true if p, and if p, then ‘p’ is true. If that’s how the property of truth works, then (I) both has and lacks it. That’s impossible, so there is no property of truth. So if TRUTH is inconsistent, nothing is true.

Scharp goes so far as denying that there is a property of truth, but not that things are true. But if there is no property of truth, then being true is not a way that things are. And if things aren’t true, then things aren’t true. To say otherwise is to maintain, for example, that ‘Snow is white’ is true, despite the fact that being true is not a way that ‘Snow is white’ can be. Note that Scharp is not saying what, say, prosententialists have said (e.g., Grover 1992). He doesn’t deny that truth is a property because doing so mistakenly treats ‘true’ as grammatically a predicate when really it’s a prosentence-forming operator. Scharp is abundantly clear that consistent alethic concepts (that is, concepts that formally resemble TRUTH but shed its problematic constitutive principles) do correspond to properties (though they would be as deserving of a prosententialist treatment as TRUTH is). He writes: “I shall argue that there is no property of being true because no property comes close enough to satisfying the platitudes for truth” (2021: S650). The nature of TRUTH (and so the

---

8 Scharp agrees: “When something is true, it has the property of being true” (2021: S648).
meaning of ‘true’), not the grammatical nature of ‘true’, is responsible for the non-existence of the property truth.

1.2 Motivating alethic nihilism

The view that nothing is true is, to put it lightly, contentious. The main theoretical impetus behind the view involves its resources for responding to the liar paradox. The basic reasoning goes as follows. Given the concept that it is, TRUTH just is that concept that endorses unrestricted application of the following principle:

\[(T) \text{ For all } x \text{ and } p, \text{ if } x \text{ means that } p \text{ then } x \text{ is true if and only if } p.\]

Reasoning in line with this principle is usually anodyne and unobjectionable. But given that the sentence (L) means that (L) is not true, the schema yields the contradictory:

\[(L) \text{ is true if and only if } (L) \text{ is not true.} \]

Thus, a seemingly innocuous ordinary principle like (T) together with the fact that (L) is stipulated to mean what it does leads to a contradiction.

Liggins responds to the paradox by demonstrating how the alethic nihilist may avoid it. The nihilist maintains that nothing is true. Hence, they will reject (T). (T) entails that ‘Penguins predate puffins’ is true, given that ‘Penguins predate puffins’ means that penguins predate puffins, and that penguins predate puffins. The nihilist agrees that ‘Penguins predate puffins’ means that penguins predate puffins, and they agree that penguins predate puffins. (To be a skeptic about the existence of things being true is not to be a skeptic about semantics or evolution or anything else.) But they don’t think anything is true, so they reject (T).

Nihilists, then, are not beholden to the T-schema. Consider the instance of the schema corresponding to (L):

\[\text{‘(L) is not true’ is true if and only if (L) is not true.} \]

The nihilist rejects the left-hand side, as it claims, incorrectly in their view, that something is true. But the nihilist accepts the right-hand side, as it correctly assesses (L)’s not being true: nothing is,

\[\text{Note that while the quantifier binding ‘} x \text{’ is objectual and nominal, it’s contentious what is binding ‘} p \text{’. On Liggins’s view, following Künne (2003), it’s objectual and sentential.}\]
for the nihilist. Since the nihilist accepts one side of the biconditional but not the other, they reject the biconditional itself. But without this biconditional, the paradox is blocked. Yes, \((L)\) is not true, and \((L)\) means that \((L)\) is not true. Isn’t \((L)\) true then after all? No, says the nihilist: to say otherwise is to presuppose the T-sentence in question, which the nihilist has grounds for rejecting.

The nihilist offers a unique perspective on the T-schema. Half of its instances are acceptable, and half are not. (None, of course, is true.) The acceptable ones involve unacceptable right-hand sides. For example:

‘Dolphins demand diamonds’ is true if and only if dolphins demand diamonds.

Dolphins don’t demand diamonds, and the sentence isn’t true, so this biconditional is acceptable. Unacceptable T-biconditionals are those with acceptable right-hand sides, such as:

‘Dolphins don’t demand diamonds’ is true if and only if dolphins don’t demand diamonds.

Dolphins don’t demand diamonds, but the sentence that says as much isn’t true. So this T-biconditional is to be rejected.

Liggins’s attitude is that the alethic nihilist, in virtue of their nihilism, has a principled stance on the T-biconditionals, and thus a principled response to the liar paradox. Other views “restrict” the T-schema solely to avoid the paradox, whereas alethic nihilism comes with such restrictions “built in”. (I return to this dialectic below, in section 3.3.)

Hence, alethic nihilism’s motivation is primarily logical rather than metaphysical. By contrast, consider the sort of nihilism one finds in Nietzsche’s early unpublished essay “On Truth and Lies in a Nonmoral Sense” (1979). There, Nietzsche argues that no belief any of us could possibly have is true. Any belief we form is a product of the concepts we possess, and those concepts are irredeemably anthropocentric; because they are our concepts, they cannot claim to describe reality as it is in itself. For a belief to be true it must be formed in terms of those concepts

---

10 Note that this motivation separates alethic nihilism from other error-theoretic views. Field’s error theory about numbers (1980), Mackie’s about ethics (1977), and Appiah’s (1992) and Zack’s (1993) about race all have ontological motivations. Roughly speaking, because the entities or properties needed to make true our discourse about these topics don’t exist, the claims in question systematically fail to be true. That motivation is lacking for alethic nihilism, since nihilists accept what others take to be sufficient grounds for the existence of truth. Ontological concerns about the property of truth typically lead to *deflationism* about it, not nihilism. Armour-Garb and Woodbridge at times motivate their view metaphysically (2010: 70-71). But note that they consider such a view a non-error-theoretic form of fictionalism.
that capture reality as it is, concepts which are forever inaccessible to us. So Nietzsche offers a radical brand of Kantianism: he agrees with the Kantian that facts about the noumena are in principle unknowable (and even unthinkable), and goes further by finding no room for truth with respect to phenomena. Unlike the contemporary nihilist, the early Nietzsche is committed to there being truths, although those truths are in principle cognitively inaccessible. But for all those thoughts that we can in principle think, the early Nietzsche agrees with the contemporary nihilist that none of them is true. The major difference with contemporary nihilism is that Nietzsche must deny all claims (including claims that negate one another), whether or not they are semantically ascended. Not only is ‘Snow is white’ not true, but snow isn’t white, either. By avoiding this “omnidenialism”, the contemporary nihilist can advocate a consistent and more sensible view.

Liggins offers some other considerations in favor of nihilism, beyond its response to the liar paradox. Those include its relative ontological simplicity and epistemological advantages. I question both of those supposed benefits below. Now I turn to the nihilist’s response to the problem of self-refutation. I argue that the nihilist avoids the objection only at the cost of changing the subject.

2 Self-refutation and changing the subject

The idea that alethic nihilism is self-refuting has a long pedigree. Sextus Empiricus presents the basic argument concisely: “For if all appearances are false and nothing is true, “Nothing is true” is true. If nothing is true, therefore, there is a true thing. And so Xeniacas, in saying that all appearances are false and that nothing at all in the things that are is true, has been brought round to the opposite of his thesis” (2005: 79; see also 99). The nihilist puts forward a claim: that nothing is true. But in so doing, they put forward a truth: that nothing is true. After all, in asserting a claim one is presenting it as being true. So the nihilist position amounts to the self-contradictory thesis that while nothing is true, something is true (namely, the thesis that nothing is true).11

The argument turns on the transition from a claim that \( p \) to the claim that it’s true that \( p \), on what Charron and Doyle call “the necessary prefixability of the operator “it is true that”” (1993: 242). The acceptability of inferences between ‘\( p \)’ and ‘It’s true that \( p \)’ is so widespread that it’s no challenge to find contemporary authors who accept the self-refutation argument.12 This inference

---

11 Medieval philosophers made great use of this argument as well. See Augustine 1910: 95, and references to Anselm, Bonaventure, and Aquinas in Charron & Doyle 1993. These same philosophers (save for Aquinas) took the argument for the necessity of there being truth to further be an argument for the existence of God.

12 See, e.g., Mackie 1964: 195, Priest 1995: 56-58, Grim & Rescher 2012: 60-62, and Scharp 2021: S672-S673. The plausibility of the argument is also a factor in how interpreters of Nietzsche confront his apparent denial of truth (e.g.,
is precisely what nihilists like Liggins challenge; assuming it within the self-refutation argument is thus question-begging (David 1994: 60, Liggins 2019: 14).\(^\text{13}\)

As we have seen, the nihilist regards the inferences between \(p\) and \("p is true\) as invalid. The biconditionals \("p is true if and only if \(p\) is acceptable only if \(p\) is not. Breaking the link between a claim and its semantic ascension explains why the nihilist is not an omnidenier who denies everything. If asserting that nothing is true requires denying everything, then the assertion is self-undermining: in asserting it, one must deny it, too. But the nihilist doesn’t see the rejection of truth as a rejection of everything. Snow is still white, even though ‘Snow is white’ isn’t true. And though ‘Snow is white’ isn’t true, that doesn’t mean that ‘Snow is white’ isn’t true’ is true.

The self-refutation argument can be presented as follows:

1. Nothing is true.
2. If nothing is true, then it’s true that nothing is true.
3. If it’s true that nothing is true, then something is true.
4. Something is true.

(4) contradicts (1), and so the argument offers a *reductio* on (1), thereby proving that something is true. (1) is the statement of alethic nihilism. (2) is maintained by anyone who unconditionally adopts the T-schema, but the nihilist sees no reason to accept it. The nihilist rejects it because they affirm its antecedent but reject its consequent. To use (2) against the nihilist is to beg the question against their view.

The nihilist, thus, claims to adopt a self-consistent view. Though they accept that nothing is true, they do not grant that it follows that their view, which says precisely that, is itself true. However, this internal consistency, obviously vital to the nihilist, comes at the expense of changing the subject. That is to say, when the nihilist denies that something is true, they must be denying something that their opponent does not recognize. As a result, they cannot be interpreted as having denied the existence of *truth*, but rather something else. Hence, the self-consistency earned is nothing but a mirage.

---

Clark 1990 and Tanesini 1995). Note that Gemes (1992) refers to Nietzsche’s nihilist statements as “paradoxical”, which gives them more initial credence than they deserve.

\(^{13}\) Duns Scotus objects to the self-refutation argument, though not in a way that is useful to contemporary nihilists. According to Scotus, what follows from there being no truth is not that there is truth after all, but that nothing exists, which is not a happy consequence for the nihilist (Charron & Doyle 1993: 254-256).
First, consider the structure that the nihilist’s defense must take. The non-nihilist accepts the validity of inferences between two kinds of claims, ‘p’ and ‘q’. The nihilist denies the inference: even if it’s the case that p, it doesn’t necessarily follow that q. The nihilist must therefore find a “gulf” between the two claims—some logical space for breaking the two apart. (The absence of such a gulf between ‘p’ and ‘p’, for instance, explains why reiteration is valid.) In fact the gulf must be wider. For the nihilist, the separation between ‘p’ and ‘q’ is not merely logically possible, but actual. Moreover, the nihilist infers the negation of ‘q’ from ‘p’. The inferential behavior between the two camps couldn’t be more different. What explains the discrepancy is that what the nihilist denies in denying ‘q’ is not what the non-nihilist accepts in accepting ‘q’.

There are different ways of filling in this structure, depending upon how strong the equivalence between grounded statements and their alethic counterparts is supposed to be. First, one must be careful when it comes to which alethic counterpart is at issue. Compare ‘Penguins predate puffins’ against the following:

(A) ‘Penguins predate puffins’ is true.
(B) The proposition that penguins predate puffins is true.
(C) It’s true that penguins predate puffins.

The equivalence between ‘Penguins predate puffins’ and (A) appears to be metaphysically contingent, in that they are equivalent only because the English sentence ‘Penguins predate puffins’ means that penguins predate puffins, which is a matter of contingent semantic fact. The equivalences between ‘Penguins predate puffins’ and (B) and (C) appear to be stronger. In my view, the equivalence with (C) is the strongest. (B) appears to be about a proposition, unlike ‘Penguins predate puffins’, which is about birds. Given that (C) isn’t obviously about a proposition either (note that it involves a truth operator rather than a predicate), I believe that it is closest in content to the original. This point is disputable—one might take (B) and (C) to be stylistic variants of each other (e.g., Moltmann 2021: S711). But even if (C) is no closer to the original than (B), it still has claim to being the alethic counterpart closest to ‘Penguins predate puffins’, and so I focus on it below. Nihilism, of course, denies that there is any equivalence at all between ‘Penguins predate puffins’ and any of (A), (B), and (C); nihilists accept the former but reject all of the latter.

Next, there are different perspectives one might have on the equivalence between ‘p’ and ‘It’s true that p’ I shall consider two. First is the strong view that these two are “cognitively equivalent” (e.g., Field 1994), or express the same proposition (e.g., Frege 1956: 293 and Asay 2013: 152). This is the relationship between, say, ‘Snow is white’ and ‘Schnee ist weiß’: they are just
different ways of saying the same thing. Second is the moderate view that these are cognitively and conceptually distinct, but metaphysically equivalent. On this view, there may be extra content added by way of the truth ascription, but this content is not such as to make it metaphysically possible for one to obtain but not the other. This view is embraced by some deflationists (e.g., Horwich 1998: 128) but also substantivists about truth, whose theories provide robust accounts of the nature of the truth property being ascribed. If there is a weak view out there, it would be the nihilist’s, which denies that there is any equivalence at all.

It’s straightforward to demonstrate how the strong view yields the conclusion that the nihilist has changed the subject. According to this view, ‘\( p \)’ and ‘It’s true that \( p \)’ are cognitively equivalent. There is no chasm to be bridged between the two: to deny one but not the other is like accepting that snow is white, but not that Schnee ist weiß. Because the nihilist accepts that snow is white, and accepting that snow is white just is accepting that it’s true that snow is white, then if they do succeed in denying something by uttering ‘It’s not true that snow is white’, they must be denying something else, on pain of outright contradiction.

For the moderate view, the case can’t rely on an equivalence in meaning between ‘\( p \)’ and ‘It’s true that \( p \)’. The relationship between the two is more akin to that between, say, ‘This glass is full of water’ and ‘This glass is full of \( \text{H}_2\text{O} \)’. The claims are metaphysically equivalent in that it’s metaphysically impossible for one of them to obtain but not the other. Given that there is water, there must be \( \text{H}_2\text{O} \), even though ‘water’ and ‘\( \text{H}_2\text{O} \)’ don’t have the same meaning. If this kind of equivalence is operant, then there is an easy way to make sense of how one can accept that there is water, but not \( \text{H}_2\text{O} \): one must reject the claim that water is \( \text{H}_2\text{O} \). (Perhaps one thinks that water is an element.) In the case of truth, the non-nihilist argues that a metaphysically sufficient condition for it being true that snow is white is just snow being white. (Substantivists and deflationists agree on this point, even if substantivists append a further story as to how the property of truth is to be analyzed.) Nihilists must tell a different story: they must give an account of what truth is such that snow being white is not a sufficient condition for it being true that snow is white, just like how the \( \text{H}_2\text{O} \) denier must show that there being water is not a sufficient condition for there being \( \text{H}_2\text{O} \).

The fact that the nihilist is obliged to give an account of what truth is (or, rather, would be) that rejects a simple platitude accepted by every other theory of truth is highly suggestive, again, that the nihilist has to switch topics in order to succeed. Consider Tarski’s contention that if a “definition of truth is to conform to our conception, it must imply” the T-biconditionals (1944: 343; emphasis added). For Eklund and Scharp, that snow is white is sufficient for it being true that snow is white is a constitutive principle of TRUTH, such that (at least on Scharp’s view) denying it gives one’s interlocutors grounds for doubting that you mean the same thing as them by ‘true’.
According to Lynch, denying the platitudes about truth captured by the T-schema “would mean that you would be regarded by other users of the concept as changing the subject” (2009: 13). The point is that even if ‘p’ and ‘It’s true that p’ don’t exactly coincide in meaning, the bond between them is so strong that one can’t break it without raising the alarm of subject change. I don’t here offer a partisan theory as to what it is for the nihilist to have changed the subject in denying that truth exists. But it doesn’t matter: the nihilist provides fuel for that conclusion, regardless of how it should be understood. The nihilist rejects what are taken to be constitutive principles for truth that give the word ‘true’ its meaning on some views. The nihilist rejects claims involving truth that are said to be analytic (true in virtue of meaning), by those who believe in analyticity. The nihilist rejects platitudes involving truth that constitute what we mean by ‘true’, at least in the eyes of Canberra planners. The nihilist engages in radically different inferential practices regarding ‘true’, for those who identify inferential role as the key factor when it comes to meaning. When the nihilist offers their account of what they mean by ‘truth’, it will be unrecognizable, irrespective of one’s background views about what constitutes meaning and subject change.

Consider the following analogy. Suppose a philosopher claims to be a nihilist about bachelors: they deny that anything is a bachelor. Nevertheless, the bachelor nihilist firmly agrees that there are plenty of unmarried men. If one charges the bachelor nihilist with being inconsistent, the bachelor nihilist notes that they reject the inference from ‘x is an unmarried man’ to ‘x is a bachelor’. After all, the instances of the biconditional ‘x is a bachelor if and only if x is an unmarried man’ are to be rejected whenever ‘x’ is replaced by an unmarried man. For in that case the left-hand side will be rejected (nothing is a bachelor) but the right-hand side upheld. Were we to encounter such a character, the appropriate response would be: whatever it is you think you’re denying when you deny that some unmarried man is a bachelor is not something that I understand. Given that you’ve granted that there are unmarried men, there are no remaining grounds for denying that there are bachelors. This is the case, irrespective of whether ‘bachelor’ and ‘unmarried man’ mean the same thing, or just refer to metaphysically equivalent properties.

The burden facing the nihilist is that they must establish both that they are talking about what everybody else is talking about (on pain of having changed the subject), and also that everybody else is nevertheless wrong about what is involved in there being truth. The analog is the H$_2$O denier who must convince others that they’re wrong to believe that water is H$_2$O. Given the claims about truth that nihilists deny, it’s unclear on what basis they could establish that they do mean what the rest of us do when we talk about truth. They don’t just disagree with us about what is true (none of us agree about what’s true); they disagree with the very principles that we use to determine how to reason with ‘true’. To illustrate, here is an account of truth that would vindicate
nihilism: what it is for something to be true is for it to be a magical witch that lives in Oklahoma. ‘Snow is white’, like every other truth-bearer, is not a magical witch that lives in Oklahoma, and so fails to be true by this account. But this is a clear case of subject change: whatever it is that constitutes our shared discourse on truth, it has nothing to do with witches. The nihilist must say what truth is such that it remains recognizable, yet does not entail that things are true when they say that \( p \) and \( \neg p \). It’s not clear to me how one might go about giving an account of what truth is that somehow doesn’t also appeal to the T-biconditionals.

More importantly, Liggins doesn’t offer one, either. Nonetheless, his writing is highly suggestive of an approach to truth that resembles Künne’s (2003) account that employs sentential quantification. When discussing ‘For all \( X \) and all \( P \), if \( X \) knows \( P \), then \( P \) is true’, Liggins notes that the nihilist must reject it, for although some things are known, nothing is true. But Liggins then claims:

‘true’ functions here as a device of generalization. It serves to generalize

\[
\text{For all } X, \text{ if } X \text{ knows } <\text{Snow is white}>, \text{ then snow is white.}^{14}
\]

And nihilists are free to make claims of this form. Indeed, they can assert a generalization of them, \textit{provided it does not use ‘true’}. For instance, they can claim

\[
\text{For all } X \text{ and all } p, \text{ if } X \text{ knows } <p>, \text{ then } p.
\]

where the first quantifier is a familiar objectual one, but the second is a sentential quantifier. (2019: 16; italics added)\(^{15}\)

The question is why there is any need for the italicized proviso here. If the alethically-laden claim is just a generalization of acceptable claims, then it is equally acceptable. The purpose of invoking sentential quantification here is to show how one can dispense with ‘true’: it’s not adding any genuine content. Consider next Liggins’s other example:

\(^{14}\) ‘<p>’ abbreviates ‘the proposition that \( p \)’.

\(^{15}\) Note that, at least for Künne, sentential quantification (unlike substitutional quantification) is also a form of objectual quantification.
Similarly, nihilists must deny that we should believe only truths; while we should make some assertions, there are (by their lights) no truths for us to believe. Nihilists think that ‘We should only believe truths’ should be interpreted as a generalization of ‘We should believe that snow is white, only if snow is white’. They are free to make claims of this form, and to accept a ‘true’-free generalization of them:

For all p, we should believe that p only if p. (2019: 16)

Liggins takes himself to be showing how he can say—without using ‘true’—what others have said while using ‘true’. We begin with claims such as ‘We should believe that snow is white only if snow is white’. The non-nihilist generalizes to ‘For all p, we should believe that p only if <p> is true’. The nihilist generalizes to ‘For all p, we should believe that p only if p’. But the problem for Liggins is that he hasn’t explained in what way these two generalizations differ. Sure, one uses ‘true’ and the other doesn’t. But this just reveals that ‘true’ and sentential quantification are equally useful tools for constructing generalizations. Philosophers such as Horwich doubt that sentential quantification is acceptable, and thus praise ‘true’ instead for its generalizing ability. Philosophers such as Künne find sentential quantification acceptable, and use it to define truth. What is idiosyncratic about Liggins’s view is that it finds sentential quantification acceptable, and yet doesn’t acknowledge that it renders commitments to truth all but inevitable.

A further problem for Liggins is that by embracing sentential quantification, he commits himself to the existence of truth (at least by everyone else’s lights). Consider Künne’s “modest” theory of truth that deploys sentential quantification. According to Künne, for some \( x \) to be true is for there to be some \( p \) such that \( x \) is (or expresses) the proposition that \( p \) and \( p \) (2003: 337). All the quantification here is objectual, though ‘\( x \)’ is nominal (to be replaced by a name of the value of the variable) and ‘\( p \)’ is sentential (to be replaced by a sentence that expresses the value of the variable). Because he embraces sentential quantification, Liggins may assert that there is a \( p \) such that ‘Snow is white’ expresses the proposition that \( p \) and \( p \). But that’s all there is to ‘Snow is white’

---

16 More precisely, Horwich stresses the inadequacy of appealing to substitutional quantification in one’s theory of truth, and doesn’t consider the possibility of a sentential quantifier. But what he says about the former applies just as well to the latter: “The advantage of the truth predicate is that it allows us to say what we want without having to employ any new linguistic apparatus of this sort. It enables us to achieve the effect of generalizing substitutionally over sentences and predicates, but by means of ordinary variables (i.e. pronouns), which range over objects” (1998: 4, note 1). He would apply this idea to sentential quantification: why develop an unfamiliar form of quantification to serve a purpose that ‘true’ already fulfills perfectly well?
being true, according to the modest view. Furthermore, any non-nihilist (who accepts the legitimacy of sentential quantification) accepts that there being a \( p \) such that ‘Snow is white’ expresses the proposition that \( p \) and \( p \) is at least a **sufficient** condition on ‘Snow is white’ being true, even if it doesn’t fully capture the nature of truth.

Just as he denies half of the T-biconditionals, Liggins must deny half of the “Künne-biconditionals” such as:

‘Snow is white’ is true if and only if there is some \( p \) such that ‘Snow is white’ expresses the proposition that \( p \) and \( p \).

So Liggins cannot appeal to Künne’s account of truth. Hence, Liggins still owes us a **recognizable** account of what it takes to be true such that ‘Snow is white’ fails to have it, despite snow being white. Such an account is necessary to justify the separation that Liggins detects between

(A) For all \( X \) and all \( p \), if \( X \) knows \(<p>\) then \(<p>\) is true

and

(B) For all \( X \) and all \( p \), if \( X \) knows \(<p>\), then \( p \).

Theorists who appeal to the sentential quantification in (B) do so in order to show how one can say what one says with (A) without using the truth predicate. But these theorists would accept that (A) and (B) are equivalent, because ‘true’ in (A)—as even Liggins acknowledges—“functions here as a device of generalization” (2019: 16). Liggins must insist that they are not equivalent (although he still needs to maintain that at least in some sense (B) captures what (A) is after), but he can only do that by supplying some account of what else is needed for truth that has somehow gone missing. One might have thought that he could avail himself of Künne’s account, given his embrace of sentential quantification, but he must reject it just as he must reject all extant theories of truth, since they all accept that snow being white is a sufficient condition for there being truth.

To sum up, the challenge facing Liggins is how to demonstrate that when he claims to be denying the existence of truth, he is genuinely denying the existence of what non-nihilists embrace. Given that Liggins rejects the very claims that other theorists would point to in their account of what truth (or the concept TRUTH) is, or what ‘true’ means, etc., this challenge is especially pressing. On every extant theory of truth, it’s platitudinous that snow being white is a sufficient condition
for there being truth. Liggins owes us a recognizable account of truth—one that validates the claim that he hasn’t changed the subject—that reveals how the world doesn’t, in fact, provide the necessary ingredients for there being truth.

3 Against alethic nihilism

The main plank in the defense of alethic nihilism is its response to the liar paradox. But Liggins offers other points of support. However, I believe that these considerations are not compelling, and do not strengthen the nihilist position. I also consider one final objection against nihilism.

3.1 Parsimony

One further defense that Liggins offers is a parsimony consideration:

once we see that we speak as if some things are true just in order to enhance our expressive capacities, there is no longer any motivation for positing truths. Adding the claim that there are truths is to add a claim that does no explanatory work… compared with those theories which say that some things are true, nihilism portrays the world as a simpler place. (2019: 21)

The simplicity claimed here is an illusion. First, note that the nihilist enjoys no immediate ontological advantage. The denial that there are truths is not driven by a denial that there are truth-bearers. Though Liggins has his own suspicions about propositions (2019: 23), their existence is consistent with nihilism, so long as no proposition is held to be true. Moreover, Liggins gives no indication that he disbelieves in the existence of the sentence ‘Snow is white’, or my belief that snow is white. So the nihilist and non-nihilist can agree that the sentence ‘Snow is white’ exists, that my belief that snow is white exists, and that snow is white. The only disagreement here is whether or not the belief and the sentence are true. There’s no room for an ontological advantage on either side. You and I might disagree over whether Fred is a weaver, but if you deny it while I uphold it, neither of our views is thereby more ontologically parsimonious if we both believe in Fred. We all have the same things in our ontology.

The nihilist might respond by claiming ontological parsimony by way of not having to posit a property of truth. Though the nihilist scores no parsimony points via positing fewer entities, they do via positing fewer properties. This advantage is illusionary as well. For one thing, parsimony with respect to properties needs to be understood with respect to sparse properties; there are no
relevant parsimony considerations that involve *abundant* properties. As Lewis points out, “Properties carve reality at the joints—and everywhere else as well” (1983: 346). *Being green* is just as much a property as is *being true*. Some properties might be “special”—they might carve reality at the joints, or correspond to universals, or what have you. And perhaps theories that posit fewer special (i.e., sparse) properties are more advantageous in terms of parsimony. But that factor is not operant with alethic nihilism. *Being true* is not a sparse property. My belief that snow is white is true not because the belief has a particular property (truth), but because *snow* has a particular property, namely, whiteness. The parsimony-relevant issue is whether or not the nihilist or non-nihilist has a better argument for *truth* being merely abundant. But the non-nihilist, like everyone else, has every reason to think that *truth* is a merely abundant property.\(^{17}\)

So contrary to Liggins’s account, the nihilist’s world is not simpler. They deny that my belief that snow is white is true, but they agree that the belief exists, and that snow is white. Given that all it takes for that belief to be true is for snow to be white, there is no gain in parsimony by denying that the belief has the property of truth. The supposed advantage the nihilist sees is a case of “false parsimony”, to borrow a phrase from Thomasson (1999): given that the nihilist accepts all the “ingredients” for truth, there is no gain in parsimony by denying what those ingredients add up to. One who acknowledges the existence of unmarried men but denies the existence of bachelors likewise doesn’t thereby adopt a simpler worldview, “a world without bachelors”. They just instead, falsely, and with no regard to the meaning of the word, empty the extension of ‘bachelor’, insisting that everything is a non-bachelor.

3.2 Epistemology

Another argument that Liggins offers in defense of nihilism concerns the epistemology of the T-biconditionals and semantically ascended claims (2019: 22). As Liggins acknowledges, nihilism severely diverges from ordinary belief and its commitment to things being true. But he doesn’t take that fact as itself a reason to resist nihilism; instead, he suggests that philosophical theories conflicting with common *knowledge* is what’s problematic. And non-nihilists, Liggins claims, don’t have a good explanation for how we could have this supposed knowledge of the T-biconditionals and semantically ascended claims. So there is not obviously any bit of uncontentious knowledge that nihilists are denying.

Consider first how the nihilist approaches the epistemology of T-biconditionals. We know, in the usual way, that snow is white. We know, in the usual way, that grass isn’t purple. Nihilism

\(^{17}\) See Asay 2014 for a defense of the view that *being true* is a merely abundant property.
tells us that neither ‘Snow is white’ nor ‘Grass is purple’ is true. From all this we can conclude (by relying on our knowledge of how biconditionals work) that it’s not the case that ‘Snow is white’ is true if and only if snow is white, and is the case that ‘Grass is purple’ is true if and only if grass is purple. Here, the ability to have knowledge of the T-biconditionals’ acceptability or unacceptability rests on one’s prior knowledge of nihilism, as it’s a crucial premise in determining the status of the biconditionals. So knowledge of the T-biconditionals rests on antecedent knowledge about the world, logic, and nihilism itself. A question I’ll return to later is whether there is any independent evidence in favor of nihilism.

As for the non-nihilist, Liggins suspects that knowledge with respect to truth is problematic. There’s no special epistemological difficulty for coming to know that snow is white. What Liggins does take to be of special difficulty is explaining how one can come to know that the proposition <Snow is white> is true. He writes: “There is no plausible perceptual account of our knowledge of the truth of propositions, since propositions cannot be seen or otherwise sensed. And it is hard to think of any other way to come to know that a proposition is true, if we leave aside the T-biconditionals” (2019: 22). We can deduce that <Snow is white> is true if we infer it from ‘Snow is white’ together with its T-biconditional ‘<Snow is white> is true if and only if snow is white’, but that brings into focus the question of how one comes to know the T-biconditional. Liggins says that the evidence for it can’t be empirical; but giving a non-empirical account is “fraught with difficulties” (2019: 22). So there is no good epistemology for the T-biconditionals, and so there is no strong case for there being common knowledge of them that the nihilist must contradict.

There are a number of places to dispute Liggins’s argument. First, it seems to me that there is a clear-cut empirical route to the truth of propositions (or at least those propositions that involve empirical matters of fact). The very same empirical evidence that provides me knowledge that snow is white provides me knowledge that <Snow is white> is true. There’s nothing more to knowing that a proposition is true than knowing that its content obtains. As we have seen, the nihilist must find a massive gulf between claims that p and claims that it’s true that p, such that one can accept one but deny the other. But there is no basis for finding such a gulf that respects what it means to say that something is true. Liggins might say that my argument here presupposes the T-biconditional in question: I “rely” on it to establish my “nothing more” claim regarding ‘<p> is true’ vs. ‘p’. But I don’t think that captures the phenomenon correctly. As a competent user of the linguistic vehicle ‘Snow is white’, I know how to approach it epistemologically. I need to do some visual investigation (or rely on others who have done such investigation). Liggins doesn’t dispute that I have competence regarding the epistemology relevant to this particular claim of English. But
that same competency with English also gives me a decent epistemology for ‘<Snow is white> is true’, and that competency reveals that it doesn’t involve any special epistemology.\textsuperscript{18}

As for the T-biconditionals, how we come to know them depends on which version we’re talking about. A sentential T-biconditional such as “Snow is white’ is true if and only if snow is white’ is empirical in just the way that “Schnee ist weiß’ is true if and only if snow is white’ is; they both turn on empirical facts about what certain marks mean. Propositional T-biconditionals such as ‘<Snow is white> is true if and only if snow is white’ are not obviously empirical. They are typically regarded as being necessarily the case; <Snow is white> is just the content expressed by ‘Snow is white’.

In any event, what ultimately explains the epistemology of T-biconditionals is the fact that anything that means that \( p \) (or \( p \) is a meaning that \( p \), as one might think regarding propositions) is true if and only if \( p \). Liggins might query as to how we know that, and would reject responses that appeal to concept possession or “competency” as I just did. These paths are fraught with difficulty. So be it, but it’s not clear that this is dialectically relevant. Explaining knowledge in the neighborhood of the \textit{a priori}, analyticity, and the like is an ancient, puzzling, and difficult philosophical topic. But it poses no special problem for the non-nihilist. Liggins needs to show that we have good reason to doubt that we have knowledge of the T-biconditionals; then he could maintain that his view doesn’t contradict any commonly acceptable claims to knowledge. The fact that one doesn’t have a thoroughgoing epistemology for a set of claims doesn’t show that one has reason to doubt that one knows them. It just shows that epistemology is difficult.

Consider again the bachelor nihilist, who claims that while there are unmarried men, there are no bachelors. This nihilist rejects the claim that someone is a bachelor if and only if they are an unmarried man. ‘How would one know such a biconditional?’, they might ask. Possession of the concept \textsc{bachelor} might explain why they believe the biconditional, but it wouldn’t by itself prove that bachelors are unmarried men. That such a character exists, however, wouldn’t undermine my knowledge that bachelors are unmarried men. We might also ask the bachelor nihilist to consider claims they make that rely on knowledge they might find hard to justify. For example, the bachelor nihilist denies the biconditional ‘Harry is a bachelor if and only if Harry is

\textsuperscript{18} One might, of course, raise epistemological concerns with respect to the \textit{existence} of propositions, because of their abstract nature. Liggins suggests in a footnote that propositions \textit{per se} aren’t the issue here, and that parallel epistemological concerns arise for sentence types (2019: 22). But I don’t see how there is an issue for sentence tokens or beliefs or statements. And anyway, concerns about the ontology of various abstract entities is not in and of itself a concern about \textit{truth}, or reason to doubt that it exists. To my mind, they motivate ontologically deflationary accounts of abstract objects, such as Schiffer’s (2003) pleonastic account of propositions.
an unmarried male’ because while they accept that Harry is an unmarried male, their bachelor nihilism forces them to deny that Harry is a bachelor. This bit of reasoning relies on the principle that biconditionals are to be rejected when one of their conditions is accepted and its other condition rejected. Where does knowledge of such principles come from? That’s a difficult question to answer—especially when the familiar answers are all rejected as being fraught—but it shouldn’t bring philosophical inquiry to a standstill.

Ultimately, the point is that the alethic nihilist and non-nihilist are both steeped in reasoning that is non-empirical, potentially *a priori*, and that presumably turns on linguistic competence, conceptual possession, and secure logical inference. All philosophical argument is. The epistemology of this terrain is fraught, but it doesn’t paralyze inquiry. Nor should the skepticism be deployed selectively: concern for how we know T-biconditionals isn’t any more fraught than how we know claims like ‘Biconditionals are acceptable if both conditions are acceptable’.

### 3.3 *Ad hocery*

Here is one final objection against the nihilist. It perhaps preaches to the choir, as the nihilist will claim that it begs the question. Nevertheless, it draws attention to a greater dialectical concern for nihilism. Liggins points out that the nihilist can derive various claims about truth, such as ‘For every proposition *P*, if *P* is true then *P*’s self-conjunction is true’ (2019: 20). This is just another “vacuous” claim for the nihilist, as it employs an empty antecedent. Still, the nihilist need not deny it. This same mechanism, however, saddles the nihilist with all sorts of commitments that no one should want. For example, although the nihilist may assert that all truths ought to be believed, they are also committed to the claim that all falsehoods ought to be believed. (Nihilism about truth entails nihilism about falsehood.) Nihilists must concede that if it’s true that snow is white, then Hegel’s writing is a paradigm of clarity. Nihilists accept that all falsehoods are knowable. But of course (say I), it’s not the case that all falsehoods are knowable.

As noted, the nihilist accepts these consequences; these commitments that no one else would dare accept are not dealbreakers for nihilists. They are symptoms of the fact that the concept of truth is deeply entrenched in our conceptual scheme—an unfortunate fact, according to the nihilist, but a fact nonetheless. But it must be noted that there is no *other* reason to believe any of these claims, beyond the fact that they follow from nihilism. That in turn puts enormous dialectical pressure on the initial thesis of nihilism itself. Given that it entails countless commitments that we have no other reason to believe, there needs to be significant reason to believe nihilism in the first place. Parsimony doesn’t provide a reason. Nor does Liggins’s epistemological argument. So the
basis for believing nihilism rests entirely on its response to the liar paradox. This fact provides the grounds for my final objection.

Liggins identifies as a restrictionist, where restrictionism is the view that rejects some of the T-biconditionals, thereby “restricting” the scope of the T-schema. Mainstream deflationists like Horwich reject only the T-biconditionals that lead to paradox (1998: 40-42). Critics then charge them with being ad hoc, as rejecting the biconditionals only because doing so enables them to dodge the paradox (e.g., Beall & Armour-Garb 2003). Liggins claims that his restrictionism, by contrast, is principled: “the nihilist’s rejection of half of the T-biconditionals is principled: as we have seen, nihilism entails the negation of these biconditionals. Their rejection is motivated not by the desire to escape paradox but by the conviction that nothing is true” (2019: 20). The concern with being ad hoc is that in order to solve a philosophical problem (the liar paradox), one adopts a philosophical view (restrictionism) that is motivated only by its ability to answer the problem. But Liggins is open to this sort of critique: the main motivation (and the only tenable motivation, I’ve argued) for accepting alethic nihilism is its ability to answer the liar paradox. In response, Liggins here seems to sever the motivational connection between the Liar and nihilism. Liggins’s nihilism is said not to be motivated by its solution to the Liar. The conviction in nihilism comes first; the restrictionism that follows (and the response to the Liar it makes available) is a happy downstream consequence. Hence, Liggins avoids the charge of being ad hoc that less extreme restrictionists face at the expense of giving up any motivational basis at all for alethic nihilism. But what reason could there be for believing that nothing is true, save for the liar paradox? Without an answer to that question, nihilism is either completely unmotivated, or no less ad hoc than its less extreme restrictionist cousins.

Conclusion

Alethic nihilism is a radical philosophical view, and Liggins is correct to argue that this status does not make it unworthy of philosophical consideration. Crucial to its defense, however, is showing that it’s not self-refuting, as philosophers across millennia have taken it to be. The nihilist does have a defense, but I believe it turns on imposing more substance onto the property of truth than anyone should. The last century of work on truth has aimed at showing that the notion of truth is actually metaphysically anodyne; those who balk at the existence of truth (like the early-to-middle Nietzsche, or figures like Rorty) are fighting against an illusory opponent. The contemporary nihilist appreciates the progress in the theory of truth, and sees truth’s fundamentally expressive raison d’être as grounds for denying that truths exist. What I have pressed is that, to the contrary, the minimal commitments behind there being truths make their existence
all but inevitable. Because there’s nothing more to believing in truth than believing anything at all, the logical space for a view like alethic nihilism is intolerably narrow.

The fact that something is true is, as most have thought all along, inevitable. There remains the question of how to solve the liar paradox, and I have said nothing to motivate any alternative approach. But I do hope to have lessened the recent enthusiasm for the family of views that hope to solve the paradox by arguing that truth is non-existent, or that the concept TRUTH is inconsistent. For the latter view entails the former, and the former is independently unsustainable. The paradoxes remain a puzzle, but they have hardly proven that nothing is true.  

References


---

19 My thanks go to Max Deutsch for his help on this paper, as well as to the referees for the journal. The research presented here was partially supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (project number HKU 17618420), and funding from the University of Hong Kong’s Outstanding Young Researcher Award.


