

What the States of Truthmaker Semantics Could (Not) Be

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Abstract: Developments in truthmaker semantics for the most part stay clear of the metaphysical issue of what sort of entities serve as the truthmakers and falsitymakers for sentences. It is assumed that perhaps facts or states of affairs (Fine, 2017a; Jago, 2020), with these taken sometimes as concrete particulars (Hawke, 2018) could serve for the job, but nonetheless that some such entities would do. In this paper I take a closer look at the issue of what entities could or could not play the role of truthmakers and falsitymakers in standard truthmaker semantics (Fine, 2016, 2017a,b; Fine and Jago, 2019), based on desiderata imposed by metaphysical and semantic considerations.

Keywords: states; truthmaker semantics; impossible worlds; rigid embodiments; modal realism.

1 Introduction

When Kripke first presented his semantics for various modal logics, some were left wondering about what the valuation points (the possible worlds) in Kripke frames and models were. Were they as real as the actual world, or did the actual world have a special status? Could there be impossible or non-normal worlds? If so, then it seems that they could not be as real as our own world, for otherwise we would be admitting genuine impossibilities out there, in some corner of reality (Lewis, 1986; Berto and Jago, 2019).

Not everything seemed to be of the right kind to be a possible world either. While Lewis (1986) showed in a fascinating way how to conceive of possible worlds as concrete particulars, my left foot for instance does not seem to be appropriately maximal to be a possible world. This is trivial, of course. But the lesson to take from it is revealing of a more general point: the way formulae are evaluated at possible worlds translates into restrictions on what possible worlds can be. It's because possible worlds represent each formula as true or false that they would have to be maximal entities of any kind, and hence maximal concrete objects if they were concrete objects. On the other hand, if we pick

a particular kind of entity to be the possible worlds what one can say having possible worlds in one's theory will also change, based on the metaphysics of those same entities. It's because worlds for Lewis are concrete particulars that there is no object a such that $a \in D_w$ and $a \in D_{w'}$, for D_w the domain of w and $D_{w'}$ the domain of w' , for w and w' distinct possible worlds (which is just a roundabout way of saying that there is no transworld identity).

The same will be the case for truthmaker semantics, as primarily developed by Kit Fine (2016, 2017a,b,c) and the differing accounts one might take of what states are. Throughout I will be assuming that there is a unified metaphysics of states. The paper should, thus, be taken in an exploratory way, so as to see how far this assumption of a unified metaphysics of states will take us. Under this assumption, I want to start us off on considering what the viable alternatives are for capturing the notions of exact truthmaking and falsitymaking, as well as those that are non-starters. I will start by quickly presenting the target that I will wish to capture with as minimal changes as possible: the basic model for standard exact truthmaker semantics in the widest space of states possible, the complete state space, deriving some desiderata from it (Section 2). Afterwards, I present reasons for thinking that a conception of states as concrete particulars in which all objects are states (Hawke, 2018) is not tenable (Section 3.1). I then show afterwards that even though an alternative in which states are a subclass of concrete particulars (and so according to which all states are particular objects, but not all particular objects are states) taking inspiration from Fine's (1999) theory of rigid embodiments is promising, it also faces difficult challenges from both the semantics and metaphysical side of things (Section 3.2). Moving on from the general approach of taking states to be concrete "chunks of reality", I consider the option of taking them to be abstract constructions out of concrete particulars and properties, finding it more successful both at capturing the target semantics as well as at squaring with certain metaphysical principles (Section 4). I finish with a brief conclusion and recap of the discussion.

2 The Target

Truthmaker semantics has been developed in recent years mostly due to the work of Kit Fine (2016, 2017a,b,c), but its roots can be found already in works such as those of van Fraassen (1969), Angell (1977), Schubert (2000), and Yablo (2014). Here I will focus on its most basic form as presented in Fine(2017a,c), though there are many ways in which the approach has been applied and modified, to the notion of verisimilitude (Fine, 2019), partial truth (Yablo, 2014; Gemes, 1994, 1997; Fine, manuscript), imperatives and deontic logic (Anglberger, Korbmayer and Faroldi, 2016; Fine, 2018a,b), epistemic logic (Hawke and Özgün, 2023), subject matter (Yablo, 2014; Fine, 2017b, 2020a), among many others (with many more to come, for sure).

As is standard, I will let $\langle S, \sqsubseteq \rangle$ be a frame where S is a set of states and \sqsubseteq is a partial order on S (i.e., a reflexive, transitive and anti-symmetric relation). I also define an operation of fusion on S , \sqcup , where if $s, t \in S$, then a $u \in S$ is such

that $u = s \sqcup t$ if and only if $s \sqsubseteq u$ and $t \sqsubseteq u$ and for all states v such that $s \sqsubseteq v$ and $t \sqsubseteq v$, then $u \sqsubseteq v$. I let $\bigsqcup S$ be equal to $s_1 \sqcup s_2 \sqcup \dots \sqcup s_n$ for s_1, \dots, s_n all the elements of S . It is imposed now that S is also a complete state space. That is, for T any set such that $T \subseteq S$, then there exists a state s such that $s = \bigsqcup T$.

Central to truthmaker semantics is the notion of exact truthmaking. A state exactly makes true a given sentence whenever it is responsible for the sentence's truth and is further such that "it must be relevant as a whole to the truth of the statement" (Fine, 2017a, 628). We can add to our frame two valuation functions $|\cdot|^+$ and $|\cdot|^-$ which attribute to each atom in the language the set of its exact truthmakers and the set of its exact falsitymakers, respectively. Of course, a sentence's truthmakers and falsitymakers need not be actual, for otherwise as soon as a sentence would have both truthmakers and falsitymakers it would be both true and false. This will be particularly important to keep in mind in the discussion that follows, and to understand the account of propositions as sets of truthmakers or tuples of truthmakers and falsitymakers in truthmakers semantics¹. We get then a model $\langle S, \sqsubseteq, |\cdot|^+, |\cdot|^- \rangle$. With the intuitive understanding of exact truthmaking (and correspondingly of exact falsitymaking), the following clauses for when a state $s \in S$ makes true (\Vdash) or false (\dashv) a sentence should come out as intuitive (Fine, 2017a):

$$\begin{aligned}
s \Vdash p & \text{ iff } s \in |p|^+ \\
s \dashv p & \text{ iff } s \in |p|^- \\
s \Vdash \neg A & \text{ iff } s \dashv A \\
s \dashv \neg A & \text{ iff } s \Vdash A \\
s \Vdash A \vee B & \text{ iff } s \Vdash A \text{ or } s \Vdash B \\
s \dashv A \vee B & \text{ iff } \exists(t, u)(s = t \sqcup u) \text{ and } t \dashv A \text{ and } u \dashv B \\
s \Vdash A \wedge B & \text{ iff } \exists(t, u)(s = t \sqcup u) \text{ and } t \Vdash A \text{ and } u \Vdash B \\
s \dashv A \wedge B & \text{ iff } s \dashv A \text{ or } s \dashv B
\end{aligned}$$

This is the very basic framework, which is then expanded upon in very different ways for different purposes². Unless it is needed to argue for a specific point, however, I will not concern myself here with the particulars of these further developments of truthmaker semantics. As it will be seen, finding entities for the bare bones of truthmaker semantics might already be a tall order, before we move on to flesh them out. Another argument in favour of focusing on the

¹Thanks to an anonymous reviewer for suggesting I make this point clearer early in the paper.

²One could then wonder whether what the states are should not depend on the development and application of truthmaker semantics to given specific issues. Here I agree with Lewis (1986, 19–20), who mentions the possibility that one could interpret possible world semantics in various ways, for instance as some towns connected by rail. If we did so, such towns would then instantiate models validating a given modal logic or other. But this would of course not yield a correct metaphysics of possible worlds across all uses. While different entities could play the role of a state for different purposes, I take it that the same applies here and that only some kinds of entities can play the role of the states across all uses. Thanks to an anonymous reviewer for raising this issue.

complete space of exact truthmakers and falsitymakers is that in principle one should be able to construct the other spaces of states and to define the other relations of truthmaking and falsitymaking one is interested in on the basis of this space of states and with this notion of truthmaking. This seems to be material from which one should be able to get everything else, no matter the application.

Following the advice of two anonymous reviewers, I would like to say more on what I mean by this last sentence. Here the thought is simply that if one finds entities that are able to play the role of states for the complete state space, then no matter what the application of truthmaker semantics one is interested in, such application is going to per force be a subset of the set of all states in the complete state space. But then we're guaranteed to have already found enough entities for that particular application, and we can always impose a qualification on them to yield the resulting subset of states that we're interested in. The risk, assuming again for exploratory purposes that the states are a unified kind of entity, is that we might not have entities to stand for all the truthmakers and falsitymakers we would wish for.

Having in mind what the target is, some desiderata naturally follow. I'll start by listing them and then I'll provide justifications for each of them.

- Desideratum 1: States should be individuated by what they make true and false;
- Desideratum 2: We should provide entities corresponding to all states (which notably includes the empty state, \square , a state which is part of every state);
- Desideratum 3: Exact verifiers/falsifiers should only contain non-trivial states³ as parts that contribute to the truth/falsity of the sentences they verify/falsify⁴.
- Desideratum 4: Truths concerning what the truthmakers and falsitymakers for φ are, are grounded/explained by truths concerning what the truthmakers and falsitymakers for its proper subsentences are⁵.
- Desideratum 5: Truthmakers should necessitate the sentences that they make true.

Desideratum 1 is based on the thought that any distinctions between states that do not amount to distinctions between what they make true and/or false are superfluous. What does it mean to say that there are various states making

³That is, states other than the null state. Thanks to an anonymous referee for this addendum.

⁴This is not to say that they cannot contain states making true sentences that contain *redundant* but relevant information as Fine(2017c) stresses. Rather, what this desideratum implies is that all non-trivial components of the state must play an active role in explaining the truth/falsity of the sentence.

⁵That is, subsentences not identical to the whole sentence.

exactly the same sentences true and false? The explanatory work we can do with multiple such states, we can do with only one. Importantly, this desideratum does not imply that for any sentence there is only one state making it true and one state making it false⁶. Rather, what this desideratum entails is that there are no two states making true and false exactly the same sentences⁷. The reason for accepting such a desideratum comes down to, mostly, a reason of theoretical economy and simplicity: on the one hand, why multiply states beyond what their use is, i.e. serve as truthmakers and falsitymakers for sentences; on the other hand, if the entities we want to play the roles of states are the kind of entity that make true and false sentences, and if by Leibniz's Law distinct states are distinct entities, then what sense is there in saying that there are distinct states that make true and false the same sentences?

Desideratum 2 follows from what the target is. Given we want to provide a metaphysics for standard truthmaker semantics, it will not do to just say what some of its states are and stay mute on what entities some of the other states are. This desideratum, as is stated, does not go as far as to claim that the states must all be the same kind of entity, but rather that all states must be some entity or another and to give a proper metaphysics of truthmaker semantics, we need to provide an account of what each and every state *is*⁸.

Desideratum 3 is simply a matter of respecting the core notions of truthmaker semantics: exact verification/falsification. It captures the very definition of the concept of exact verification and falsification as present in (Fine, 2017a,c). The way I interpret it and which will be important later on, is however more sympathetic to the spirit of Jago's (2023b) way of understanding truthmaker semantics, which allows for the existence of disjunctive parts. Namely, on Jago's (2023b) account, a state might make true a disjunction while not making true any of the disjuncts (which would necessitate different clauses for the disjunction)⁹. Similarly, on my way of interpreting Desideratum 3, a state might make

⁶Thank you to an anonymous reviewer and the editors for pushing me to clarify this point.

⁷A helpful anonymous referee asks what is the language in which these sentences are formed. The worry, I take it, being that if what states there are is restricted by any language that is learnable by humans, say, then we would likely be imposing an unwarranted restriction on what states there can be. This is a very important point. Here I am assuming a very idealized notion of a language and assuming a tacit quantification over any possible language. This includes the lagadonian language (Lewis, 1986; Berto and Jago, 2019), which will play an important role later on, where each object serves as a name for itself, and each property and relation serves as a predicate designating itself. As we will see, a number of accounts will struggle to meet Desideratum 1 not because of containing too many states anyway, but rather because the entities they claim the states to be are too coarse-grained to play the roles of truthmakers and falsitymakers for sentences even in a natural language.

⁸Having said this, however, I am assuming that the states are all the same kind of entity and I will assume that we should present positive reasons for deviating from the assumption that given entities that are individuated by making true and false sentences are of the same kind. My arguments against proposals according to which states are concrete particulars of some kind will not turn on this assumption, however, and while my own account is committed to all states being entities of the same kind, I don't take this to in general be a desideratum that any theory of states must necessarily meet. Thank you to two anonymous referees for pushing me to clarify this point.

⁹This is not to say that I aim to capture Jago's (2023b) account.

it false that “The bag is brown”, while not making it true that the bag is any other colour. Jago could still maintain that “The bag is not brown” is made true by the same states as the big disjunction of “The bag is red”, “The bag is blue”, and so on, for all possible colours that are not brown, for he includes the case where the disjunction is made true but none of the disjuncts is made true¹⁰. But another way one may go is to deny that the truthmakers for a negated disjunct are the same set of states as the ones for the corresponding disjunction of relevant alternatives (contra Fine (2017a)). This is the option that I will be following in this paper, but which I think is close in spirit to Jago’s (2023b) approach.

Desideratum 4 establishes, for instance, that truths concerning what the truthmakers for $\neg A$ are will be grounded by truths concerning what the falsitymakers for A are, and that what the truths concerning what the truthmakers for $A \wedge B$ are will be grounded by the truths concerning what states are fusions of a truthmaker for A and a truthmaker for B , and so on for the other clauses given above. This desideratum comes from the irreflexivity of grounding and the clauses for truthmaking, with the assumption that the more fundamental grounds the less fundamental. We want an explanation for truths of the sort “ s is a truthmaker for $\neg A$ ”, and we know that the truth of “ s is a truthmaker for $\neg A$ ” won’t do, thanks to the irreflexivity of grounding. We know that the required truth is true if and only if “ s is a falsitymaker for A ” is true, and this seems to be more fundamental than the truth we started with. In fact, what’s on the basis of what Fine (2020a) and Yablo (2014, 2018) call “recursive truthmaking” seems to be precisely this idea that we keep “pushing” dependency of truthmaking facts down until we reach the atomic level¹¹.

Finally, Desideratum 5 expresses a necessary condition for a state to be a truthmaker that is widely accepted in the literature, for instance in Restall (1996) and Jago (2018, §6), and many other places. Both Restall (1996) and Jago (2018, §6) present strong cases for why necessitation also isn’t a sufficient condition for truthmaking and for grounding. However, here we only need the claim that truthmakers necessitate whatever they make true. Asay (2020) presents a recent opposing modal skeptic view. This principle is usually stated as follows: if $s \Vdash \varphi$, then Necessarily, φ is true if s exists. But I prefer to state it by making explicit “is actual”, for we might have a broader – “unrestricted”

¹⁰Assuming, of course, that the bag is coloured all-over with the same colour.

¹¹An anonymous reviewer asks if for instance the truth of $A \vee \neg A$ shouldn’t be explained by being an instance of a general logical law. I think that that’s very plausible, but on a different reading of “explanation”. Taking “It’s raining or it’s not raining” to be grounded in the fact that this is an instance of the general law of excluded middle is especially plausible on epistemic readings of grounding, where to ask for the grounds of a given claim is to consider what would be a sufficient explanation for an agent who wants to know why a given sentence is true. I am myself very interested in this project and hope to say more on it in some other occasion. However, here I want to focus on a metaphysical reading of grounding, according to which the grounds for a sentence’s truth are independent of any agents’ epistemic endeavours. When it comes to how mind-independent reality is structured, I favour a bottom-up view according to which general laws like excluded middle are not the grounds for their instances (though the opposite might, but need not be the case, as the law itself is a schema, not a sentence or proposition).

– notion of existence. So instead, I prefer to state it as follows: if $s \Vdash \varphi$, then Necessarily, φ is true (i.e. true in the actual world) if s is actual.

3 States as Concrete ‘Chunks of Reality’

Having set up the target semantics we wish to provide a metaphysics for, as well as the desiderata that will be deployed to evaluate the various proposals to follow, let us start by considering two broad ways of taking the states of truthmaker semantics to be concrete ‘chunks of reality’, as they’re often called. In particular, here I’ll consider the outlook of taking states to be: ordinary objects, events, spacetime regions, rigid embodiments and concrete states of affairs.

3.1 Concrete Particulars as States: Ordinary Objects, Events, Spacetime Regions

On his way to a possible characterization of the subject matter of individual terms in the context of truthmaker semantics, Hawke (2018) suggests (possibly influenced by Fine’s (2020a) quotation of Yablo (2014)) that the states of truthmaker semantics can be taken as “chunks of reality” of which concrete particular objects involved in those states are part. So for instance my bag (let us call it b) is part of the state of *my bag being on the table* (let us call it s), which is itself a concrete particular. Hawke (2018, 717) has it that any object is itself a state and that $b \sqsubseteq s$ (for \sqsubseteq the parthood relation between states mentioned above).

In a truthmaker semantics setting, it is natural to identify propositions with their set of truthmakers or with their pair of sets of truthmakers and falsitymakers (Fine, 2017a, 2020a; Jago, 2023a). But clearly, as we’ve noted, not all such truthmakers and falsitymakers are actual, for not all propositions are both true and false¹². Therefore, if we claim that the states of truthmaker semantics are concrete and further that objects can be states, then we will end up favouring a realm of concrete non-actual *possibilia* like that defended by Lewis (1986).

Notably, states or situations in situation semantics have been understood as concrete chunks of reality in a Lewisian way by Kratzer (1989), who further understands exact verifiers and falsifiers as minimal situations (Kratzer (2021)) – i.e. a situation that verifies a given sentence and which does not contain any proper part verifying that sentence. This association with modal realism might be enough, however, for many to reject the account of states as concrete objects if one wants to avoid the “incredulous stare” along with other difficulties facing modal realism. Here I mention a couple of them, which I take to be particularly perspicuous.

¹²Aside from noting that truthmakers and falsitymakers for a given sentence φ need not be actual or at least actually make true/false φ and the earlier desideratum concerning necessitation, I will for the most part not be having other modal considerations in mind throughout the paper. Notably, I will not consider whether what the truthmakers are for a given sentence might change from world to world (or from time to time). Thanks to an anonymous reviewer for suggesting I clarify this point.

Firstly, the charge that modal claims would not concern the entities which they are about. As Kripke (1980) puts it, it seems I have no reason to (at least prudentially) care about what happens to individuals in other spatiotemporally isolated worlds, whereas modal claims about oneself are usually prudentially relevant. Why should Humphrey care that some counterpart of his won the election but not him?

Another objection, put forth by Adams (1974) is that modal realism implies that no matter what one does when faced with a choice, all options will be done by counterparts of one. So it's indifferent what one does. But it seems one might be rightly chastised for, say, not wearing a seat belt during a car trip. Of course, one would not be excused if by chance nothing bad happens as a result of one's actions. And the reason for that seems to be that easily things could have gone differently and taken a wrong turn. However, if we analyse this claim in terms familiar to the modal realist, going back to Kripke's (1980) objection then it's not clear why the person in the actual world should be blamed for what happens to wholly distinct individuals in other possible worlds. What we seem to want to claim is that easily some negative consequences could have followed from the *actual* person's actions to *them*.

A further worry for this account is that states in standard truthmaker semantics need not be possible. Therefore, accepting impossible states and that states simply are concrete objects would lead one to accept impossible concrete objects. Significantly, such concrete objects would not merely represent impossibilities, in the same way that a fiction book might narrate an impossible story, but rather they realize the impossibility themselves. But then one accepts that impossibilities are realized by some objects, which would seem to commit one's theory to impossibilities when quantifying unrestrictedly over what there is¹³.

To resist this last worry one could instead, following Berto (2010), opt for hybrid modal realism and a disjunctive account of what states are, according to which: (i) possible states are concrete; and (ii) impossible states are abstract representations constructed out of *possibilia*. This account notably rejects the parity thesis (Berto and Jago, 2019), namely that impossible and possible states are ontologically on a par, and are entities of the same kind. Aside from inheriting the usual difficulties faced by modal realism, one might worry that this account does not say enough on why we should distinguish between what the possible and impossible states are like. It is clear that the impossible states can't be genuine (i.e. concrete and such that they represent, say, that *a* is *F* by containing *a* as a part, in such a way that, in the state, *a* does indeed satisfy *F*). Yet if they are not concrete but rather abstract, why not say that all states are abstract? One reason that one could present (Berto, 2010) is that we should strive for a reductive account of modality, as Lewis (1986) has argued for. But it isn't clear that: (i) such a reduction is desirable in the first place (Stalnaker, 2012); and (ii) if it is, that it isn't achievable without an ontology like that of the modal realist (Berto and Jago, 2019).

¹³See Lewis (1986) for the original objection. Yagisawa (2010) endorses concrete *impossibilia*, however Jago (2014) and Berto and Jago (2019) have successfully argued against this form of extended modal realism.

There are, however two more general worries for this account, even if one is willing to accept modal realism. One is to the very thought of concrete objects being truthmakers and falsitymakers combined with the assumption that the states are all entities of the same kind. After all, concrete entities seem to be contingent while some truths seem to be necessary and concerning abstract entities. For instance, what would be the concrete truthmaker for “the empty set is a subset of every set”, and other kindred mathematical truths? Of course, we could find concrete proxies for the empty set and other mathematical objects, like Lewis (1991) does. But saying that the empty set is memberless doesn’t seem to be about the fusion of all possible individuals (the empty set for Lewis)¹⁴.

An anonymous reviewer suggests that the empty state could be the truthmaker for all pure mathematical truths. I see the appeal in saying that, but I don’t think it would work. After all, the empty state is the bottom element of the algebra of states. Such a view would imply that all states contain the truthmaker for all pure mathematical claims as a part. Let’s suppose that “ $1 + 1 = 2$ ” is one such claim. Then we would have that the impossible state verifying “ $1 + 1 = 3$ ” would be an inexact verifier for “ $1 + 1 = 2$ ”. This sounds intuitively wrong to me. Similarly, we would have to say that the exact truthmaker for “Samantha jumped” is an inexact truthmaker for this same claim. But the exact truthmaker for “Samantha jumped” doesn’t seem to contain any information about the numbers 1 and 2. Furthermore, count Fine’s (2017b, 2020a) account of subject-matter as part of the standard treatment of truthmaker semantics, according to which what a sentence is about is the fusion of its verifiers and falsifiers. Accepting this theory would lead one to accept that: (1) all pure mathematical truths have the same subject matter; and that (2) the topic of any sentence contains the topic of these sentences as a part. Both of these also seem to be, interestingly enough, widely recognized unwelcome consequences of Lewis’s (1988a,b) theory of subject matters.

Another worry, now more directly connected to this particular account of concrete objects as truthmakers and falsitymakers, is that it would lead to a too coarse-grained account of propositions. Suppose that my bag is the actual truthmaker for “My bag is brown”, as well as the falsitymaker for “My bag is yellow”. On the other hand, non-actual bags in other possible worlds would correspondingly be truthmakers and falsitymakers for “My bag is yellow” and “My bag is brown”. But then the two sentences would have the same subject matter, which in standard truthmaker semantics is just the fusion of their truthmakers and falsitymakers (Fine, 2017b, 2020a). But plausibly while the two sentences share some subject matters – for instance, they’re both about my bag –, they don’t seem to have the same exact subject matter (Yablo, 2014): one is about my bag being coloured brown, the other about my bag being coloured yellow¹⁵.

Related to this point, it seems that exact falsitymakers would contain irrelevant information, whereas like exact truthmakers, they “must be relevant

¹⁴Thank you to an anonymous referee for encouraging me to mention this objection.

¹⁵Thanks to an anonymous reviewer for pointing me in this direction.

as a whole to the [falsity] of the statement” (Fine, 2017a, 628). If the actual object that is my bag functions as a falsitymaker for “My bag is green”, then it contains a lot of information that is irrelevant to the falsity of the statement, for instance about what colour other than green it has, what form it has, and so on. So particular objects seem to be too few to draw enough distinctions between subject matters and to provide us with adequate exact falsitymakers for sentences (violating Desideratum 2).

Finally, on some conceptions of objects, the bag could remain the same through a change in colour, and so that it could make true “My bag is brown” at a moment and make it false at another moment (violating Desideratum 1)¹⁶.

Perhaps instead of ordinary objects, like bags, we should be looking at other kinds of concrete particulars to function as truthmakers and falsitymakers. An anonymous reviewer very helpfully suggests taking events or spacetime regions as truthmakers or falsitymakers. While I see the pull for both accounts, I think they each clearly violate different desiderata.

First, let us consider the view of truthmakers as events. It seems plausible that events can explain the truth and falsity of at least some sentences. To use an example provided by an anonymous referee, the event of John buttering the toast seems to make it true that “John buttered the toast”, providing the required explanation for its truth. However, we are dealing with exact truthmaker semantics and therefore looking for an entity that could be the exact truthmaker for this sentence. And while we could describe this situation as an event of John buttering the toast, we would probably be leaving out lots of details about the event that would be irrelevant for the truth of “John buttered the toast”, such as: how long John took, with what hand he did it, what brand of butter (if any) he used, how burnt the toast was, etc. All of these details would be part of any event of John buttering the toast, yet they are all irrelevant information for determining the truth of “John buttered the toast”. This would lead to a violation of Desideratum 3.

Second, let us consider the view of states as spacetime regions. By Desideratum 6, states must necessitate the truth or falsity of what they make true or false. Let us consider the case of “My bag is on the table”, and suppose it is true. Surely, it could have been false. In that case, the given spacetime region would have not been occupied by the table and bag, but by other objects. But then the spacetime region could have still been actual and it would have not necessitated the truth of “My bag is on the table” (for this claim would be false) which leads to a violation of Desiderata 1 and 5.

¹⁶As an anonymous reviewer rightfully points out, this depends on a particular conception of objects according to which it isn’t time-slices of objects that are truthmakers and falsitymakers for sentences. But the time-slice view would presumably have other problems. Say that the bag is exactly identical at t_1 and t_2 . Then we would have two objects (two time-slices) making true and false the same sentences. Which as said above would be superfluous, we only wanted one state in such a case. This would also violate Desideratum 1. So in any case Desideratum 1 is violated.

3.2 Concrete Particulars as States: Rigid Embodiments and States of Affairs

For the reasons seen above, taking the objects that figure in the states to be themselves states is a non-starter. Similarly, states can't be spacetime regions or events. What if one takes ordinary concrete objects to be parts of states but not themselves states? Then if one takes states to still be concrete particular objects, one needs an independent way of distinguishing between the objects that are states from those that aren't. For instance, to say that those that are the states are those that make true or false sentences wouldn't add anything to saying that they are... the states.¹⁷ While in the previous subsection I considered an account according to which concrete objects in general could be truthmakers and falsitymakers, in the present subsection I'm considering an account according to which only some of them are states¹⁸.

A natural alternative way to push the thought that states are concrete "chunks of reality", is to take them to be rigid embodiments (Fine, 1999). A rigid embodiment r is a concrete object that exists insofar as given objects (the rigid embodiment's material parts), a_1, \dots, a_n instantiate a given relation R (the formal property of the rigid embodiment). In the limit case where the rigid embodiment only has one material part and a property as a formal part, we may also refer to it as a *qua*-object. To make explicit the structure of a rigid embodiment, we may write it as follows $a_1, \dots, a_n/R$, where $/$ is the operator outputting a rigid embodiment when given a tuple of objects and a predicate. For *qua*-objects, one may simply write, for instance "my bag *qua* being self-identical" for the rigid embodiment that is formed whenever my bag instantiates the property of *being self-identical*. My bag *qua* being self-identical would be the truthmaker for my bag = my bag and my bag *qua* being brown would be the truthmaker for "my bag is brown".

Fine gives several criteria for the identity, existence, location and other characteristics of rigid embodiments. Here I won't go into the details of all of them, but only as much as necessary to clarify the proposal and discuss its relevant contact points with truthmaker semantics¹⁹.

An important point to note is that the rigid embodiments having concrete particulars as their material parts, regardless of what one takes the status of the formal part to be, are themselves concrete particulars. The clearest example of that is that the go-to example of a rigid embodiment (Fine, 1999) is a ham sandwich. There are no abstract ham sandwiches, at least non-fictional ones, and

¹⁷This is the same kind of complaint that Lewis (1986) voices against philosophers that try to provide an account of what a proposition *is* (that is, of what entities the propositions can be) by saying that it is an entity that fulfils the "way the world can be" role, as that is simply its functional concept (van Inwagen (1986, 192)).

¹⁸Thanks to an anonymous reviewer for helping me to clarify this point.

¹⁹I only mention rigid embodiments as I am trying to account for the metaphysics of truthmaker semantics in its tenseless version. A fuller, more precise characterization involving considerations to do with time would have to pay attention to how entities persist over time, as well as to Fine's (1999) theory of variable embodiments. Thanks to an anonymous reviewer for suggesting to me I clarify this point.

no one can make such a sandwich at home. Ham sandwiches are paradigmatic cases of concrete objects, if any are.

A second important point to note relates to the existence condition for rigid embodiments. The property or relation must hold of the material part(s). What to make of merely possible truthmakers and falsitymakers, then? Just like the previous view, the view of states as rigid embodiments is committed to a version of modal realism. When it is said that a state s is a truthmaker for A it is not meant that it is actually a truthmaker for A , as A might be false, and s might even be an impossible state. My bag is actually brown, but it could have been green. So there should be a possible state that is a truthmaker for my bag being green, it simply isn't part of the actual world. But that state will itself be concrete. As it was seen, the bag itself won't do for being such a truthmaker, and the rigid embodiment my bag *qua* being green does not exist as the property is not instantiated by my bag.

So this perspective inherits the previous perspective's worries insofar as it is committed to a version of modal realism. It faces, however, other, more serious, worries. On the one hand, one also wants states that make false atomic sentences. But it is not clear what "chunks of reality" those would be, given again the problem that for a sentence Fa to be false, then F must not be instantiated by a . One could perhaps take a hint from the truthmaker clause for negation ($s \Vdash \neg A$ iff $s \dashv\vdash A$) and accept negative properties, following Jago and Barker (2012) and Jago (2018). Taking again the example of my bag being green, one could then accept the property *not being green*, and accept the rigid embodiment my bag *qua* not being green as the falsitymaker for "my bag is green". But this seems to get things the wrong way 'round: it seems that it's not because a state makes true that "My bag is not green" that it makes false the sentence "My bag is green", but rather that it's because a state makes false that "My bag is green" that it therefore makes true that "My bag is not green" (according to Desideratum 4).

A theory of states along these lines would also have to tell us how is it that fusion between rigid embodiments works. If one accepts rigid embodiments, it is natural to accept that there are at least two ways of forming wholes out of given individuals: the standard horizontal process of fusion; and the application of the principle of rigid embodiment (Fine, 2020b). But then it becomes a non-trivial question how these two processes interact, and one such question is exactly when is it possible to obtain the fusion of two individuals, at least one of which is a rigid embodiment.

Specifically, I am interested in the case where all the individuals being fused are rigid embodiments, and therefore states. If one wants to stay true to truthmaker semantics, then their fusion ought to also be a state, namely the state that makes true the conjunction of what each state separately makes true. But then, say that I want to fuse the rigid embodiment my bag *qua* being brown with the rigid embodiment of the pen *qua* being black. They have nothing in common: the material and formal parts share no part whatsoever. And yet one wants to form out of them a rigid embodiment that makes true the conjunction "My bag is brown and the pen is black". Here one option might be to have both

my bag and the pen be material parts of the resulting rigid embodiment and pick a relation R such that my bag and my pen stand in the relation R if and only if my bag is brown and the pen is black. It is a strange object for sure, unlike the ham sandwich, as it doesn't relate to our practices in any meaningful way, but so would be the fusion of the bag with the pen that the mereological universalist accepts, independently of the added paraphernalia involving properties²⁰.

If one is unwilling to accept such wholes, thinking that fusion should instead be restricted in some way, then perhaps one would already be at odds for instance with the thought that the state space is complete. Still, when one considers states to be concrete particulars, perhaps things get more complicated. What is the concrete particular that serves as the fusion of the empty set of rigid embodiments? Perhaps it could be Caplan et al.'s (2010) empty set: the property *having some attribute or other* applied to no objects. But that would lead one to accept rigid embodiments with no material parts if this were the empty state. Of course, there are uses of truthmaker semantics for which one does not need the state space to be complete, but only for instance for it to be bounded complete (i.e., that there is a least upper bound of a subset of the set of states whenever there is an upper bound of that set of states). But as mentioned above, I want entities that can serve the role of states in all such uses, and for that we need a characterization of the complete state space.

Finally, I would like to consider a worry from circularity to this account. Fine (1999) presents two criteria for the identity of rigid embodiments. The first is that rigid embodiments are identical whenever they have the same material and formal parts. The second, which he prefers, is that rigid embodiments are identical when they correspond to the same state. The reason why Fine prefers to take the second conception is that the first one would lead us to accept too many rigid embodiments: for instance $a, b / a$ being on top of b would be a different rigid embodiment than $b, a / b$ being below a . Arguably, however, they correspond to the same object, made of a and b in the same relative position, simply described in different ways. But clearly one can't non-circularly provide identity conditions for rigid embodiments in terms of them being the same state if states just are rigid embodiments.

This is a tough problem for this conception of states of truthmaker semantics. It is especially relevant as even though we do have some pre-theoretic intuitions about a number of cases, our intuitions might not be helpful in all

²⁰Another alternative, suggested by an anonymous reviewer, would be to claim that only the atomic states are rigid embodiments and the other states are fusions of rigid embodiments but need not themselves be rigid embodiments. This sounds to me like a plausible alternative for some restricted versions and applications of truthmaker semantics, but it would imply a distinction between the kind of entities that are the atomic states and non-atomic states. I take two issues with this move. The first is that this seems to carry a distinction between states that truthmaker semantics does not by itself make. Whereas the metaphysical distinction between possible and impossible states might have been excusable based on the fact that they are treated differently in the semantics, there is no semantic distinction between "basic" and "non-basic" states. The second issue is that in standard truthmaker semantics only one state is atomic: the empty state. All other states have the empty state as a proper part. And theories of states as *concreta* have trouble accommodating the empty state. It is for these reasons that I opt to consider all states as rigid embodiments in this objection.

cases, including some that might be theoretically relevant. For instance, we might be interested in ascertaining whether the state of a being identical to a is the same as the state of a being self-identical. A conception appealing to rigid embodiments would help if one could say that different relations would lead to different rigid embodiments. But this is not the most promising version of the theory. Rather, we are told that $a, a/ =$ and $a/\text{self-identical}$ are identical if and only if they are the same state. But that’s exactly what we wanted to know. So when in doubt about when two states are the same, this theory won’t help us decide between which is which.

One would then need to provide a more robust account of rigid embodiment identity, and if Fine (1999) is correct, identity of material and formal parts might be too strict a criterion. Given all these difficulties, however, one should look elsewhere for how to think of states.

An influential alternative to taking states to be rigid embodiments is to take them to be facts or states-of-affairs. On one way of constructing them, these could be themselves taken as concrete. However, if they are concrete, then I presume that they would be factive, facing most of the same problems as I have just presented for the rigid embodiments view, or they would have to be indexed to worlds and thereby facing other objections for modal realism, which one can find in Jago (2017, 2023a)²¹.

4 States as Abstract Constructions

In their recent revision of the Stanford Encyclopedia of Philosophy entry on Impossible Worlds, Berto and Jago (2023), talking about the relationship between truthmaker semantics and impossible worlds semantics say that “[o]ntologically, they seem on a par”. I agree. Just like states of truthmaker semantics, the impossible worlds of impossible worlds semantics (as developed by Berto and Jago (2019)) can be proper parts of possible worlds (if we accept, with Lewis (1991) that subsets are parts of sets), and they can be inconsistent²². Like Fine (2017a) stresses (and Berto and Jago (2023) agree), however, truthmaker semantics focuses on exact verification, whereas impossible worlds semantics is concerned with (inexact) representation.

This distinction notwithstanding, given that Jago (2014) and Berto and Jago (2019) say more on the ontology of impossible worlds, than it has been said on the ontology of states, one might learn from their efforts in attempting to provide a satisfactory ontological underpinning for truthmaker semantics.

²¹Thanks to an anonymous reviewer for calling my attention to this option. Below I also consider the option of taking states to be abstract states-of-affairs.

²²The reason for this is that worlds (possible or impossible) for Berto and Jago are sets of lagadonian language sentences, and worlds might be impossible in either of two ways: by representing inconsistencies, or by failing to represent a given proposition as being the case or not the case – i.e. they can fail to be maximal or consistent. A non-maximal but consistent impossible world would then be a proper subset of a possible world, and if proper subsets are proper parts, then they would be proper parts of worlds. Thanks to an anonymous reviewer for helping me clarify this point.

A first lesson one can learn from them is that if one takes states to be abstract constructions out of concrete “chunks of reality”, then one doesn’t run into the problem that merely possible truthmakers for sentences don’t find any correspondence with a state where a given object (actually) satisfies a given property. One doesn’t need to rely on a counterpart relation and face the incredulous stare together with the modal realist: the states are just set-theoretical constructions out of the objects and properties that feature in them – unlike the case of rigid embodiments, the property does not have to be instantiated by the object.

This automatically helps with the problem of finding falsitymakers for atomic sentences as well. Negative properties would no longer be needed (though they could be accepted if wanted). Instead, one could take states to be pairs of sets (like impossible worlds are double worlds in Jago (2014)), where the elements of the pair have themselves set-theoretical constructions as members. The elements of the first are what makes the state responsible for making certain sentences true; and the elements of the second what makes the state responsible for making certain sentences false.

Berto and Jago (2019) favour a construction in terms of lagadonian language sentences, but they are not very clear on some of the details of how the construction of the language should go (even though the lagadonian sentences seem to look like the neo-Russellian structured propositions of Soames (1987) and Salmon (1986)). An atomic structured proposition in this account is a pair consisting of a tuple of singular terms and a property or relation that applies to the elements of the first element of the structured proposition. So, for instance, the sentence “My bag is brown” where b is my bag and B is the property of *being brown* is going to be $\langle\langle b \rangle, B\rangle$, so that the first element of the tuple is a tuple having b as an element and the second element is the property or relation instantiated by the elements of the first element of the “wider” tuple. Complex propositions themselves are also tuples, where the connectives are taken to have truth-functions as their semantic value, namely NEG for \neg , DISJ for \vee and CONJ for \wedge . So for instance “My bag is brown and the pen is red”, using p for the pen itself and R for the property of being red then the proposition would be expressed by $\langle\text{CONJ}, \langle\langle b \rangle, B\rangle, \langle\langle p \rangle, R\rangle\rangle$ ²³.

While I could instead have representations of individuals and of their properties and relations as the members of structured propositions, as Jago (2015) very helpfully argues, separating in this way the syntax and the semantics of the “worldmaking language” would be superfluous and would simply further complicate the view. It is for this reason that I will opt to take the objects and properties themselves to be constituents of the structured propositions, and follow in Berto and Jago’s (2019) footsteps²⁴.

²³Here I won’t discuss the problems that this account faces as a view of *propositions*. Notice however that these won’t be the propositions in our view, just like they aren’t in Jago’s (2014, 2015) or Berto and Jago’s (2019) accounts, even if they make use of similar tuples of properties and individuals. In Jago (2014, 2015) and Berto and Jago (2019), as well as King (2019) one can find helpful discussion and an overview of this account of propositions.

²⁴In Lewis (1986) one can find further arguments for why the worldmaking language would

If structured propositions are so fine-grained and have already so much structure, while not presupposing that the property or relation in the second element of the tuple is instantiated by the object(s) in the first element of the tuple, why not simply identify states with structured propositions? This seems to be the way Jago (2017) considers states to be ersatz states-of-affairs as well, so it has seemed like an especially attractive view²⁵.

The main reason is a repetition of some points against the view of rigid embodiments as states. Namely, suppose that $\langle\langle b \rangle, B\rangle$ is the truthmaker for “My bag is brown”. Is it also the falsitymaker for “My bag is yellow”? Then it contains irrelevant information (violating Desideratum 3). Suppose instead that we accept negative properties like $\neg Y$ for *not being yellow*. Then could $\langle\langle b \rangle, \neg Y\rangle$ be the falsitymaker for “My bag is yellow”? Here we seem to have the same case as above: it seems that it’s because it’s false that my bag is yellow that we can truthfully say that it has the property of *not being yellow*, rather than the other way around (violating Desideratum 4). Having said this, if we consider the structured propositions/lagadonian language sentences to be themselves states-of-affairs, or if we replace them by states of affairs, my view can attribute states-of-affairs a very special role, albeit not going quite as far as identifying them with the states.

Following to some extent Berto and Jago (2019), we might take an exact verifier for “My bag is brown” to be a state s which will be a pair of sets, $s = \langle s^+, s^- \rangle$, the first, s^+ containing the structured propositions that contain what is responsible for the state making true what it does, and the second, s^- containing the structured propositions that make the state responsible for making false what it does. One might then take exact verification to simply be a matter of the abstract constructions I have been alluding to belonging or not to one of the elements of a state. For readability purposes, let us suppose that what I am calling abstract constructions are the structured propositions of Salmon and Soames, though I would be happy for them to be states-of-affairs constructed in some other way (Jago (2018, §4) presents three viable alternative ways). Let us use capital letters from the beginning of the alphabet with asterisks to refer to them, so A^* for instance is the abstract construction (the structured proposition) corresponding to the sentence A . As mentioned previously, states will be pairs of sets, each containing these so-called abstractions.

In this way of constructing them, states have therefore a similar structure to the double worlds of relevant logics, which have also been used by Jago (2014) in the context of impossible worlds semantics. States constructed in this way inherit the benefit of being able to represent independently what a valuation point makes true and makes false. This is important for an adequate representation of truthmaker semantics, for it follows the American Plan for negation (Berto and Restall, 2019) and truthmaking and falsitymaking clauses are given independently. Consider for instance a state s that both verifies and

have to be lagadonian, even though Lewis ultimately rejects linguistic ersatzism wholesale. Thanks to an anonymous reviewer for bringing up the option that states could have mere representations of individuals as their constituents.

²⁵Thanks to an anonymous reviewer for drawing my attention to this alternative.

falsifies A . If states were only structured propositions, as constructed above, or states-of-affairs, the closest one could get would be to have $\langle \text{NEG}, A^* \rangle$ or some similar construction. And while A is only falsified by a state s if it verifies $\neg A$, we want states not only to verify $\neg A$ but also to falsify A , as stressed above, by Desideratum 4²⁶.

Take a verifier for “My bag is brown”, and call it s . Since we’re only interested in considering s insofar as it makes true “My bag is brown”, let’s ignore what s^- may be. s^+ in its turn will have to contain $\langle \langle b \rangle, B \rangle$ as a member. But one needs to impose some conditions on what the members of s^+ are. Namely, I impose the following, for φ^* and ψ^* variables ranging over structured propositions:

$$\begin{aligned} \varphi^* \in s^+ & \text{ if and only if } \langle \text{NEG}, \langle \text{NEG}, \varphi^* \rangle \rangle \in s^+ \\ \langle \text{DISJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^+ & \text{ if and only if } \varphi^* \in s^+ \text{ or } \psi^* \in s^+ \text{ }^{27} \\ \varphi^* \in s^+ \text{ and } \psi^* \in s^+ & \text{ only if } \langle \text{CONJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^+ \end{aligned}$$

These have it that verifiers are closed under double negation introduction and elimination, disjunction introduction and elimination and conjunction introduction. A state s then exactly verifies A if its corresponding structured proposition A^* is a member of s^+ , and s^+ must be closed as per above. These are natural requirements given the corresponding clauses for truthmaking. So a verifier for “My bag is brown” will also be a verifier for “My bag is brown or my bag is yellow”, “My bag is brown and my bag is brown”, “It’s not the case that it’s not the case that my bag is brown”, and so on.

Let us turn now to the conditions on s^- , and consider a falsitymaker for “My bag is brown”. Again, this will be such that $\langle \langle b \rangle, B \rangle \in s^-$. But we have to impose conditions on s^- . These are as follows:

$$\begin{aligned} \varphi^* \in s^- & \text{ if and only if } \langle \text{NEG}, \langle \text{NEG}, \varphi^* \rangle \rangle \in s^- \\ \langle \text{CONJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^- & \text{ if and only if } \varphi^* \in s^- \text{ or } \psi^* \in s^- \\ \varphi^* \in s^- \text{ and } \psi^* \in s^- & \text{ only if } \langle \text{DISJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^- \end{aligned}$$

These are just the same closure conditions as the ones for verification, except that disjunction and conjunction have switched places, as they do in the clauses given in Section 2. So a falsifier for “My bag is brown” will be a falsifier for “My bag is brown and green”, “My bag is brown or my bag is brown”, “It is not the case that it is not the case that my bag is brown” and so on.

The negation clause imposes two conditions that bridge s^+ and s^- :

²⁶Thanks to two anonymous reviewers for suggesting to me I clarify why I opt for this specific construction instead of a simpler one.

²⁷This condition implies that there are no states that just make true a disjunction without making true either of the disjuncts. Jago (2023b) presents very interesting cases for why one should accept such states. For instance, might there be a state that makes true that I have a (binary) sibling but is silent on whether they are a brother or sister of mine? Given that I am trying to capture standard truthmaker semantics, I impose this condition while hoping to remain neutral on the debate on whether such states are acceptable. Thanks to an anonymous referee for calling my attention to this issue.

$$\begin{aligned} \langle \text{NEG}, \varphi^* \rangle \in s^+ & \text{ if and only if } \varphi^* \in s^- \\ \langle \text{NEG}, \varphi^* \rangle \in s^- & \text{ if and only if } \varphi^* \in s^+ \end{aligned}$$

So for instance a verifier for “My bag isn’t brown” is a falsifier for “My bag is brown” and a falsifier for “My bag isn’t brown” is a verifier for “My bag is brown”.

Fusion of states can be redefined via a concatenation operator, \frown on structured propositions and truth-functions, and through conjunction on the truth-making side and disjunction on the falsitymaking side. The concatenation operator is defined as per the formation rules above in the following way:

$$\begin{aligned} \varphi^* \frown \psi^* &= \langle \varphi^*, \psi^* \rangle \\ \text{NEG} \frown \varphi^* &= \langle \text{NEG}, \varphi^* \rangle \\ \text{CONJ} \frown \langle \varphi^*, \psi^* \rangle &= \langle \text{CONJ}, \langle \varphi^*, \psi^* \rangle \rangle \\ \text{DISJ} \frown \langle \varphi^*, \psi^* \rangle &= \langle \text{DISJ}, \langle \varphi^*, \psi^* \rangle \rangle \end{aligned}$$

\frown^* is the ancestral of \frown , so that for instance if $\varphi_1^* \frown^* \varphi_n^*$ then there is a chain of \frown such that $\varphi_1^* \frown \dots \frown \varphi_n^*$.

Now we can give a precise formulation of fusion in terms of the ancestral of the concatenation operator, \frown^* . Namely, if $s = t \sqcup u$, and $t \neq u$ then $s^+ = \{X \frown^* \langle \text{CONJ}, \langle \varphi^*, \psi^* \rangle \rangle : \varphi^* \in t^+ \wedge \psi^* \in u^+\}$ and $s^- = \{X \frown^* \langle \text{DISJ}, \langle \varphi^*, \psi^* \rangle \rangle : \varphi^* \in t^- \wedge \psi^* \in u^-\}$ for X a metavariable over structured propositions and truth-functions and where again if X is a structured proposition, say ξ^* , the other conditions for $\xi^* \in s^+$ and $\xi^* \in s^-$ presented above still hold. If on the other hand $t = u$, then $s = t = u$. That is, in the resulting state all structured propositions that are verified have conjunctions of propositions that were verified by the fused states individually as syntactic constituents. Similarly, the propositions that are falsified have disjunctions of propositions that were already falsified by the fused states individually as syntactic constituents. So for instance the fusion of a verifier for “My bag is brown” with a verifier for “My pen is red” will be a state verifying “My bag is brown and my pen is red”. Similarly, the fusion of a falsifier for “My bag is brown” with a falsifier for “My pen is red” will be a falsifier for “My bag is brown or my pen is red”, as one should expect. But we will also have for instance that the fusion of the verifiers will also verify “It is not the case that it is not the case that My bag is brown and my pen is red”, as we get by the other conditions. The mereological relation of parthood between states still exists, and is now given a set-theoretical reading, defined in terms of fusion: $s \sqsubseteq t := s \sqcup t = t$.

One might worry that this notion of parthood does not do justice to the way parthood is defined in standard presentations of truthmaker semantics²⁸ To assuage these worries, noting that this notion of parthood is a partial order might help. This can be quickly proved in an informal way. To prove that parthood is reflexive, we only need to show that $s \sqsubseteq s$, that is that $s \sqcup s = s$. But this immediately follows from the definition of \sqcup . To prove transitivity is to prove that if $s \sqsubseteq t$ and $t \sqsubseteq u$ then $s \sqsubseteq u$. We show the results for s^+ , the

²⁸Thanks to the editors for pushing me on this point.

results for s^- are identical. Suppose that all members of t^+ contain conjunctions with members of s^+ as syntactic parts. Likewise, all members of u^+ contain conjunctions with members of t^+ as syntactic parts. But then they will all also contain a conjunction with a member of s^+ as a syntactic part, proving the relevant result. Finally, to prove anti-symmetry we want to prove that if $s \sqcup t = t$ and $t \sqcup s = s$, then $s = t$. But by the way abstractions/structured propositions are constructed, this immediately follows.

We can then list formal conditions for conjunctive structured propositions in s^+ and disjunctive structure propositions in s^- :

$$\begin{aligned} \langle \text{CONJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^+ & \text{ if and only if } \varphi^* \in u^+ \text{ and } \psi^* \in t^+ \text{ and } s = u \sqcup t^{29} \\ \langle \text{DISJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^- & \text{ if and only if } \varphi^* \in u^- \text{ and } \psi^* \in t^- \text{ and } s = u \sqcup t^{30} \end{aligned}$$

These conditions solve the problem that the other accounts faced with Desideratum 3. To see why, consider that, for instance, that on the truthmaking side, a state s making true a conjunction of two atoms, $p \wedge q$ contains as parts only truthmakers for p and for q , as well as the null state, \square , and no other state. Therefore containing no irrelevant information. Furthermore, it does so without inverting the order of explanation, for how any sentences get made true or false, satisfying Desideratum 4. This is so, for if we accept what Jago (2015) calls the Nature of Sets thesis (after Fine (1994)), we will say that s makes true the conjunction (i.e. it is a tuple having given sets of structured propositions) *because* it *is* (i.e. it is identical to) the fusion (as defined above) of two states that make true each of the conjuncts.

Finally, there are conditions that apply to both s^+ and s^- , which I write as $s^{+/-}$:

Commutativity:

$$\begin{aligned} \langle \text{CONJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^{+/-} & \text{ if and only if } \langle \text{CONJ}, \langle \psi^*, \varphi^* \rangle \rangle \in s^{+/-} \\ \langle \text{DISJ}, \langle \varphi^*, \psi^* \rangle \rangle \in s^{+/-} & \text{ if and only if } \langle \text{DISJ}, \langle \psi^*, \varphi^* \rangle \rangle \in s^{+/-} \end{aligned}$$

Associativity:

$$\begin{aligned} \langle \text{CONJ}, \langle \langle \text{CONJ}, \langle \varphi^*, \psi^* \rangle \rangle, \xi^* \rangle \rangle \in s^{+/-} & \text{ if and only if} \\ \langle \text{CONJ}, \langle \langle \text{CONJ}, \langle \psi^*, \xi^* \rangle \rangle, \varphi^* \rangle \rangle \in s^{+/-} &^{31} \\ \langle \text{DISJ}, \langle \langle \text{DISJ}, \langle \varphi^*, \psi^* \rangle \rangle, \xi^* \rangle \rangle \in s^{+/-} & \text{ if and only if} \\ \langle \text{DISJ}, \langle \langle \text{DISJ}, \langle \psi^*, \xi^* \rangle \rangle, \varphi^* \rangle \rangle \in s^{+/-} & \end{aligned}$$

These tell us that the order by which structured propositions are put together in a conjunction or disjunction is irrelevant. So a verifier/falsifier for “My bag

²⁹Here note that in the particular case where φ^* and ψ^* are the same, then $\varphi^* \in s^+$ if and only if $\langle \text{CONJ}, \langle \varphi^*, \varphi^* \rangle \rangle \in s^+$.

³⁰Again, if φ^* and ψ^* are the same, then we have that $\varphi^* \in s^-$ if and only if $\langle \text{DISJ}, \langle \varphi^*, \varphi^* \rangle \rangle \in s^-$.

³¹Here I only present this option, as commutativity ensures we can swap the other values in the inside conjunction. The same applies for the case of disjunction.

is brown and my pen is red” is also a verifier/falsifier for “My bag is brown and my pen is red”. And similarly for disjunction instead of conjunction. Similarly, “My bag is brown and my pen is red, and my bottle is blue” has the same verifiers as “My bag is brown and my bottle is blue, and my pen is red”.

On this conception, conditions on the state space of truthmaker semantics, such as exclusivity (i.e., that one can never fuse together a state in the set of truthmakers for a sentence with a state in its set of falsitymakers) can be imposed in the usual way, but they will be understood in terms of what pairs of sets one is allowed to include in one’s state space.

There are also interesting results one can state about what one may call “properly atomic sentences”, that is, atomic sentences which, to borrow terminology employed by Russell (1919) describe facts which can’t be decomposed into any further more primitive facts. Nowadays, one would probably phrase this in terms of fundamentality and say that a properly atomic sentence is an atomic sentence where its designator refers to a fundamental object and its predicate to a fundamental property. We know that given the clause for \neg in truthmaker semantics, given any exact truthmaker s for A (for A a properly atomic sentence) that since $A^* \in s^+$, then $\langle \text{NEG}, A^* \rangle \in s^-$. Further, since s is an exact truthmaker for A , then for any B a properly atomic sentence, and $B \neq A$, then $s \not\Vdash B$ ³². And for the same reason, then $s \not\Vdash \neg B$, for then it would have to be that $s \Vdash \neg B$, and it seems that s contains information irrelevant to know that B is false, namely the information that confirms that A is true.

Therefore, it seems one can only form structured propositions that must contain A^* in s ’s truthmaking-component, which is the same as saying that s can only make true sentences such as A , $A \wedge A$, $A \vee B$, $\neg\neg A$, and those formed out of those through multiple application of \vee , \wedge or $\neg\neg$ introduction. Once we have accounted for all of these clauses, it is not clear that there is more than one exact truthmaker and falsitymaker per properly atomic sentence: it seems that we fully specify what *the* truthmaker for a given proper atom A must be like. It would be interesting to develop this point further and see how different conditions would take us from the strict uniqueness of truthmaker and falsitymaker at the level of fundamentality, to the more unconstrained sets of truthmakers and falsitymakers in standard truthmaker semantics, and what conditions might there be on them. This, however, is left for future work.

This perspective can also meet the other desiderata. Given that the sets s^+ and s^- are directly responsible for what the state makes true and makes false, there won’t be different states that make the same sentences true or false, and given the closure conditions, one can be assured that different pairs of sets are coarse-grained enough, satisfying Desideratum 1.

Further, there is no problem now in characterizing a complete state space. Let us introduce in the language the sentences \top and \perp , the first which is trivially

³²Suppose that $s \Vdash B$. Then s must be wholly relevant to the truth of B . But s was also wholly relevant to the truth of A . But how can s be wholly relevant to the truth of two distinct properly atomic sentences at the same time? It seems that part of the information that it contains and that makes one of them true will be added information that is not needed to make the other true, exactly because they represent different fundamental facts.

made true by any state and the second which is trivially made false by any state. Then we may identify the empty state, \square , as $\langle\{\top^*\},\{\perp^*\}\rangle$. This agrees with the definition in Fine (2017a), as then $s = \square$ if and only if for all states s' , $s \sqsubseteq s'$, that is, if the sentences that s verifies have as a syntactic constituent conjunctions that include \top^* as one of the conjuncts, and if the sentences that s falsifies have disjunctions as a syntactic constituent where \perp^* is one of the disjuncts. But we know that since all states make true \top that the conjunction of any sentence φ with \top is equivalent to φ , and that since any state makes false \perp that the disjunction of any sentence φ with \perp is equivalent with φ . We can let \top^* be the big disjunction of all literals (i.e. all atomic structured propositions and their negations), and we can let \perp^* be the corresponding conjunction. The full state, \blacksquare on the other hand can simply be $\bigsqcup\{s : s \in S\}$, i.e. the fusion of all states, the biggest truthmaker and falsitymaker.

Taking propositions to be sets of states (their exact truthmakers), as unilateral propositions, or pairs of sets of states, as bilateral propositions (specifying their exact truthmakers and falsitymakers), one can give the same account as Fine (2017a) of extremal propositions. On the unilateral account T_{\square} will be $\{\square\}$ (that is $\{\langle\{\top^*\},\{\perp^*\}\rangle\}$) and F_{\square} will be \emptyset . Similarly, T_{\blacksquare} will be S and F_{\blacksquare} will be $\{\blacksquare\}$ (which is $\{\langle\blacksquare^+,\blacksquare^-\rangle\}$). While on the bilateral account (making already the adjustments to fit our conception of states) $T_{\square} = \langle\{\langle\{\top^*\},\{\perp^*\}\rangle\},\emptyset\rangle$, $F_{\square} = \langle\emptyset,\{\langle\{\top^*\},\{\perp^*\}\rangle\}$, $T_{\blacksquare} = \langle S,\blacksquare\rangle$ and $F_{\blacksquare} = \langle\blacksquare,S\rangle$.

This shows how the perspective here presented satisfies Desideratum 2.

This conception is faced with a similar problem to the one Jago (2017) poses for double propositions. It seems that it is necessary that a state verifies what it does. This is also what Desideratum 5 seems to be getting at: how can an entity metaphysically explain or necessitate the truth of another if there is no necessary connection between them? And yet why is it that the first element of the pair contains what is responsible for what the state makes true, and likewise the second contains what is responsible for what the state makes false? This seems to be an arbitrary decision.

Of course, states need not be exactly the set-theoretic constructions that I have presented so far. Whereas when looking for a conception of states as concrete chunks of reality we could not find any entities fit for the job, it seems that once we allow for states to be constructed set theoretically out of actual concrete chunks of reality, we have too many options, with no clear winner. As another example, why not let the semantic value for properties and relations come before the semantic value for the objects in the construction of the structured propositions?

This is a case entirely analogous to that of the natural numbers, which can be identified with different pure sets. And here in principle the answers one can give in the philosophy of mathematics to the Benacerraf identification problem (Benacerraf, 1965) in the case of natural numbers will be the same as one can give in the case of states. I agree with Lewis's (1991) general stance: just like "singleton" and "natural number", "state" imposes certain ontological constraints on the size and shape of reality if our best theory includes reference to "states" (as understood in truthmaker semantics). However, these constraints

might not be as stringent as to specify that specific entities with such-and-such characteristics exist. Rather, it might be that any entities sharing given properties will do the job, provided there are enough of them. What decides between them is simply that we stipulate them to be the states and we interpret them to play given roles.

Once all interpretations have been fixed, then one can explain why is it that such an odd entity as a pair of sets of structured propositions necessitates and metaphysically explains the truth of “My bag is brown”. Part of it has to do with what properties and objects feature in those structured propositions, but a good part of it is simply how we’ve stipulated the tuples and set to represent what they do. This is how we satisfy desideratum 5.

It seems then that Berto and Jago’s (2023) claim that ontologically impossible worlds semantics and truthmaker semantics are on a par is vindicated. In fact, they seem to end up coinciding if states are understood in this way, for then what I have presented is in fact a way of defining exact verification and constructing the state space (or what they would call a space of impossible worlds) of truthmaker semantics using the same metaphysical resources as Berto and Jago help themselves to. Berto and Jago’s (2019) reply to the compositionality objection to impossible worlds semantics relies on membership conditions of lagadonian language sentences in elements of double worlds (which are just the structured propositions in their membership to s^+ and s^- in my idiolect). So one could even argue for the stronger claim that with this translation one can move freely between their theory of impossible worlds and truthmaker semantics. I hope to make this point more perspicuously somewhere else.

Conclusion

From classic papers (Kratzer (1989)) to more recent ones (Hawke (2018), Kratzer (2021)), the thought that states (of situation semantics and truthmaker semantics) can be taken to be concrete chunks of reality has been alive and well. Here I have tried to present some reasons for thinking that such an intuitive connection in the case of truthmaker semantics might have more problems than might at first glance seem.

After presenting the target semantics (the standard truthmaker semantics as developed by Kit Fine (2016, 2017a, c)), I considered whether we could take states to be concrete. In order to do this, I considered states that would seemingly be particularly favourable for someone defending a view of states as being concrete: states where particular objects instantiate a property. Still, the views considered were not able to meet the desiderata presented at the end of Section 2. Given that not even such states can be accounted for successfully if we take states to be concrete, what to say of other states that are less amenable to a concretist construal, such as the state that $1 + 1 = 2$?

Of course, it was not possible to consider all possible views of states as concrete chunks of reality, but the arguments presented had a high level of generality and the perspectives considered included views such as states as events

and spacetime regions, which are notable alternatives to states as ordinary objects, facts or states-of-affairs and rigid embodiments, which were more carefully considered.

For these reasons, one may tentatively draw the conclusion that the states of truthmaker semantics could not be concrete. Instead, one should prefer to construct the states from concrete chunks of actual reality by set-theoretic means. One such way has been provided above, though I have also noted that it might not be the only possible set-theoretic construction fit for the job, mirroring other situations we have been confronted with when doing metaphysics with abstract objects (Benacerraf, 1965).

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