A Plea for Inexact Truthmaking*

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In a series of recent papers, Kit Fine has begun to make a persuasive case for exact truthmaker semantics, a version of situation semantics with revolutionary aims.[1] Possible worlds, the workhorse of the currently dominant framework for doing natural language semantics, fall by the wayside, replaced with finer-grained, fact-like states. But beyond this step, which had already been made by other situation semanticists, Fine advocates adoption of his program's namesake relation: *exact* truthmaking. This contrasts with the *inexact* truthmaking relation used in the familiar versions of situation semantics, usually called 'support' or 'truth in a situation'.[2] Whereas

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[1] Primarily Fine (2017c), which is an overview of the framework and some of its applications, but also Fine (forthcoming, 2012, 2014a,b, 2016, 2017a,b, 2018a,b,c, ms) and Fine and Jago (2019). Some of the central ideas can be traced back to van Fraassen (1969). Besides Fine, Friederike Moltmann makes interesting use of exact truthmaker semantics (see Moltmann (forthcoming, 2017, 2019)), as does Tim Fernando: Fernando (2015). Closely related ideas have been developed more or less independently in work by several others: Cobreros et al. (2015), Correia (2016), Ferguson (2017), Gemes (1994) Gemes (1997), van Rooy (2000), van Rooij (2017), Yablo (2014), Yablo (2018), Rothschild and Yablo (ms), and Santorio (2018).

[2] See Barwise and Perry (1983), Barwise (1989), Kratzer (1989), Kratzer (2002), Kratzer (2007), Elbourne (2013, Ch. 1), and Leitgeb (2019), among others. Fine seems to think that inexact truthmaking is the very same relation as truth in a situation and that situation

a situation must guarantee a sentence's truth in order to be a truthmaker of either kind, it must be *wholly relevant* to the sentence—not containing parts which don't contribute to making the sentence true—in order to be an exact truthmaker, but not an inexact truthmaker.

Use of the exact truthmaking relation, Fine shows, allows for elegant solutions to a diverse array of longstanding linguistic puzzles. Among the highlights are accounts of free choice and Ross's paradox, counterfactual simplification, and scalar implicature. It also makes for easy definition of a variety of other useful notions, like partial content, tautological entailment, and subject matter.[3]

Exact truthmaking is meant to be more than just a new tool for the semanticist's toolbox; Fine's revolution also has a foundational ambition. Not only does exact truthmaker semantics provide us new solutions to old problems, it is also meant to be capable of simulating the more familiar tools from possible world and inexact truthmaker semantics. Fine, at various points, argues that his preferred notion of truthmaking can be used to define inexact truthmaking—the kind used in more familiar situation semantics—as well as loose truthmaking—a kind of truthmaking which can be used to formulate a semantics equivalent to possible worlds semantics. Furthermore, he claims, definitions in the other direction cannot succeed. Exact truthmaker semantics, then, has some claim to be considered an *ur*-theory, one that can be used to construct everything needed to do both possible worlds semantics and standard situation semantics, but which cannot itself be constructed from the tools provided as primitives by those theories. In taking up exact truthmaker semantics, Fine concludes, "semanticists of the world have nothing to lose but their chains" (Fine 2018c, p. 39).

There are thus two strands of the revolution Fine envisions: the practical, which encourages use of the notion of exact truthmaking in everyday semantic theorizing, and the foundational, which encourages us to reconceive possible worlds and inexact truthmaking, insofar as we continue to

semantics can be assimilated with inexact truthmaker semantics. See, e.g., Fine (2017c, p. 559). I have doubts about this, but will not explore the matter here.

[3] For an overview, see Fine (2017c).

use them, as being really, deep down, constructions of what exact truthmaker semantics makes available.

In this paper I challenge the foundational strand of Fine's revolution. I argue that of the two truthmaking relations, we should treat the inexact, rather than the exact, as primitive. I begin, in §1 and §2, by giving an overview of exact truthmaker semantics and by explicating Fine's argument for treating exact truthmaking as fundamental. Then, in §3, I argue that Fine gets things backwards: inexact truthmaking can be used to define exact truthmaking, but not vice versa. It is inexact truthmaker semantics, rather than exact truthmaker semantics, that should play a foundational role.

Before getting started, I should like to say that my intentions are not reactionary. I am no counterrevolutionary. I find the practical component of Fine's revolution congenial and promising, and would like to see exact truthmaking and related notions applied far and wide. And this practical project is where most of the interesting action will be. However, this project can and should be shorn of what I take to be a mistaken foundational claim about the relation between exact and inexact truthmaking.

1 Exact Truthmaker Semantics

We are used to thinking of the central aspect of meanings of (indicative) sentences as truth-conditions and taking truth-conditions to be sets of possible worlds. The first step on the road to exact truthmaker semantics is to replace the worlds of truth-conditions with something more specific—we'll call them *states*—which would *make* the relevant sentence true.

For example, both (1-a) and (1-b) are true in the actual world, but they have different actual truthmakers.

(1) a. Paris is a national capital.
    b. Buenos Aires is a national capital.

Intuitively, the state of Paris's being a national capital actually makes (1-a) true, whereas the state of Buenos Aires's being a national capital city actually makes (1-b) true is. And neither state makes the other sentence true.

Even sentences that are true in all of the same worlds can differ in their truthmakers.

(2) a. Paris is or is not a national capital.
    b. Paris is or is not inhabited.

Both of these are true in all worlds where Paris exists, but they have different truthmakers. The state of Paris's being a national capital makes (2-a) but not (2-b) true. The state of Paris's being inhabited makes (2-b) but not (2-a) true. This finer grain is one of the key advantages to using states rather than worlds.

What exactly are these states? As far as the semantics is concerned, we need not delve deeply into this question. As with possible worlds, it's a few very abstract properties of them that do the work, and while it might be of some interest to theorize about the nature of states or facts, it's a bad idea to get bogged down in such issues when one's main interest is using them to do semantics. All the semanticist needs from the metaphysician are things with the right structural properties.

Fine is noncommittal on this issue—"the term 'state' is a mere term of art" (Fine 2017c, p. 560)—and is happy to treat them as primitive or use different things for different purposes (e.g. taking actions to be the 'states' when dealing with imperatives). But for the most part he seems to be thinking of them as fact-like, rather than objectual or representational, and we will follow him in this.[4]

As for the very abstract properties relevant for semantics, what's important is that a part-whole relation, $\sqsubseteq$, be defined for them, and that it be a partial order (reflexive, transitive, antisymmetric) such that each subset

[4] I say 'fact-*like*' since we'll want to include states which don't actually obtain, which might be taken to disqualify them from facthood. Another reason is that we may wish to countenance, for example, disjunctive facts without allowing them to count as separate states for the purposes of our semantics. In general, I wish to avoid here various disputes about the metaphysics of facts, which I take to be irrelevant for current purposes, and take states to be whatever is appropriate for playing the required role in our semantics.

of the set of states has a least upper bound ($\sqcup$), or fusion. So given that there's the state, **p**, of Paris's being a national capital and the state, **b**, of Buenos Aires's being a national capital, there must also be the state, $\mathbf{p} \sqcup \mathbf{b}$, which is their fusion. This is the state of Paris's being a national capital and Buenos Aires's being a national capital.

One other property of states worth noting is that Fine does not require verifying states to be actual, or indeed even possible. This means that their relation to sentences is would-be truthmakers/falsehoodmakers, so what a sentence's verifiers and falsifiers are doesn't depend on what is the case. Thus besides the actual state of Paris's being a national capital, there's the state of Paris's not being a national capital, and, given the fusion requirement, an impossible state of Paris's being a national capital and not being a national capital.

The second and final step on the road to exact truthmaker semantics—it's a short road, or rather, they're big steps—is using a particular conception of the truthmaking relation: exact truthmaking.

Truthmaking, or verification, is a relation between sentences and states, but when does it hold? The easiest way to specify it is with a counterfactual. A state is a (would-be) truthmaker of a sentence if it would *make the sentence true*, were it actual.[5] But what is it for a state to actually make a sentence true? This is where the varieties of truthmaking we will be interested in—exact and inexact—come apart.

Both exact and inexact truthmakers must be sufficient for making the sentence true, in a generic sense of 'making'. The main distinction between them is whether they tolerate extra stuff beyond what plays a role in making the sentence true. Exact and inexact truthmaking differ in what they require of the parts of a truthmaking state.

For a state to exactly verify ($\Vdash_e$) a sentence, *every* part of it must be 'relevant' to the truth of the sentence—they must all be involved in a way

[5]This is to be taken as a heuristic, rather than a full definition, for two reasons. First, it may overgenerate truthmakers for impossible states, depending on what we make of counterfactuals with impossible antecedents. Secondly, we may wish to analyze counterfactuals in terms of truthmaking, rather than vice versa. I will leave open the issue of whether a better characterization of truthmaking is available in other terms.

of making the sentence true. Thus adding, through fusion, to a state that is an exact truthmaker need not result in another exact truthmaker, since this extra part might be irrelevant. In contrast, to inexactly verify ($\Vdash_i$) a state need only be partially relevant to the truth of the sentence.[6] Adding extra parts beyond what is sufficient will result in new inexact truthmakers—the irrelevance of these extra parts is not an issue.

The state of Paris's being a national capital, for example, is relevant to the truth of (1-a) but not at all relevant to (1-b). So while $\mathbf{p} \Vdash_i$ (1-a), $\mathbf{p} \nVdash_i$ (1-b). And assuming that **p** doesn't have any parts, then it is *wholly* relevant to (1-a)—its only part is relevant—$\mathbf{p} \Vdash_e$ (1-a), but of course $\mathbf{p} \nVdash_e$ (1-b). The sufficiency of merely partial relevance for inexact but not exact truthmaking comes into play clearly only with complex states. For example, $\mathbf{p} \sqcup \mathbf{b} \Vdash_i$ (1-a), but **b**'s irrelevance to the truth of (1-a) means that $\mathbf{p} \sqcup \mathbf{b} \nVdash_e$ (1-a). $\mathbf{p} \sqcup \mathbf{b}$ does, though, exactly verify the conjunction (1-a) $\wedge$ (1-b), since each of **p** and **b** is relevant to it. And this—checking the relation between verifiers of conjunctions and their conjuncts—is a good test for whether a truthmaking relation is exact or inexact. In general, an inexact verifier of $A \wedge B$ will also be an inexact verifier of A. But this is not so for exact verification; except in special cases, an exact verifier of $A \wedge B$ will *not* exactly verify A, since it will have parts (whatever verifies B) that are not relevant to the truth of A.

Fine also makes use of an independent falsehoodmaking (or falsification) relation, again between sentences and states, which holds when the state makes the sentence false. The same varieties are available here as well. A state that inexactly falsifies a sentence ($\dashv\vert_i$) must be partially relevant to the falsehood of the sentence and a state that exactly falsifies ($\dashv\vert_e$) a sentence must be wholly relevant to the falsehood of the sentence.[7] So, for

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[6]Dropping the requirement of partial relevance leaves us with an even less restricted form of truthmaking, *loose* truthmaking, which only requires that the existence of the state is incompatible with the sentence's being false. Thus any state at all will loosely verify a necessarily true sentence, even if the state has nothing to do with the content of the sentence. Loose truthmaking, as Fine (ms, p. 4) points out, doesn't involve any real advance over possible worlds semantics.

[7]There is also loose falsification, which only requires incompatibility with the sentence's truth.

example, the state $\mathbf{t}$ of Toronto's not being a national capital is an inexact and exact falsifier of (3).[8]

(3) Toronto is a national capital.

The state $\mathbf{t}^{+}$ of Toronto's neither having mild winters nor being a national capital is an inexact falsifier of (3), but not an exact falsifier of it.

With exact truthmaking and falsehoodmaking, Fine provides a plausible semantics for classical propositional logic, one very similar to that described by van Fraassen (1969): a model is a triple $\langle \mathcal{S}, \sqsubseteq, |\cdot|\rangle$, where $\mathcal{S}$ is the set of states, $\sqsubseteq$ is the part-whole relation on $\mathcal{S}$, and $|\cdot|$ is a valuation function mapping each atomic sentence to a pair $(\mathcal{V}, \mathcal{F})$ of subsets of $\mathcal{S}$—the sentence's exact verifiers, $\mathcal{V}$, and its exact falsifiers, $\mathcal{F}$. We will write the function that takes an atomic sentence to its set of exact verifiers $|\cdot|^{+}$, and to its set of exact falsifiers $|\cdot|^{-}$. And now we can define exact verification and falsification for any sentence, where $\mathbf{s}$ is a state, P is an atomic sentence, and Q and R are sentences:

(i)$^{+}$	$\mathbf{s} \Vdash_e P$	iff $\mathbf{s} \in \|P\|^{+}$
(i)$^{-}$	$\mathbf{s} \dashV_e P$	iff $\mathbf{s} \in \|P\|^{-}$
(ii)$^{+}$	$\mathbf{s} \Vdash_e \neg Q$	iff $\mathbf{s} \dashV_e Q$
(ii)$^{-}$	$\mathbf{s} \dashV_e \neg Q$	iff $\mathbf{s} \Vdash_e Q$
(iii)$^{+}$	$\mathbf{s} \Vdash_e Q \wedge R$	iff $\exists \mathbf{t}, \mathbf{u} \in \mathcal{S}$ such that $\mathbf{t} \Vdash_e Q, \mathbf{u} \Vdash_e R$, and $\mathbf{s} = \mathbf{t} \sqcup \mathbf{u}$
(iii)$^{-}$	$\mathbf{s} \dashV_e Q \wedge R$	iff $\mathbf{s} \dashV_e Q$ or $\mathbf{s} \dashV_e R$
(iv)$^{+}$	$\mathbf{s} \Vdash_e Q \vee R$	iff $\mathbf{s} \Vdash_e Q$ or $\mathbf{s} \Vdash_e R$
(iv)$^{-}$	$\mathbf{s} \dashV_e Q \vee R$	iff $\exists \mathbf{t}, \mathbf{u} \in \mathcal{S}$ such that $\mathbf{t} \dashV_e Q, \mathbf{u} \dashV_e R$, and $\mathbf{s} = \mathbf{t} \sqcup \mathbf{u}$

In English: negations are verified by the unnegated sentence's falsifiers, and falsified by its verifiers; conjunctions are verified by fusions of verifiers of each conjunct, and falsified by falsifiers of either conjunct; and disjunctions are verified by verifiers of either disjunct, and falsified by fusions of

[8]For convenience, I am helping myself to negative facts, which have long been controversial (Bertrand Russell jokes that he nearly produced a riot by arguing for their existence (Rusell 1918, p. 42)). Doing without them would make falsification more complicated, but not in ways relevant to the issues at hand.

falsifiers of each disjunct. For exact verification, this all seems right.[9]

And from here we can expand in various directions. We can extend the framework to give a semantics to a quantificational language, for example, or a language with modality. But for our purposes, for now, this is enough of a backdrop to consider whether something like this exact truthmaker semantics framework is preferable to a framework that makes primitive use of inexact verification for use as a foundational theory for natural language semantics.[10]

2 The Argument for Exact Truthmaking

Fine gives a simple argument for concluding that we should take exact truthmaking, rather than inexact truthmaking, to be primitive.[11] First

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[9]It should be noted that this is but one of several significant variants of exact truthmakers semantics. For example, we may wish to replace (iv)$^+$ with the more inclusive semantic clause that says a $Q \vee R$ is exactly verified by s iff $\mathbf{s} \Vdash_e Q$ or $\mathbf{s} \Vdash_e R$ *or* $\mathbf{s} \Vdash_e Q \wedge R$, as Fine (2016, p. 206) does. Besides varying the semantic clauses, we may wish to impose certain further restrictions on the models. For example, we might require *Verifiability*, which requires $\mathcal{V}$ to be non-empty for all atomic sentences. With the right restrictions and clauses, we may be able to get by with a unilateral semantics, which assigns sentences verifiers but not falsifiers (Fine 2017a).

How precisely the semantics should be formulated is not a question that we can settle here, and indeed it will be reasonable to use different formulations for different purposes. The above formulation, though, should suffice for current purposes, and the arguments of this paper do not depend on using it rather than others.

[10]Though natural language semantics is one of the main applications Fine has in mind for truthmaker semantics, it should be noted that he also has broader ambitions for applying it in logic, metaphysics, and epistemology, among other areas (Fine 2017c). This will be significant, since as I discuss at the end of §3.1, part of my argument will turn on a strategy that only applies to natural language semantics.

[11]A few things to note about the intended conclusion: First is that it is comparative; the "instead of" is crucial. It is meant only to show that, compared to one of its main competitors, exact truthmaker semantics has a better claim to be used as a foundational theory. Second, it is only directly comparing it to *one* alternative. This argument doesn't say anything directly about how exact truthmaker semantics compares to possible worlds semantics, for example, though an analogous argument for using exact (or inexact) truthmaker semantics rather than possible world semantics can be made (see Fine (ms, pp. 3–4) and elsewhere; Perry (1986, p. 106) makes remarks which suggest a similar argument in favor of old-fashioned situation semantics over possible world semantics. Finally, the

premise: we can define inexact truthmaking using the resources of exact truthmaker semantics. So anything that can be done with the former can be done with the latter. Second premise: there are some things we can't do with inexact truthmaker semantics that we can do with exact truthmaker semantics. So exact truthmaker semantics is strictly more expressive, so is preferable for use as a foundational theory. As Fine puts it, "we obtain the greatest flexibility in developing a theory of verification by taking the exact notion as primitive and seeing the other notions as off-shoots of the exact notion" (Fine 2017c, p. 565).

The form of the argument is straightforward enough. And while one could challenge the assumption that strictly greater flexibility is a reason to prefer a theory over another for foundational purposes, this strikes me as reasonable enough to assume as a background for this debate. What is more interesting is Fine's defense of the two premises, which we will detail in the remainder of this section.

2.1 Defining Inexact Truthmaking

The only difference in the basic components of exact truthmaker semantics and inexact truthmaker semantics is that one makes primitive use of exact verification (and falsification) and the other makes primitive use of inexact verification (and falsification). Thus to show that the components of inexact truthmaker semantics can be defined from those of exact truthmaker semantics, it is sufficient to show how to define inexact truthmaking (and falsehoodmaking) in terms available to exact truthmaker semantics.

This is just what Fine does. Here's his definition of inexact truthmaking:

> . . . we may take a state to inexactly verify a given statement just in case it contains a state that exactly verifies the statement; the inexact verifiers of a statement are simply those that contain

conclusion is about which we should treat as the foundational theory. This leaves open the possibility that there are some applications for which the foundationally superseded theory should be used, perhaps for reasons of simplicity. But in such cases, we should view this use as being ultimately able to be cashed out in terms of exact truthmaker semantics.

exact verifiers.

Fine (ms, p. 4); see also Fine (2017c, p. 565)

Or, to put it in symbols, for any state **s** and sentence A:

$$\mathbf{s} \Vdash_i A \quad =_{\mathrm{df}} \quad \exists \mathbf{s}'(\mathbf{s}' \sqsubseteq \mathbf{s} \wedge \mathbf{s}' \Vdash_e A)$$

This is intuitive. As Fine puts it, it is to "take literally the idea that inexact verification is partial verification, verification by a part" (Fine ms, p. 4). And we can see that it works for a couple simple cases.

Recall the states, **p**, of Paris's being a national capital, and **b**, of Buenos Aires being a national capital. We said that $\mathbf{p} \Vdash_i$ (1-a) and $\mathbf{p} \sqcup \mathbf{b} \Vdash_i$ (1-a), but $\mathbf{b} \nVdash_i$ (1-a). Given that $\mathbf{p} \Vdash_e$ (1-a) and $\mathbf{b} \nVdash_e$ (1-a), this is just what the above definition predicts, since $\mathbf{p} \sqsubseteq \mathbf{p}$ and $\mathbf{p} \sqsubseteq \mathbf{p} \sqcup \mathbf{b}$, but $\mathbf{b} \not\sqsubseteq \mathbf{p}$. So, at least with these cases, this definition of inexact truthmaking gets things right.

And, though Fine leaves it implicit, we can easily make an analogous definition for inexact falsification in terms of exact falsification.

$$\mathbf{s} \dashV_i A \quad =_{\mathrm{df}} \quad \exists \mathbf{s}'(\mathbf{s}' \sqsubseteq \mathbf{s} \wedge \mathbf{s}' \dashV_e A)$$

A state inexactly falsifies a sentence if it contains an exact falsifier of the sentence. And again, this works for simple cases. For example, **t**, Toronto's not being a national capital is an inexact falsifier of (3), as is $\mathbf{t} \sqcup \mathbf{p}$. This is what our definition of inexact verification in terms of exact verification predicts, given that $\mathbf{t} \dashV_e$ (3), $\mathbf{t} \sqsubseteq \mathbf{t}$, and $\mathbf{t} \sqsubseteq \mathbf{t} \sqcup \mathbf{p}$.

From these considerations we can tentatively conclude that these definitions are successful. It might turn out that for some more complicated cases, these definitions fail. But since they have some intuitive appeal (in connecting the partial relevance of inexact verification to whole relevance of a part) and work for the basic cases we've considered, the burden is on the proponent of inexact truthmaker semantics to come up with the problem cases. And until they do, it seems warranted to conclude that the definition succeeds.

2.2 What Inexact Truthmaking Can't Do

Now for the second premise, that there are some things that can be done in exact truthmaker semantics that can't be done in inexact truthmaker semantics. Again, there's a direct way to do this: give an example. And this is what Fine does. He argues that exact truthmaker semantics can, but inexact truthmaker semantics cannot, distinguish the content of A and logically equivalent $A \vee (A \wedge B)$, which turns out to be important for various applications.[12]

These sentences will differ in exact truthmakers (Table 1). Suppose $\mathbf{a} \Vdash_e A$, $\mathbf{b} \Vdash_e B$, and that $\mathbf{b}$ is irrelevant to the truth of A. Then $\mathbf{a}$ but not $\mathbf{a} \sqcup \mathbf{b}$ will be exact truthmakers for A. However, *both* $\mathbf{a}$ and $\mathbf{a} \sqcup \mathbf{b}$ will be exact truthmakers for $A \vee (A \wedge B)$, since any truthmaker of a disjunct will be a truthmaker for the disjunction, and $\mathbf{a} \Vdash_e A$ and $\mathbf{a} \sqcup \mathbf{b} \Vdash_e A \wedge B$. So $A \vee (A \wedge B)$ has an exact truthmaker that A doesn't. However, the inexact truthmakers for these sentences will be the same (Table 2). Through having $\mathbf{a}$ as a part, both $\mathbf{a}$ and $\mathbf{a} \sqcup \mathbf{b}$ will be inexact truthmakers for both sentences.

	A	$A \vee (A \wedge B)$
$\mathbf{a}$	✓	✓
$\mathbf{a} \sqcup \mathbf{b}$	✗	✓

Table 1: Exact Verifiers

	A	$A \vee (A \wedge B)$
$\mathbf{a}$	✓	✓
$\mathbf{a} \sqcup \mathbf{b}$	✓	✓

Table 2: Inexact Verifiers

It seems that exact truthmaking, then, affords us a distinction which inexact truthmaking does not.

This is not conclusive, however. The observations so far merely show that a completely flat-footed application of inexact truthmaker semantics is insufficient to capture the distinction between A and $A \vee (A \wedge B)$. This leaves open whether there is some more complicated way to capture the distinction using inexact truthmaking. If some such way could be found, the inexact truthmaker semanticist could defuse this example of Fine's.

[12] We want, for instance, to be able to distinguish the contents of sentences like 'Sue takes the pill' and 'Sue takes the pill or takes the pill and the cyanide' to account for the different behavior of counterfactuals which have them as antecedents (Fine 2017c, p. 571).

More ambitiously, the inexact truthmaker semanticist might try to define exact truthmaking from inexact truthmaking. If she could do that, it would follow that there are no distinctions which can be drawn in exact truthmaker semantics but not inexact truthmaker semantics. Can this be done?

Fine considers a couple attempts by situation semanticists to define, using inexact truthmaking (or something much like it), something "to do the work of exact verification", but thinks that "all such attempts are doomed to failure"(Fine 2017c, p. 564). If he's right about this, then our suggested reply on behalf of the inexact truthmaker semanticist is similarly doomed. Let us examine, then, the problem Fine thinks they have.

The first approximation uses the notion of a minimal situation.[13]

$$\mathbf{s} \text{ is } P\text{-minimal} \quad =_{\text{df}} \quad (\mathbf{s} \Vdash_i P) \wedge \forall \mathbf{s}'(\mathbf{s}' \sqsubset \mathbf{s} \to \mathbf{s}' \nVdash_i P)$$

The minimal situation is a 'smallest' inexact truthmaker for a sentence—a state that inexactly verifies the sentence without having any proper parts that verify it.

A minimal situation shouldn't have any irrelevant parts, since if it did we should be able to excise them and get a smaller truthmaker, but this would mean this smaller truthmaker is a proper part of the first situation, which means it wasn't minimal after all. We might expect, then, that we can simply define exact truthmaking as minimal inexact truthmaking.

$$\mathbf{s} \Vdash_e P \quad =_{\text{df}} \quad \mathbf{s} \text{ is } P\text{-minimal}$$

However, there's a well known glitch in this idea of minimality which causes trouble for this definition. A state may have infinitely many smaller and smaller parts, all of which verify a sentence, in which case we can never reach a minimal verifier. Take the sentence

(4) Achilles was moving.

[13] Minimal situations have been prominent in the situation semantics literature since Berman (1987) and Heim (1990) used them in accounts of quantificational adverbs and donkey anaphora.

On certain natural assumptions (which we'll discuss in §3.2), we may wish to treat this as having infinitely descending chains of exact truthmakers. For example, the fact that Achilles was moving from t_1 to t_5 makes (4) true, and has no irrelevant parts, so is an exact truthmaker. But so too is the fact that he was moving from t_2 to t_4, and $t_{2.5}$ to $t_{3.5}$, and so on. If we take the motion facts of the subintervals to be parts of the motion facts of the larger intervals, then there will be no minimal truthmakers for (4); we can always find smaller truthmakers.[14] So this approximation won't work.

The second approximation uses exemplification, a notion developed by Kratzer (1990, 2002) in order to avoid the kind of problem for minimal situations just discussed.[15]

$$\mathbf{s} \text{ exemplifies } P \quad =_{\text{df}} \quad \mathbf{s} \Vdash_i P \wedge (\forall \mathbf{s}'(\mathbf{s}' \sqsubset \mathbf{s} \rightarrow \mathbf{s}' \Vdash_i P) \vee \forall \mathbf{s}'(\mathbf{s}' \sqsubset \mathbf{s} \rightarrow \mathbf{s}' \nVdash_i P))$$

That is, $\mathbf{s}$ inexactly verifies P and its proper parts (if it has any) are homogeneous with respect to verifying P: either all of them do or none of them do. Sentences like (4) pose no problem for exemplification, since all of the parts of the relevant states will verify the sentence, so these states will be exemplifiers of the sentence, even though they aren't minimal verifiers of it. So instead of using minimal verification, we might try

$$\mathbf{s} \Vdash_e P \quad =_{\text{df}} \quad \mathbf{s} \text{ exemplifies } P.$$

And this does keep $\mathbf{a} \sqcup \mathbf{b}$ from exactly verifying A, which is what was keeping simple inexact verifiers from being able to distinguish the truthmakers of A and $A \vee (A \wedge B)$, as we saw above. But unfortunately, as Fine observes, it also keeps it from exactly verifying $A \vee (A \wedge B)$. $\mathbf{a} \sqcup \mathbf{b}$ doesn't exemplify $A \vee (A \wedge B)$) since it has a part, $\mathbf{a}$ that inexactly verifies $A \vee (A \wedge B)$ and a part, $\mathbf{b}$, that doesn't. Exemplification does exclude inexact truthmakers' irrelevant parts, but it also sometimes eliminates relevant ones along with

[14] See also the mud example from Kratzer (2002, pp. 166–167).

[15] Kratzer formulates the idea differently: $\mathbf{s}$ exemplifies P iff whenever there is a part of $\mathbf{s}$ that doesn't inexactly verify P, then $\mathbf{s}$ is P-minimal. This is equivalent, though, to the definition I give.

them.[16]

	A	$A \vee (A \wedge B)$
a	✓	✓
$\mathbf{a} \sqcup \mathbf{b}$	✗	✗

Table 3: Exemplifiers

So we still can't distinguish A and $A \vee (A \wedge B)$ in terms of inexact truthmakers or anything yet defined from them.

These definitions fail. There's nothing else available in the literature that would work and it seems that anything along the minimality or exemplification lines will run into the A vs. $A \vee (A \wedge B)$ problem. This still isn't conclusive—it's possible we just haven't thought of the right kind of definition yet—but at this point inexact truthmaker semanticists have their work cut out for them.

3 The Argument Overturned

Fine's argument for taking exact rather than inexact truthmaking as primitive, we've seen, rests on two premises: that inexact truthmaking can be defined in terms of exact truthmaking and that there are things that exact truthmaking can do that can't be done with inexact truthmaking. I will argue that both are false. We *can* define exact truthmaking in inexact truthmaker semantics, so there's nothing that can be done in exact truthmaker semantics that can't be done with inexact truthmaker semantics. And there are cases of inexact truthmaking not captured by Fine's definition, or indeed any definition in terms of exact truthmaking.

[16]The same problem, it's worth observing, applies to the definition using P-minimality. So even if the infinite descension problem didn't arise, the definition still wouldn't work.

3.1 Defining Exact Truthmaking

Given Fine's A vs. $A \vee (A \wedge B)$ case, one may be tempted to conclude with him that defining exact truthmaking with something like minimal inexact truthmakers or exemplification is "doomed to failure". But in fact, there is a way to define exact verification and falsification using the resources of inexact truthmaker semantics. With a cheap trick we can avoid Fine's problem case as well as any similar ones.

The definition makes use of exemplification, though not by saying that exact truthmaking just *is* exemplification. Rather, it starts with identifying exact truthmaking with exemplification for the atomic case only, then builds the rest of the definition recursively from there, simply copying the recursive clauses used by the exact truthmaker semanticist to define exact truthmaking for complex sentences. As I said, a cheap trick.

The first part of the definition goes like this. Where $\mathbf{s}$ is a state, P is an atomic sentence, and Q and R are sentences,

(d.i)$^{+}$	$\mathbf{s} \Vdash_e P$	$=_{\text{df}}$	$\mathbf{s}$ exemplifies P
(d.iii)$^{+}$	$\mathbf{s} \Vdash_e Q \wedge R$	$=_{\text{df}}$	$\exists \mathbf{t}, \mathbf{u} \in \mathcal{S}$ such that $\mathbf{t} \Vdash_e Q$, $\mathbf{u} \Vdash_e R$, and $\mathbf{s} = \mathbf{t} \sqcup \mathbf{u}$
(d.iv)$^{+}$	$\mathbf{s} \Vdash_e Q \vee R$	$=_{\text{df}}$	$\mathbf{s} \Vdash_e Q$ or $\mathbf{s} \Vdash_e R$.

Clearly, this is incomplete. It doesn't yet say anything about exact falsification, or about exact truthmaking of negated sentences. For that we'll need to introduce a negative counterpart of exemplification. What we already have, though, is enough to see that this definition will not fall prey to the original problematic case for inexact truthmaker semanticists: distinguishing A and $A \vee (A \wedge B)$. For suppose $\mathbf{a}$ exemplifies A, $\mathbf{b}$ exemplifies B, and $\mathbf{b} \nVdash_i A$. Then, by the definition above, $\mathbf{a} \Vdash_e A$, $\mathbf{a} \Vdash_e A \vee (A \wedge B)$, and $\mathbf{a} \sqcup \mathbf{b} \Vdash_e A \vee (A \wedge B)$, but $\mathbf{a} \sqcup \mathbf{b} \nVdash_e A$. It works just as it did with primitive exact truthmaking.

More generally, if the definition for exact truthmaking of atomic sentences is right, a completed definition along these lines will work just as well as the exact truthmaker semanticist's account for the truthmakers of any complex sentences. The only place where difficulties might arise, then, is in the base clause, which defines exact truthmaking of atomic sentences as exemplification. But so far we have not seen any challenges to the claim that exemplification and exact truthmaking are the same for atomic sentences.[17]

To complete the definition, we define ‘counterexemplification’, the negative counterpart of exemplification.

$$\mathbf{s} \text{ counterexemplifies } P \quad =_{\mathrm{df}} \quad ((\mathbf{s} \mathrel{\dashv\!\mid}_i P) \wedge (\forall \mathbf{s}'(\mathbf{s}' \sqsubset \mathbf{s} \rightarrow \mathbf{s}' \mathrel{\dashv\!\mid}_i P) \vee \\ \forall \mathbf{s}'(\mathbf{s}' \sqsubset \mathbf{s} \rightarrow \mathbf{s}' \not\mathrel{\dashv\!\mid}_i P))$$

This is just the same as exemplification, with $\mathrel{\dashv\!\mid}_i$’s swapped for $\Vdash_i$’s. A counterexemplifier is a state that inexactly falsifies a sentence whose proper parts (if it has any) are homogeneous with respect to falsifying it.

Using counterexemplification we can give the rest of the definition, in the same manner as before.

(d.i)$^-$	$\mathbf{s} \mathrel{\dashv\!\mid}_e P$	$=_{\mathrm{df}}$	$\mathbf{s}$ counterexemplifies P
(d.ii)$^+$	$\mathbf{s} \Vdash_e \neg Q$	$=_{\mathrm{df}}$	$\mathbf{s} \mathrel{\dashv\!\mid}_e Q$
(d.ii)$^-$	$\mathbf{s} \mathrel{\dashv\!\mid}_e \neg Q$	$=_{\mathrm{df}}$	$\mathbf{s} \Vdash_e Q$
(d.iii)$^-$	$\mathbf{s} \mathrel{\dashv\!\mid}_e Q \wedge R$	$=_{\mathrm{df}}$	$\mathbf{s} \mathrel{\dashv\!\mid}_e Q$ or $\mathbf{s} \mathrel{\dashv\!\mid}_e R$
(d.iv)$^-$	$\mathbf{s} \mathrel{\dashv\!\mid}_e Q \vee R$	$=_{\mathrm{df}}$	$\exists \mathbf{t}, \mathbf{u} \in \mathcal{S}$ such that $t \mathrel{\dashv\!\mid}_e Q$, $\mathbf{u} \mathrel{\dashv\!\mid}_e R$, and $\mathbf{s} = \mathbf{t} \sqcup \mathbf{u}$

This completes the definition. It uses only notions available in inexact truthmaker semantics and, if it works for the atomic case, it will work for defining exact truthmaking in general (at least for propositional languages). And so far we haven’t seen any problems for the atomic case. So we might conclude here that exact truthmaking can be defined in inexact truthmaker semantics after all, so one of Fine’s crucial premises is false.

This would be too hasty, though, since there are some problematic cases for exemplification that are, as far as a propositional languages are concerned, atomic. Take, for example, (5).[18]

(5) There are infinitely many stars.

[17] There are, however, some problematic cases. We’ll address them after we finish the definition.

[18] This example is from Kratzer (2002, p. 171).

This seems to have no exemplifier. For consider some arbitrarily ordered infinite collection of stars that play a role in the truthmaking state. Might the state of all these being stars be an exemplifier of (5)? Suppose we have an ordered (infinite) list of all the stars. Now take every other star—the ones with an odd-numbered position on the list. This gives us another infinite collection of stars that is a proper part of the first collection, so we'd expect the state of their being stars to inexactly verify (5) and be a proper part of the original state. But not every part of the original state is a truthmaker for (5). Consider some selection of five stars from the original collection. The state of these being stars seems like it should be a part of the original state, yet it does *not* inexactly verify (5). So the parts of the original truthmaker aren't homogeneous with respect to verifying (5). We can do this, of course, for any infinite collection of stars, so it seems there will be no exemplifiers for it, despite there being exact truthmakers. That such examples are problematic for exemplification is well known, but as far as I know they have not yet been dealt with adequately.[19]

However, I think the inexact truthmaker semanticist can deal with them at least as well as the exact truthmaker semanticist can, again by taking a leaf from the exact truthmaker semanticist's book. The idea is to apply the same strategy, but use exemplification for defining exact truthmaking for atomic, *unquantified* sentences, then recursively define exact truthmaking on that basis.

We begin by considering how the exact truthmaker semanticist can deal with the truthmaking for a simple existential sentence, (6).[20]

[19]See Kratzer (1990, 2002) and Armstrong (2004, pp. 21–22), who attributes this kind of example to unpublished work from 1995 by Greg Restall. Kratzer suggests that we handle (5) by claiming the proposition expressed by it is not one that is true in any situation in which there are infinitely many stars (Kratzer thinks of situations as at least sometimes being spatiotemporally extended, so it makes sense to think of stars being parts of or contained in situations), but instead one such that it "contains all the stars in the world of [it] and there are infinitely many of them". This seems to me not very plausible. Is (5) really not true in situations that contain infinitely many stars but not all of the stars in the world? And even if we think this maneuver will work for this case, it seems unlikely to succeed as a general fix.

[20]We will not address falsification, since that gets us into tricky issues about how to deal with truthmakers for universal generalizations which I don't think are relevant here.

(6) There is a star.

Here is what Fine (2017c, pp. 566–567) suggests. First, we introduce predicates ($F, G, \ldots$) and individual constants ($a_1, a_2, \ldots$) into the language and a domain D of individuals ($\mathsf{a}_1, \mathsf{a}_2, \ldots$) into the model. The valuation function will now map an n-place predicate together with a sequence of n individuals to its exact verifiers and falsifiers. So $|\textit{is-a-star}(a_1)|^+$ will be the set of states of a_1's being a star. And from here all of the truth-functions can be treated exactly as before.

Fine proposes that we treat the existential quantification $\exists x\phi(x)$ as a (possibly infinite) disjunction of statements ascribing the relevant property to each individual of the domain: $\phi(a_1) \vee \phi(a_2) \vee \ldots$ So $s \Vdash_e$ (6) iff $s \Vdash_e \phi(a_1)$ or $s \Vdash_e \phi(a_2)$, or ... [21]

Ultimately, we'll want a way to extend this to all generalized quantifiers, but for now I'll just sketch one plausible way of giving an exact truthmaker semantics for "infinitely many".

$$\begin{aligned} s \Vdash_e \text{“There are infinitely many } \phi\text{'s”} \quad \text{iff} \quad & s = \mathbf{t} \sqcup \mathbf{u} \sqcup \ldots \\ & \wedge (t \Vdash_e \exists x\phi(x) \wedge \mathbf{u} \Vdash_e \exists x\phi(x) \wedge \ldots) \\ & \wedge \{t, u, \ldots\} \text{ has infinitely many members.} \end{aligned}$$

That is, s is a fusion of infinitely many states that each exactly verify $\exists x\phi(x)$. There are various issues to be worked out here, but I think this is a reasonable start of an account of sentences like (5). So exact truthmaker semantics seems not to have trouble making sense of them.

Fortunately, there's nothing in this account that the inexact truthmaker semanticist cannot mimic. The strategy is the same as it was for our original definition: substitute in 'exemplification' for 'exact verification' (and 'counterexemplification' for 'exact falsification') in the atomic case, but treat everything else in exactly the same way. So all we need to alter about the above story is that in the atomic case, $\mathbf{s} \Vdash_e \phi(\alpha) =_{\text{df}} \mathbf{s}$ exemplifies $\phi(\alpha)$. And from there we define the exact truthmakers of existential

[21] To make things simple, we assume a one-to-one mapping between individuals and individual constants. But of course what we'd really want to do is add in the standard machinery for quantification.

quantification using disjunction and the exact truthmakers of "infinitely many" using existential quantification, as before. This means that so long as exemplification works for the atomic, unquantified case, the inexact truthmaker semanticist can specify appropriate exact truthmakers for (5). But there's nothing particularly problematic about finding exemplifiers for "a_1 is a star", nor atomic formulas in general. Thus, once we revise our definition to identify exact truthmakers with exemplifiers only for atomic sentences of a quantificational language, it's no problem that (5) has exact truthmakers but no exemplifiers.

But what about predicates like 'has infinitely many parts'? Then we can get the same sort of problem for "a_1 has infinitely many parts" even though it could be an atomic formula even in a quantified language. Though it's somewhat trickier, I think the same sort of solution can be pursued here: find more structure, then use exemplification only for the basic sentences, which in this may turn out to be things like '*part(x,y)*', which would seem to have exemplifiers. So this sort of case shouldn't be a problem either.

Before concluding that a successful definition is available, though, we need to observe an important limitation on the strategy pursued here. We've been assuming that we can find further structure which can provide us exemplifiers to specify sentences' exact truthmakers. This only makes sense, though, for natural language, where we can reasonably hold that there is further structure to be uncovered. For artificial languages, of course, one is free to specify meanings for atomic sentences as one wishes. So if I say S is an atomic sentence in a language I'm defining, and its meaning is the same as (5) (or, for that matter, some sentence with the form $A \vee (A \wedge B)$), we cannot claim that S is not actually an atomic sentence in this language. This means that if we're hoping for exact truthmakers to be definable from inexact truthmakers of atomic formulas in the object language, we must limit our claims about definability to natural language.[22]

[22]Here's another interesting kind of problem case, which I owe to an anonymous reviewer: suppose we follow Fine (2016, 2017a) in allowing for a null state, $\square$, which is part of every state but has no state as a proper part. Now suppose we introduce an atomic formula $\top_\square$ which has $\square$ as its sole exact verifier, a sentence, in other words, that is "trivially true because nothing (or, more exactly, nothing beyond the state of mere

Since I'm concerned here with the foundations of natural language semantics, this limitation doesn't trouble me. It should be noted, however, that Fine's concerns are about content in general, not just content in natural language, and so extend to domains where this strategy of uncovering further structure does not apply.[23] But for natural language the definitional strategy outlined above seems to allow definition of the exact in terms of inexact.

And so, pending further issues, I tentatively conclude that there is a successful definition of exact verification and falsification available to the inexact truthmaker semanticist of natural language. Inexact truthmaker semanticists, then, should welcome the various innovations relying on exact truthmaking, since exact truthmaking is already available to them, at least in principle.

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nothingness) is required for it to obtain" (Fine 2017a, p. 630). Since $\square$ will also be an inexact verifier of $\top_\square$, every state will be an inexact verifier of $\top_\square$, by the monotonicity of $\Vdash_i$. This means that every state will be an exemplifier of $\top_\square$. So if we try our definition of $\Vdash_e$ in terms of exemplification, we get the wrong results: every state comes out an exact truthmaker, not just $\square$. Exemplification cannot distinguish $\top_\square$, which has only the null state as an exact verifier, from another kind of trivially true sentence $\top_\blacksquare$, which has every state as an exact verifier.

We might try revising our definition in order to solve this problem, but I conjecture that natural language has no atomic formulas—or indeed any formulas—with the semantics of $\top_\square$, in which case for our purposes there is no need for revision. But it should be emphasized that even if this conjecture is correct, we may wish to make use of $\top_\square$ in an artificial language for other purposes. For those purposes, we would either need to revise the definition or else admit exact truthmaking as a primitive notion.

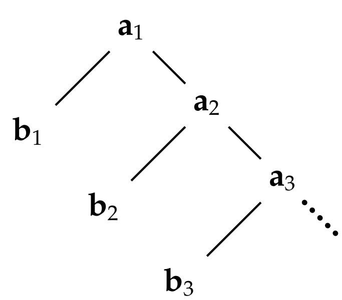
[23]There are interesting issues concerning the metasemantics of artificial languages and their relation to natural language. We might take the view that they must be somehow given, at least ultimately, by specifications in a natural language. If this is right, and if I'm right that for natural language exact truthmaking can be defined in terms of inexact truthmaking, then there will be a sense in which exact truthmakers for sentences of artificial languages will also be definable in terms of exact truthmakers, it will just be that they would be defined by exact truthmakers for sentences in the metalanguage, rather than object language. I have doubts that this is right, however—it seems conceivable that artificial languages can expand what we are able to think and say.

3.2 Inexact Truthmakers without Exact Truthmakers

The other major premise in Fine's argument was that everything that is needed to do inexact truthmaker semantics can be constructed from what's available to the exact truthmaker semanticist. Fine argued for this by providing a definition of inexact truthmaking. As we've seen, Fine's definition of inexact verification—a state inexactly verifies a sentence iff it has an exact verifier of the sentence as a part—is plausible and works for several cases. This does not guarantee, however, that it works for all cases.

In fact, I think there are some cases for which it fails. Cases, that is, where there are inexact verifiers without exact verifiers as parts. The kind of case I have in mind is one where every part of an inexact verifier of a sentence has further parts irrelevant to the truth of the sentence, so cannot have an exact verifier at all, let alone as a part.

Imagine, for example, a very thorough mixture of a-stuff with b-stuff which has the following structure.



Let's call this 'the Mixture'. Every bit of a-stuff in the Mixture has an b-part and an a-part. This isn't because to be a-stuff requires a certain proportion of b-stuff, it's just that there happens to be b-stuff mixed in. A martini may contain olive juice, though olive juice is not required for being a martini. For concreteness, the b-parts can be taken to be atomic, though it doesn't matter, so long as they don't contain any a-parts that themselves don't contain b-parts.[24]

[24] This means that another kind of mixture that would work as a counterexample is one where there are two substances which are blended in such a way that every part of the blend is itself a blend of each of the substances. This is similar to the kind of blending

Supposing that the Mixture exists, and supposing we take states to be the objects ($\mathbf{a_1}$, $\mathbf{b_1}$, etc.) themselves,[25] what parts of the Mixture are the exact verifiers for (7)?

(7) There is some a-stuff.

It seems that none of them are. The obvious candidates for truthmakers of (7) are the a-parts: $\mathbf{a_1}$, $\mathbf{a_2}$, ... But none of these can be *exact* truthmakers, since any $\mathbf{a_n}$ has a part, $\mathbf{b_n}$, that is irrelevant to the truth of (7). And exact truthmakers must be wholly relevant to the statements they verify.

Nevertheless, there are plenty of inexact verifiers (e.g, $\mathbf{a_1}$). The fact that they have irrelevant parts does nothing to keep them from being inexact verifiers. But then there are inexact verifiers, like $\mathbf{a_1}$, that don't have any exact verifiers as parts. If this right, then Fine's definition of inexact verification fails. What it says is a necessary condition of inexact verification is not actually a necessary condition. And I see no alternative to Fine's suggested definition that does any better. Indeed, given that there are *no* exact truthmakers, it's difficult to see how to use exact truthmaking in a definition that gets inexact truthmakers for this case. I thus tentatively conclude that the central component of inexact truthmaker semantics cannot be successfully defined using resources from exact truthmaker semantics.

There are several objections to this line of reasoning which need to be addressed. One of the objections will require us to move to another case. But beforehand it's worth clarifying why it is that there can be no exact verifiers for (7) in this kind of mixture.

It's not that exact verification has a closure condition requiring every part of an exact verifier to be an exact verifier. Rather, whole relevance only requires that each part of the state plays some role in making the statement true. So in the case above, the problem isn't that the a-parts

discussed in Nolan (2006) which, on his reading, is an idea that goes back to Chrysippus. That said, we cannot allow, as Nolan does (p. 172), that the original 'pure' substances (which don't have parts that involve the other substance) are themselves parts of the blend.

[25]If you are thinking, "But that's not what states are!", hold that thought. This will come up as an objection in a moment. We'll give another case which avoids it.

have b-parts that aren't themselves exact verifiers of (7). Rather, it's that they have b-parts that *play no role whatsoever* in verifying the statement, as olive juice plays no role make a drink a martini.[26] Now onto the objections.

The first objection is that this sort of gunk-like mixture, which not only involves infinitely descending parthood chains but also violates standard mereological supplementation principles, is metaphysically impossible, so we need not worry about such cases ever arising. In reply, we can note that even if it is impossible (which is not obvious, in any case), it seems like the kind of impossibility that we can intelligibly talk about, and so presumably semanticists should not ignore it on account of its impossibility. This is especially so for exact truthmaker semantics, given that one putative advantage of the framework is that it allows for distinguishing contents of sentences which aren't possibly true.[27]

A second objection is that I too quickly concluded that the b-parts are irrelevant to the truth of (7), or that I ignored other possible exact truthmakers of (7). We can state this objection as a dilemma. If the b-parts can't be separated out from the a-stuff, at least in principle, then perhaps the b-parts really are playing some active role in the truthmaking of (7), and so the a-parts could be exact truthmakers. On the other hand, if the b-parts can be separated out from the a-stuff, then the pure a-things can be the exact truthmakers of (7). This objection misses the point of the case. It's not meant to show that there is no possible exact truthmaker for (7). Rather, it's that given some instance of the Mixture, there will be inexact truthmakers of (7) that don't have any exact truthmakers of it as parts. Some particular a-stuff may have parts like this, even if it need not have them to be a-stuff. And that particular a-stuff will make for inexact truthmakers that don't have exact truthmakers as parts.

A third objection is that inexact truthmaker semantics has a problem here as well, since this kind of case seems to be one where there is no exemplifier, since it fails the homogeneity requirement. But I (and other situation semanticists) have suggested that we make use of the notion of

[26] This is of course compatible with it playing a role in making it a *dirty* martini. Similarly, the b-parts will play a role in making the Mixture impure a-stuff.

[27] Fine (forthcoming).

exemplification. And if inexact truthmaker semantics can't account for this case, it's no objection to Fine's argument to show that exact truthmaker semantics can't either. But again, this is just meant to be a case of inexact without exact truthmaking. It's not presented as a case where we have some account of the semantics of (7) in inexact truthmaker semantics. Moreover, the fact that there is no exemplifier of (7) is not merely a non-problem, but an advantage for the inexact truthmaker semanticist making use of exemplification to define exact truthmaking. That an existential sentence which doesn't have exact truthmakers also doesn't have exemplifiers is something we'd predict on this account. Were it otherwise, something would have been amiss with the definition of exact truthmaking.[28]

The strongest objection to the argument against Fine's definition goes as follows. We should not take states for our semantics of sentences like (7) to be concrete objects. Rather, we should continue to think of them as fact-like entities, such as the fact that $\mathbf{a_1}$ is a-stuff (and exists). And there's no requirement that the parthood relation between things must be mirrored by the states pertaining to their existence. Once we realize this, we can say that there is the state that $\mathbf{a_1}$ is a-stuff (and exists), which doesn't itself include all the parts of $\mathbf{a_1}$ or any states corresponding to those parts, and that this is an exact truthmaker of (7). Similarly for the state that $\mathbf{a_2}$ is a-stuff (and exists), and so on. This makes available all the exact truthmakers we would need to be parts of the inexact truthmakers of (7). So Fine's definition survives unscathed.

Unlike the previous objections, I think this one is pretty compelling. It does have a cost: it commits us to a particular conception of states as fact-like, where we may have wanted to leave open the possibility of treating them as objects or events which include objects.[29] Actually, we need not go even this far. We can simply require that the $\sqsubseteq$ relation on

[28]That said, there may be a real worry stemming from this kind of case for certain of the other applications of exemplification and minimal situations made by situation semanticists. This should not, however, pose a problem for inexact truthmaker semantics as a general framework.

[29]Moltmann (2019) and Fernando (2015) both take events to be states in exact truthmaker semantics. Fine (2018a,b) takes actions to be the states for the state space used for giving the semantics of imperatives and permission statements.

states, whether they are facts, events, or objects, should not be the same as (or an extension of) the parthood relation on objects. Parthood for states, we'd say, is not (and does not include) parthood for objects. And this cost may well be small—perhaps there aren't applications for which guaranteeing a correspondence between the mereology of states and the mereology of objects is important.[30] I'm inclined to grant this, and allow that this response is adequate to save Fine's definition from this proposed counterexample.

It does not, however, get to the root of the problem. There is not yet any reason to think that structures relevantly similar to that of the Mixture's cannot arise within the state space, however we want to think of $\mathcal{S}$ and $\sqsubseteq$. And if they do arise, then we'll have potential for cases of inexact truthmakers without any exact truthmakers. Indeed, I think it's plausible that we see such cases when dealing with sentences about activities put together with sentences about achievements, around which our next problem case for Fine's definition turns.

Philosophers and semanticists have long distinguished different categories of events (or eventualities) which sentences, depending on their aspectual class, express things about.[31] We need not review any full classification scheme here, but will simply distinguish activities (or processes), which are described by sentences like (8-a), and achievements, which are described by sentences like (8-b).

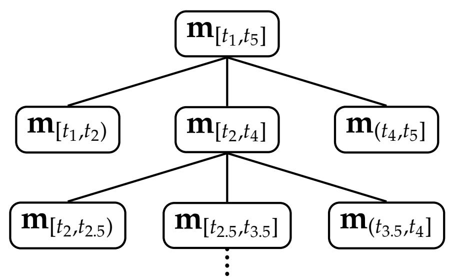
(8) a. Achilles was moving.
    b. The Tortoise won the race.

Two features of activities are important for us. First, they require that something go on for some non-zero measure of time. (8-a) can't be true

[30] However, see Krifka (1989, 1992, 1998) for reasons to think that the treatment of incremental themes may require such a correspondence, in particular for cumulative predicates like *eat the apple*.

[31] Going back to Aristotle's *Metaphysics* Θ (1048*b*18–36). More recently: Ryle (1949), Kenny (1963), Vendler (1967), Mourelatos (1978), Bennett and Partee (1978), Dowty (1979), Bach (1986), Verkuyl (1989), and Parsons (1990). Some helpful review articles are Filip (2012), de Swart (2012), and Casati and Varzi (2015).

simply due simply to the state of things at a single, temporally unextended instant. Assuming that time, as far as natural language is concerned, is dense, this requires that something be going on for a proper interval of time.[32] Second, activities are in some sense homogeneous: "any part of the process is of the same nature as the whole" (Vendler 1967, p. 101). What these assumptions mean is that (8-a) will be made true (inexactly and exactly) by states with the following sort of structure, where $\mathbf{m}_{[t_x,t_y]}$ is the fact that Achilles was moving throughout the interval $[t_x, t_y]$:[33]



Achievements, in contrast to activities, "are events that by their very nature are instantaneous" (Parsons 1990, pp. 20–21). A race is won at a particular time, not over a period of time. We can ask how long Achilles was moving for, but it makes no sense to ask how long the Tortoise won the race for.[34] We will take the exact truthmakers for (8-b), then, to be states like $\mathbf{w}_{t_3}$, the state of the Tortoise's winning the race at t_3.

So far, there's no problem for Fine's definition of inexact truthmaking, but there is one close at hand. Namely, what are the truthmakers for (9)?

(9) Achilles was moving when the Tortoise won the race.

[32]Use of intervals for imperfective sentences goes back at least to Montague (1973), partially credited to Dana Scott. It has been standard, in one form or another, since then.

[33]The divisions into intervals shown here is arbitrary; there are many other parts of each state which are not shown.

[34]Though there are related questions that make sense: How long did it take for the Tortoise to win? How long was the Tortoise winning for? How long did the Tortoise regularly win races for? But these are about different kinds of eventualities. For more on the instantaneousness of achievements, see Piñòn (1997).

As with the Mixture case, there are plenty of inexact truthmakers around. Any state which includes both one of Achilles motion and the Tortoise's winning will do, so long as their times overlap. $\mathbf{m}_{[t_1,t_5]} \sqcup \mathbf{w}_{t_3}$, for example, as well as $\mathbf{m}_{[t_2,t_4]} \sqcup \mathbf{w}_{t_3}, \mathbf{m}_{[t_{2.5},t_{3.5}]} \sqcup \mathbf{w}_{t_3}, \ldots$. But what about exact truthmakers? In our list of inexact truthmakers, the **m**-parts always contain irrelevant parts. Take $\mathbf{m}_{[t_1,t_5]} \sqcup \mathbf{w}_{t_3}$. It includes $\mathbf{m}_{[t_1,t_2)}$ as a part, but this is irrelevant to making (9) true—if t_3 is when the Tortoise won, Achilles's motion from t_1 to t_2 plays no role in making (9) true. We could move to a tighter interval of motion surrounding t_3, but the same problem will arise there, just with a smaller irrelevant subinterval. And given our assumptions, it will always be so: no matter how small an interval of motion we get, there will always be irrelevant parts. So there will be no exact truthmakers for (9). So there are inexact truthmakers without exact truthmakers as parts. So Fine's definition doesn't work here.

Can't we make the same sort of objection that blocked the Mixture case? Why not just reject, for example, that $\mathbf{m}_{[t_1,t_5]}$ contains $\mathbf{m}_{[t_1,t_2)}$ as a part? Just as the mereology of states need not be that of objects, it need not be that of events either.

I think this maneuver doesn't work for this case. First, Fine himself suggests we may want structures just like the one above: "... we may well maintain that any verifier (the motion of the object through an interval of time) will contain another verifier as a proper part"(Fine 2017c, p. 564). Moreover, having this structure is important for exact truthmaker semantics, since one of the framework's main applications is in capturing the intuitive notion of partial content. We want to predict that the content of A but not that of $A \vee C$ is part of what is said by $A \wedge B$, for example, and we want to say that the content of (10-b) is part of the content of (10-a).[35]

(10) a. Fido is a cocker spaniel.
b. Fido is a dog.

Similarly, the content of (11-b) should be a part of the content of (11-a).

[35] Fine (2017c, pp. 565–566).

(11) a. Achilles was moving from t_1 to t_5.
b. Achilles was moving from t_1 to t_2.

This seems like a paradigm case of content parthood. And so, in Fine's terminology, (11-a) conjunctively or analytically entails (11-b). This kind of entailment is treated in terms of containment of exact truthmakers: P conjunctively entails Q just in case every exact verifier of Q is contained in a verifier of P and every verifier of P contains a verifier of Q.[36] This means that exact verifiers for (11-a) must contain exact verifiers for (11-b). So the objection that worked for the Mixture case won't work for this one—$\mathbf{m}_{[t_1,t_5]}$ must contain $\mathbf{m}_{[t_1,t_2)}$.

That said, the argument from this case is still not decisive, as we relied on several assumptions that can be challenged. Perhaps we shouldn't take time to be dense, perhaps we should allow for states of motion (and other activities) at instances, or perhaps times ought not be incorporated into states at all, but instead treated in some other way. But the assumptions we made were plausible ones, so shouldn't be ruled out by fiat ahead of time without good reason. Preserving the definition of inexact truthmaking in terms of exact truthmaking does not seem to me sufficient.

The takeaway is this: Fine's definition of inexact truthmaking is plausible on its face. But once we raise the possibility of structures like those in the Mixture and in the activity/achievement overlap case, we see it will probably not work in general. It seems there may be inexact truthmakers without any exact truthmakers, and therefore no exact truthmakers as parts. And while we may dispute whether the particular cases I've put forward are ultimately best accounted for through use of such structures, there seems no good reason to impose a general ban on the structures ahead of time, which is what we'd have to do to ensure that the definition will work.

I conclude that Fine's proposed definition of the inexact in terms of the exact is unsuccessful. The partial relevance of inexact truthmaking does not in general boil down to whole relevance of a part. And given that

[36]For details, see Fine (2016, 2017b).

the cases we've seen have no exact truthmakers, there is no easy way to patch up the definition, or offer an alternative definition in terms of exact truthmakers. So it seems that exact truthmaker semantics does not provide the resources to define inexact truthmaking after all.

3.3 The Argument for Inexact Truthmaking

I've argued that Fine has things backwards: it is exact truthmaking that can be defined from inexact truthmaking, but not vice versa. If this is right, not only does the argument for exact truthmaking fail to go through, but the very same argument, *mutatis mutandis*, can be used to argue for the opposite conclusion: that inexact truthmaking, rather than exact truthmaking, should be taken as primitive. Fine's argument can be turned on its head.

First premise: we can define exact truthmaking using the resources of inexact truthmaker semantics (§3.1). So anything that can be done with the former can be done with the latter. Second premise: there are some things we can't do with exact truthmaker semantics that we can do with inexact truthmaker semantics (§3.2). So inexact truthmaker semantics is strictly more expressive, so is preferable for foundational purposes. We obtain the greatest flexibility in developing a theory of verification, not by taking the exact notion as primitive, but by taking the inexact notion as primitive, and seeing the exact notion as an off-shoot of that.[37]

[37]Since I don't take the arguments I gave for either of these premises to be conclusive, it's worth mentioning what conclusions we should draw if only one or the other turns out to be right. Suppose we accept the first but not the second. Then we would be in a familiar situation where there are multiple sets of interdefinable primitives (cf. the interdefinability, with $\neg$, of $\Box$ and $\Diamond$). Which we decide to use will depend on convenience or personal preference, though we may hope for some deeper, unifying theory which makes neither inexact nor exact truthmaking primitive. Suppose we accept the second premise, but not the first. This would mean that neither of the theories can do the work of the other. At least for foundational purposes, it seems that the best response would be to treat both exact and inexact verification (and falsification) as primitives, combining exact and inexact truthmaker semantics. I do not see any problem with doing this, though it is less elegant than starting with one kind of truthmaking and constructing the other. Again, we might hope for some deeper theory which could be used to define both notions.

4 Conclusion

As I said at the outset, I'm no counterrevolutionary. I suspect the notion of exact truthmaking will indeed be central to making important advances in semantics. On the matter of applying it in the practice of semantic theory building, I encourage semanticists: full steam ahead!

Nevertheless, I think the relation of exact truthmaking may be constructed from its more familiar inexact counterpart, and I doubt that inexact truthmaking can be successfully constructed with from exact truthmaking. Thus on the matter of what the fundamental components underlying our semantic theories are, I counsel restraint. Deep down, it's all inexact.

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