

Truthmakers

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1. Introduction

The idea of truthmakers, while still controversial, has recently attracted increasing attention.² Its appeal is that it promises to explain how, in general, ‘truth supervenes on being’, i.e. how what is true depends on *what* there is and on *how* it is. Take for example the propositions that the earth is inhabited and that it is round. These cannot be true in our world and false in another unless that other world differs from ours in those two ways: the other earth must lack inhabitants (a difference in what there is) and be a different shape (a difference in how it is).

The idea of truthmaking does however raise questions about its scope and force. Some of its advocates have exaggerated both, by claiming that *all* truths need truthmakers, and that truthmakers must *necessitate* what they make true. These claims expose the idea to needless objections, as do some claims about its implications for theories of truth and meaning. The object of this paper is to defend the idea by removing these unnecessary accretions.

2. What is truthmaking?

What is it to make propositions true?³ The first thing to say is that it is not *causing* them to be true. What it is can best be made clear to start with by existential examples like ‘the earth exists’, which is made true by the earth. That relation, between the earth and the proposition that it exists, is what I mean by ‘making true’, and it would be hard for anyone to deny that they understand it. We may debate the role of truthmaking, so understood, in semantics or metaphysics, or argue about which truths need truthmakers, or about what kinds of entity are

¹ Earlier versions of this paper were discussed at the Universities of Nottingham (10/10/01), Durham (22/11/01) London (25/1/02) and Melbourne (28/3/02), the Australian National University (3/4/02) and Universität Zürich (21/6/02). I am indebted to many comments made on those occasions, especially by Robert Black, Jonathan Lowe, Tom Smith, Graham Priest, Richard Campbell, Michael Smith, Frank Jackson, Peter Roeper, Ingolf Dalferth and Lorenz Puntel. I am also indebted to the British Academy for a Research Grant which met my expenses in travelling to Australia to work on the topic of this paper.

² See K. MULLIGAN, P. SIMONS and B. SMITH, Truth-Makers. *Philosophy and Phenomenological Research* 44, 1984, 287–322; J. F. FOX, Truthmaker. *Australasian Journal of Philosophy* 65, 1987, 188–207; G. RESTALL, Truthmakers, Entailment and Necessity. *Australasian Journal of Philosophy* 74, 1996, 331–340; D. M. ARMSTRONG, *A World of States of Affairs*, Cambridge 1997, ch. 8; J. DODD, *An Identity Theory of Truth*, London 2000, ch. 1; D. K. LEWIS, Things qua Truthmakers, in: G. RODRIGUEZ PEREYRA and H. LILLEHAMMER, *Real Metaphysics* London 2002

³ In what follows it will rarely matter whether the primary bearers of truth are propositions, sentences, statements or beliefs. Where it does matter I shall say so. Meanwhile I shall talk mostly of propositions being made true.

truthmakers, or about how many or which entities of these kinds exist. But no one who grasps the concept of existence can credibly claim not to know what truthmaking is.

If this is what truthmaking is, the first thing to be said about it is that for an entity *S* to make true a proposition ‘*P*’ is not just for the proposition ‘*S* exists’ to entail ‘*P*’. For even if that entailment always followed (and we shall see that sometimes it does not), entailment is a relation between the propositions ‘*S* exists’ and ‘*P*’, whereas what we need to mean by truthmaking is a relation between ‘*P*’ and a generally non-propositional entity *S*.

This is not to deny the propriety of saying that propositions are ‘made true’ by other propositions which entail them, as we might say for example that ‘Today is a weekday’ is made true on Tuesdays by the truth of ‘Today is Tuesday’. But it is important to distinguish truthmaking of this *logical* kind from the *ontological* kind introduced above. For it is only the latter that links what is true to what exists, a fact which, as we shall see in §7, affects which propositions need such truthmakers. This is why the distinction matters and why, since what matters here is how truth depends on being, ontological truthmakers are what from now on I shall mean by the unqualified term ‘truthmakers’.

3. Truthmaking and Truth

As a relation between propositions and non-propositional entities, truthmaking resembles Tarski’s ‘satisfaction’ relation, which holds between particulars and predicates that are ‘true of’ them.⁴ Here however the resemblance ends, since Tarski used satisfaction to define truth, which our truthmaking relation need not and should not be used to do.

To say this is not to deny that the idea of truthmaking is descended from the idea that truth is correspondence to reality. But the reason it need not face well-known objections to that idea is precisely that theories of it need not be theories of truth. Specifically, a theory of what makes propositions true need not be, or imply, a correspondence theory of truth. We can say what *makes* propositions true without saying what it *is* for them to be true, which is what Tarski’s and other theories of truth aim to do; just as we can say what makes someone a Prime Minister (winning a general election) without saying what it *is* to be a Prime Minister.

In fact the only theory of truth which truthmaker theorists need is given by the so-called equivalence principle (EP) that, for all propositions ‘*P*’,

(EP) ‘*P*’ is true if and only if *P*.

Theorists of truth may think on other grounds that there is more to truth than this, but they need not do so in order to believe in truthmakers. And conversely, whatever (EP) tells us about truth, it cannot be what gives propositions their truthmakers. For if, for all ‘*P*’, *P* was what made ‘*P*’ true, that would make it too easy to say what the truthmakers of propositions are; and it would also, in many cases, give the wrong answer. It is not that easy to discover

⁴ A. TARSKI, The Semantic Conception of Truth, in: H. FEIGL and W. SELLARS, Readings in Philosophical Analysis New York 1949, 52–84.

the real truthmakers of propositions, as we shall now see by asking what makes propositions about rainbows and mirror images true.

There are many true propositions about rainbows: for example, that a rainbow of a certain brightness and extent is visible in a certain direction from a place p at a time t . If (EP) told us what makes these propositions true, the world would have to contain rainbows, and that would pose a problem. For if rainbows are to be entities, they will need more than the unproblematic properties of being multi-coloured, arc-shaped and in definite directions from where they appear. They will also need to be at no definite distance from those places. For while they may seem to be where some rain is falling, they will also move sideways with the place from which they appear, as if they were as far away as the sun. That is one of the features of rainbows which makes them problematic.

Similarly with mirror images. As with rainbows, there are photographically verifiable truths about what is visible in a plane mirror from various positions in front of it. These truths appear to be about mirror images, entities behind the mirror with definite locations, shapes and colours, but also with no solidity (since they can exist and move about inside walls) and no inertial mass (since they can be moved faster than the speed of light by rotating the mirror). No physics, ancient or modern, makes sense of entities with such attributes.

The solution in both cases is the same: to deny that there are any such entities, which there would have to be if (EP) told us what makes propositions about rainbows or mirror images true. What makes images appear in a mirror is not light from odd objects behind it which it transmits, but light from ordinary objects in front of it which it reflects. Similarly, it is not coloured arc-shaped entities at no definite distances that make rainbows appear, but water drops refracting sunlight, reflecting it internally, and then refracting it back at angles that depend on its frequency and hence its colour. They, not rainbows, are the truthmakers for truths about the shapes, colours and directions of rainbows. This, with the corresponding facts about the ontology of mirror images, is enough to show that (EP) is not what gives propositions their truthmakers.

Similarly, and more importantly, with propositions about values and theoretical entities. For while some theories do credit these propositions with truthmakers that are or contain such entities, it takes more than (EP) to refute other, reductionist, theories which do not.⁵

⁵ See e.g. G. E. MOORE, *Principia Ethica*, Cambridge 1903, P. FOOT, *Virtues and Vices*, Berkeley 1978, E. NAGEL, *The Structure of Science*, London 1969, ch. 6. There are also anti-realist theories, which deny that apparent propositions about values or theoretical entities have any truth values, thus seeming to deny even (EP): see e.g. A. J. AYER, *Language, Truth and Logic*, Revised Edition, Oxford 1946. These theories may indeed be motivated and supported by the difficulty of finding credible truthmakers for propositions about their subject matters. But while they clearly limit the scope of truthmaking, they pose no threat to the idea of it, since nothing that lacks a truth value can need anything to make it true.

4. *Truthmakers and Meaning*

The fact that (EP) is not what gives propositions their truthmakers makes the ontology of propositions about rainbows, mirror images, etc. more interesting, both empirically and conceptually. It is interesting to discover empirically what make propositions about rainbows and mirror images true. And the need to discover these propositions' truthmakers empirically is interesting conceptually, since it shows that theories of truthmakers are no more theories of *meaning* than they are of truth.

For not only does our concept of rainbows not tell us what makes propositions about these apparent entities true, there are well-known reasons for denying that discovering their truthmakers must change our concept of them. Compare Kripke on essences:⁶

We need not ever assume that the biologist's denial that whales are fish shows his 'concept of fishhood' to be different from that of the layman; he simply corrects the layman, discovering that 'whales are mammals, not fish' is a necessary truth.

Similarly with truthmakers. Discovering that propositions about rainbows are made true not by rainbows but by photons and water drops need not change our concept of a rainbow. With mirror images the semantic situation is different, since 'mirror', unlike 'window', implies reflection. Still, our semantic distinction between windows and mirrors is an effect, not a cause, of the discovery that some surfaces show what is behind them and others show only what is in front of them. Sentences which tell us what is visible in a *mirror* only tell us what makes them true because we have incorporated our knowledge of their truthmakers into the meaning of 'mirror'.

But in general, as we have seen, the meanings of sentences, and hence the identity of the propositions they express, do not tell us what makes those propositions true. As with truth, therefore, so with meaning: theories of meaning can no more give us the truthmakers of all propositions than (EP) can. For if the meaning of every *sentence* "P" told us what made it true, (EP) *would* give propositions their truthmakers, and the correspondence theory of truth would be restored, as the *a priori* thesis that what makes any proposition 'P' true is P, i.e. the fact that P. But this is not so, as most of our examples show, mirror images being an exception that proves the rule.

5. *Truthmakers and Truth Conditions*

We have seen that truthmaker theories are not, and are not entailed by, theories of truth or meaning. But how then do a proposition's *truthmakers* relate to its *truth conditions*, which are after all familiar candidates for being, or at least for giving, the meanings of many and perhaps all contingent propositions, if not of necessary ones?⁷

⁶ S. A. KRIPKE, Naming and Necessity, in: D. DAVIDSON and G. HARMAN, *Semantics of Natural Language* Dordrecht 1972, 253–355, p. 330.

⁷ D. DAVIDSON, Truth and Meaning. *Synthese* 17, 1967, 304–323.

The relation between truthmakers and truth conditions has been obscured by the fact that the expression ‘giving a proposition’s truth conditions’ may mean two quite different things. It may mean giving the proposition’s truthmakers. But it may also mean using a Tarskian *metalanguage* to say when a sentence in an object-language is true,⁸ and this may tell us nothing at all about what *makes* that sentence true.

Here is an example.⁹ Those of us who hold a tenseless view of time have long used as an argument the fact that, for any tensed object-language sentence, like ‘The Pope is now in Rome’, we can use tenseless metalanguage sentences to say when that sentence is true, as in “‘The Pope is *now* in Rome’ is true just when the Pope is in Rome”. To this our opponents reply that they can use a *tensed* metalanguage to say when any *tenseless* object-language sentence is true. If that is granted, we may then argue about our metalanguages. Tensed theorists say that our allegedly tenseless metalanguage is not really tenseless, because an apparently tenseless key term in it like ‘earlier’ can only be learned, and so must be understood, in tensed terms, as meaning roughly ‘less future or more past’. We tenseless theorists deny this, and retort by giving a tenseless (usually an indexical) account of the tensed terms like ‘past’, ‘present’ and ‘future’ that our opponents need to use in *their* metalanguage.

For a long time both parties to this semantic dispute were guilty of thinking that settling it would tell us whether time itself is tensed (i.e. whether times and events really do flow from future to present to past) as opposed to whether we talk and think as if it is tensed, as indeed we must.¹⁰ But to infer from this that time is tensed is as fallacious as inferring from our talking as if heat flows that heat itself is a fluid. Yet the mistake is easily made, because it is built into the idea that statements of truth conditions, given in a metalanguage chosen on semantic grounds, thereby give us the ontology of their subject matter.

This mistake (a long running one in the case of time) is not *just* a mistake. The idea that semantically given truth conditions determine ontology is a substantive thesis: the thesis that metaphysics depends on semantics, rather than the other way round. This thesis has become so embedded in the idea of truth conditions that, in recent discussions of time’s ontology, I have had to stop using the term ‘truth conditions’ altogether, to make it clear that what I am doing is *not* semantics but metaphysics.¹¹

⁸ TARSKI, *The Semantic Conception of Truth*, §9.

⁹ For more details of this example, and references, see L. N. OAKLANDER and Q. SMITH (Eds), *The New Theory of Time*, New Haven 1994, Part I.

¹⁰ D. H. MELLOR, *Real Time II*, London 1998, ch. 6.

¹¹ *Ibid.*, Preface.

6. *Truthmakers for the Mind*

Fortunately, the relative independence of ontology from semantics, and hence the need for serious theories of truthmakers, is now widely accepted in many areas of philosophy, for example in the philosophy of mind. Take functionalism, if not as a theory of all mental states then at least of states, like belief, desire and intention, that can be distinguished from each other by their causes, effects and interactions.¹² We can all agree that these distinctions are given to start with by what we mean by ‘belief’, ‘desire’, ‘intention’, etc. But we must also all agree that these semantic facts do not tell us what these states *are*: for example, whether they are physical states of the brain. The truthmaker for the proposition that the Pope believes he’s in Rome is not given just by the semantics of ‘the Pope’, ‘believes’, ‘Rome’ etc.; and few philosophers now think it is.

Nor does semantics provide the most influential arguments for taking the truthmakers for propositions about mental states to be physical. Take the argument that, since all the effects that mental states need in order to meet their functional specification have physical causes, those states must, on pain of overdetermination, either be or supervene on physical states. This argument for physicalism, from the so-called ‘causal closure’ of the physical, may be unsound, as I think it is, but at least its premises are metaphysical, not semantic.¹³

Contrast this with the idea that the success of physics makes it a good bet that, when it is complete, its *concepts* will be all we need to enable us to say what in the world makes all propositions, including psychological ones, true.¹⁴ This infers from the wide scope of physical concepts (the fact that most things have physical properties like temperature), first that the language of physics gives us a metalanguage that we can use to state the truth conditions of all object-language statements, and from this that we live in a purely physical world. The first inference is bad enough; but the second is worse: the world’s ontology cannot be determined by our choice of a basic vocabulary. It is the other way round. It is not the *privilege* but the *responsibility* of the sciences to develop theories that will tell us what kinds of things and events exist, and hence what entities are available to provide truthmakers for contingent propositions.

7. *Truths without Truthmakers*

So much for what truthmaker theories need not and I say do not do, namely provide or follow from theories of meaning or of truth. All they have to do is tell us which propositions need

¹² P. SMITH and O. R. JONES, *The Philosophy of Mind: an Introduction*, Cambridge 1986, chs 11–13.

¹³ For the argument see D. PAPINEAU, *Why Supervenience?* *Analysis* 50, 1990; for a reply to it see D. H. MELLOR, *The Facts of Causation*, London 1995, ch. 8.6–7.

¹⁴ This idea is implicit in W. v. O. QUINE, *Things and their Place in Theories*, in: P. K. MOSER and J. D. TROUT, *Contemporary Materialism* London 1995, 193–208. For other recent work on physicalism, see the other papers in this volume.

truthmakers, and how truthmakers make true the propositions that have them. How should they answer those two questions?

First, we may set aside propositions that need no truthmakers because they have no truth values. Which propositions, if any, fit this bill is a moot point, as we noted in fn. 5. But suppose, to take another example, that propositions about the future, say that it will rain tomorrow, do fit the bill. In fact the inference here goes the other way: from lack of truthmakers to lack of truth values, not the other way round. Those who think it is neither true nor false that it will rain tomorrow do so because they think the future is empty, i.e. contains nothing which could make it true either that it will rain tomorrow or that it will not. But whichever way the inference goes, all that matters here, as we also noted in fn. 5, is that propositions which lack truth values need no truthmakers.

Even some propositions with truth values may not need truthmakers. For example, the necessary truths of logic and mathematics may not need them: for if a proposition's identity entails its truth, why must anything else exist to make it true? Necessary propositions may still need something (such as sets) to enable them to *exist*, as Russellian propositions do.¹⁵ So our best theories of logic and mathematics may, for this or some other reason, have to credit necessary truths with truthmakers. That seems to me an open question, which I shall not discuss.

But it is not an open question for propositions that are contingent, i.e. whose identities, however they are fixed, do not settle whether they are true or false. Contingent propositions as a whole do need truthmakers, because their truth values do depend in some way on what there is and how it is. It does not however follow from this that *all* contingent propositions need truthmakers. For some contingent propositions are truth functions of others, and truthmakers, like other entities, should not be multiplied beyond necessity.

To see why not, suppose some entities S and T respectively make true propositions 'P' and 'Q'. These truths entail the truth of 'P&Q' and, for any 'R', of 'PvR' and 'QvR'. We could therefore call S and T the 'truthmakers' of all truths entailed by 'P' and 'Q'. But we should not do so, for the following reasons.

Consider first the conjunction 'P&Q'. What is its truthmaker? It cannot be S, or T, neither of which on its own suffices to make 'P&Q' true. It could be their mereological sum, S+T, provided such sums exist for all S and T. But this assumption, of 'unrestricted mereological composition', is as controversial as it is extravagant, and I think it is false: why should we believe that every two entities, however disparate, constitute a third?¹⁶ And without some independent reason to believe in S+T, postulating that sum just to make 'P&Q' true is double-counting. For since 'P' and 'Q' entail 'P&Q', their truth suffices to make 'P&Q' true.

¹⁵ A Russellian proposition is one whose existence depends on that of an object it refers to. See G. EVANS, *The Varieties of Reference*, Oxford 1982 ch. 3.

¹⁶ P. SIMONS, *Parts: A Study in Ontology*, Oxford 1987, ch. 2.9.

But this is making ‘P&Q’ true in the logical sense distinguished in §2, not in the ontological sense that concerns us. In that sense ‘P&Q’ needs, and I say has, no truthmaker.

We have therefore no truthmaking reason to postulate mereological sums. And even if we postulate them for other reasons, and then let them make conjunctions true, that will not help with *disjunctions* like ‘PvQ’. For since ‘PvQ’ is true if either ‘P’ or ‘Q’ is, either of their truthmakers, S or T, could make this disjunction true on its own. So ‘PvQ’ does not need the sum S+T to make it true. And it certainly does not need the disjunctive entity that we might call ‘S-*alt*-T’, even if mereologists admitted such a monstrosity, which they do not.¹⁷ Nor does denying the existence of S-*alt*-T force us to credit ‘PvQ’ with alternative truthmakers, namely S or T (or both), depending on which of them happens to exist. For as with ‘P&Q’, ‘PvQ’ needs no ontological truthmaker at all, since its truth follows from the truth of ‘P’ or of ‘Q’. Here too the truthmaking is logical, not ontological.

Similarly with negations. If ‘P’ is made true by S, all it takes to make ‘P’ false and hence its negation ‘~P’ true is that S not exist. Again, postulating a truthmaker for ‘~P’, say *neg*S, is double-counting. It also poses needlessly hard problems, such as why S and *neg*S cannot coexist and, more importantly, as we shall see in §10, what makes generalisations true.

8. Atomic truthmakers

It is for the reasons just given that I decline to postulate truthmakers for truth functions. It may however not follow that only simple atomic propositions need truthmakers. For even if necessary truths do not need them, other apparently complex propositions may, like ‘I believe P’, ‘possibly P’, and non-truth-functional conditionals. But whether this is so depends on what the atomic propositions are that do need truthmakers. And the first thing to say about them is that they cannot be defined linguistically.

Suppose for example that, by definition, the weather is fine if and only if it is not dull, that one of these two propositions (‘It is fine’ and ‘It is dull’) is atomic, and the only question is which. If we define ‘dull’ as ‘not fine’, then ‘It is fine’ will be linguistically atomic, whereas if we define ‘fine’ as ‘not dull’, ‘It is dull’ will be linguistically atomic. But what exists cannot depend on which of the terms ‘fine’ and ‘dull’ we use to define the other. So for our purposes we must take the atomic *proposition* to be whichever of the two *has* a truthmaker, whether or not we express that proposition in an atomic *sentence*.

Propositions that are atomic in this ontological sense may therefore be linguistically complex, as ‘It is not dull’ will be if ‘It is fine’ is ontologically atomic. Similarly, and more interestingly, with some of the other linguistically complex propositions mentioned above,

¹⁷ Even those who believe in unrestricted composition, and hence for example in the sum of me and the star Sirius, will jib at my disjunction with Sirius: the entity that exists if at least one of us does, that is not either of us and of which, since it can exist without either one of us, neither of us can be a part.

notably some important non-truth-functional conditionals. Take Newtonian conditionals of the form

If a net force F were to act on any object x , it would accelerate at F/M ,

where ' F ' ranges over net forces and ' M ' ranges over values of Newtonian inertial mass (like 1 kilogramme). What makes a conditional of this form true for some object a and value M^* of M is that a 's inertial mass is M^* . This – ' a 's mass is M^* ' – is the ontologically atomic proposition whose truth, plus Newton's laws of motion, entails that of our linguistically complex conditional.

Conversely, many linguistically atomic propositions are ontologically complex, as 'It is dull' will be if 'It is fine' is ontologically atomic. Linguistically atomic truths about rainbows are another obvious case in point, since each of them depends on a large number of ontologically atomic truths about photons and water drops.

How can we tell which propositions are ontologically atomic? As my examples suggest, I think it is for the sciences to tell us what kinds of things and events there are, and hence which propositions are ontologically atomic.¹⁸ And by 'sciences' here I mean *all* sciences, including psychology, not just the physical sciences, not just physics itself, and certainly not just *microphysics*. 'Ontologically atomic' does not mean physically atomic, and ontological atoms, such as an object a 's having a mass M^* , are not physical atoms.

9. *Contingent Truthmaking*

But ontological atoms, whatever they may be, seem not to be enough. For as we have noted, atomic propositions about a 's mass do not on their own seem to entail how a force F would make a accelerate: to entail that we need to add Newton's laws of motion. Similarly, to entail propositions about rainbows we seem to need, as well as atomic propositions about water drops and photons, the laws of nature that make those drops refract and reflect photons as they do.

Suppose however that these laws are necessary and also that, as we conjectured in §7, necessary truths have no truthmakers. The laws would then exist only as necessarily true propositions, not as entities capable of making propositions true. But if the laws were also deterministic, they would not be needed to make anything true. For in that case atomic truths about water drops and photons could entail propositions about rainbows on their own, just as truths about masses could entail truths about how forces would affect them. We would not need laws of nature as truthmakers.

But whether all the laws required for truthmaking *are* both necessary and deterministic is a very moot point. I think most laws are neither, and the few that are both (like the law that all light is electromagnetic radiation) probably do not include Newton's laws of motion, and

¹⁸ D. H. MELLOR, *Properties and Predicates*, in: D. H. MELLOR and A. OLIVER, *Properties* Oxford 1997, 255–267.

certainly do not include the laws of refraction and reflection that rainbows depend on. This however is not an issue we need to settle now. For when, as in these cases, it takes more than one entity to necessitate a proposition 'P', it is a harmless extension of our basic concept of truthmaking to call *any* of them, given all the others, a truthmaker for 'P'.

This lets us say that, *given* the relevant laws, propositions about how forces would accelerate masses are made true by those masses, and propositions about rainbows are made true by the water drops and photons which produce them. To which we may then add that, *given* the photons, the water drops that refract and reflect them also make propositions about rainbows true, just as, given the drops, the photons make them true.

Similarly in other and more interesting cases. Suppose for example that physicalism is true. It will still be contingent that the Pope's being in a certain brain state makes it true that he believes he is in Rome: contingent on the laws that make this brain state satisfy the functional specification of that belief, and perhaps also on the Pope's being on earth rather than on some twin earth, on his having had a certain evolutionary history, and so on.¹⁹ But on our extended idea of truthmaking, given how the Pope's brain and body work, which planet he is on, his interactions with his physical environment, and his ancestors' physical history, physicalists can still say that a certain state of the Pope's brain makes it true that he believes he is in Rome.

10. Truthmakers for Generalisations

That is one simple and unproblematic way in which entities can be said to make propositions true without necessitating them. A more important one is given by the answer to the question: what makes generalisations true? By 'generalisations' here I do not mean statements of laws of nature. For as we have just noted, these may be necessarily true, if laws are necessary; and if they are not, they may be made true by whatever kinds of entities laws are. But that will not make true merely accidental generalisations like 'all emus are in Australia', which for the sake of argument I will suppose to be true.

What does make such generalisations true? To see why this may seem a hard question, imagine a world with just two particulars, *a* and *b*, both satisfying some predicate '*F*', like 'is in Australia if an emu'. What in this world makes it true there that *everything* is *F*? It looks as if it cannot just be whatever makes it true that *a* is *F* and that *b* is *F*, because these two propositions do not entail that everything is *F*, since they do not entail that *a* and *b* are the only particulars. So, to necessitate our generalisation, we need to add the proposition that there are no other particulars. But this proposition is contingent, since there could have been more particulars than *a* and *b*.

¹⁹ See H. PUTNAM, The Meaning of "Meaning", in: K. GUNDERSON, Language, Mind and Knowledge Minneapolis 1975, 131–193 and R. MILLIKAN, Language, Thought and Other Biological Categories, Cambridge, Mass. 1984.

We seem therefore to need a truthmaker for the negative existential proposition that no particular is neither *a* nor *b*. Yet it is hard to see what such a truthmaker could be – i.e. what entity there could be whose existence entails that other entities do *not* exist.²⁰ But no such truthmaker is needed if, as I argued in §7, truth functions do not need truthmakers. For then the negative proposition ‘no particular is neither *a* nor *b*’ also needs no truthmaker. All its truth needs is that there be no truthmaker for any atomic proposition that would make it false, i.e. no particular other than *a* or *b*. So if *a* and *b* are indeed the only particulars, then whatever entities make ‘*Fa*’ and ‘*Fb*’ true will also make it true that everything is *F*, even though they do not necessitate that generalisation.

This is the other exception to the principle that truthmakers necessitate what they make true: that principle does not hold for generalisations. But we need not reject the principle in all cases, only when a truth has several truthmakers, or requires something not to exist. In particular, I see no reason to deny that all ontologically atomic truths are necessitated by their truthmakers.

11. Kinds of Truthmakers

What, finally, can we say in general about what truthmakers are – as opposed to just listing them by saying that water drops and photons make true propositions about rainbows, brain states make true propositions about what people believe, and so on? There are really two questions here, the first being what *kinds* of entities make propositions true, and the second being what or which entities of those kinds there are.

The main question of the first kind is whether truthmakers are *particulars* (i.e. what first order quantifiers range over) or *facts* in some suitably strong sense of ‘fact’, whether these be tropes in D. C. Williams’ sense, or combinations of particulars and universals.²¹ The main question of the second kind is how many such entities there are, and specifically how many *worlds* of them there are. Is there just the actual world or, as modal realists suppose, are there other equally real and concrete possible worlds, distinguished from ours only by the indexical fact that we are not in them?²²

Answers to these two questions may not be independent. Suppose for example that our truthmakers must include not only particulars but also some of their properties and relations: thus, in the case of rainbows, not just water drops and photons, but the drops’ refractive indices, the photons’ frequencies, their direction, the angles at which they strike the drops,

²⁰ Various solutions have been offered, such as the ‘totality facts’ that ARMSTRONG, *A World of States of Affairs*, ch. 13, follows B. RUSSELL, *The Philosophy of Logical Atomism*, La Salle, Illinois 1918, ch. 5 in postulating as truthmakers for generalisations.

²¹ D. C. WILLIAMS, *On the Elements of Being: 1*, in: D. H. MELLOR and A. OLIVER, *Properties* Oxford 1997, 114–124; ARMSTRONG, *A World of States of Affairs*, ch. 8.

²² D. K. LEWIS, *On the Plurality of Worlds*, Oxford 1986, ch. 1.

and so on. We may still take the truthmakers of propositions about rainbows to be *particulars* rather than facts, provided we can identify properties and relations with suitable sets or pluralities of particulars, as resemblance nominalists do.²³ But it is of course far easier to do this if there are not only *actual* particulars but also merely possible ones. So here we may well have a choice of package deals: *many* worlds of *particulars* or *one* world of *facts*.

In short, answers to the question of how *many* truthmakers there are may well affect answers to the question of what *kind* of entities they are. Theories of truthmakers may therefore need to take a stand on the question of modal realism. But it does not follow that this question will be answered by truthmaker theory, since (to put it crudely) the world's entities, whatever they are, do not exist to provide truthmakers for propositions, or semantic values for their constituents. In other words, it is not for semantics but for metaphysics to tell us in general, and for the sciences to tell us in more detail, what truthmakers exist and are therefore available to make contingent propositions about various subject matters true.

So, for example, it is for metaphysics to tell us whether, given our eyesight and colour concepts, propositions about the colours of things are made true by their Lockean primary qualities,²⁴ and, if they are, for the sciences of colour vision to tell us what these primary qualities are, and hence what it is about, say, a red object that makes it true to call it red. Similarly with time, as indicated in §5. It is the metaphysics and physics of time, not its semantics, which tells us that there are only tenseless truthmakers for temporal propositions, tensed or tenseless.

What then is left for a *philosophical* theory of truthmakers to do, once the scientific and metaphysical theories which tell us what truthmakers there are, and what they make true, have done their jobs? Well, there are the questions, about which propositions need truthmakers, to which I have suggested some answers. Besides that, perhaps the most important job of truthmaker theories is to remind us that semantics rests on metaphysics, and not *vice versa*; thus helping to ensure that, as Nelson Goodman once put it, 'there should not be more things dreamt of in [our] philosophy' – like rainbows, mirror images and mereological sums – 'than there are in heaven or earth'.²⁵

²³ G. RODRIGUEZ PEREYRA, *Resemblance Nominalism*, Oxford 2002.

²⁴ See e.g. A. D. SMITH, *Of Primary and Secondary Qualities*. *Philosophical Review* 99, 1990, 221–254.

²⁵ N. GOODMAN, *Fact, Fiction, and Forecast*, 2nd Edition, New York 1965, ch. 2.1.