CRITICAL NOTICES

FOUR DIMENSIONALISM

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Theodore Sider's *Four Dimensionalism* (Clarendon Press, 2001. xxiv + 256 pp. £35.00) is one of the major contributions to metaphysics in recent years. As such it merits careful scrutiny. The book is an extended argument for the claim that "necessarily, each spatiotemporal object has a temporal part at every moment at which it exists" (p. 59). He calls this thesis 'four-dimensionalism'.

Preliminaries

He begins the book with an introduction in which he defends the sort of metaphysics he is practising, a metaphysics whereby one can come to important truths about the world through *a priori* reasoning. His statement of the general presuppositions of his argument is clear and well-formulated. However, one might wonder exactly why he decided to include it in the book. It is too short to be at all convincing to people who are sceptical of this sort of metaphysics, and, furthermore, his audience likely will be one already sympathetic to this way of doing philosophy. But it is a nice statement of the assumptions behind traditional metaphysics, and usually meta-metaphysical comments are aimed at setting out a non-traditional picture of metaphysics and the world.[1]

Against Presentism

One of Sider's most significant chapters in the book is his long argument against presentism (and the Tooley/Broad 'growing block' view of time). It is a short route from eternalism to four-dimensionalism.[2] So showing the falsity

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1. See, e.g., Hilary Putnam *Reason, Truth, and History* (Cambridge University Press, 1981).
2. Indeed, Trenton Merricks ('Persistence, Parts, and Presentism', *Nous*, 33 (1999), pp. 421–438) claims there is outright entailment here. I share Sider's scepticism about Merricks's definition of 'endurance' such that endurance straight-out entails presentism. The usual way of generating a problem for eternalist endurantism is to insist on the exemplification of ordinary 'monadic' properties by enduring objects (more on this later).

of presentism would be of great help to Sider's cause. He begins with a rough characterisation of presentism and eternalism, claiming that the former is analogous to actualism and the latter possibilism in the metaphysics of modality. It seems to me that in the case of eternalism, possibilism isn't the correct modal analogue. Let us follow Alvin Plantinga, the epitome of an actualist, in characterising actualism as the claim that there aren't nor could have been nonexistent objects.[3] We then may take possibilism to be the denial of actualism, viz., that there are or could have been nonexistent objects. For the possibilist, then objects come in two ontological varieties—those that exist, and those that don't exist. However, the eternalist doesn't claim that there is any sort of bifurcation in the ontological status of times or objects at different times. Indeed, the eternalist claims that every object and time (unrestricted tenseless quantifer) are ontologically on a par. So, I don't think that possibilism is the right modal 'counterpart' of eternalism. Rather, I think that Lewisian concretism is a better modal example for understanding eternalism.[4]

Sider proceeds to discuss the eternalist project of reducing tensed discourse.[5] He is careful in distinguishing between providing a tenseless sentence S′ for each tensed sentence S such that S and S′ express the same proposition, and providing tenseless truth conditions for S. The former, *prima facie*, is a much more difficult task than the latter, and most B-theorists today opt for the latter. Roughly, the reduction proceeds as follows.

> The temporal reductionist claims that tensed locutions are . . . indexical. 'Present' applies to an event iff it occurs at the time of utterance, 'past' to an event iff it occurs before the utterance and 'future' to events occurring after the utterance. The reductionist goes on to give a general account of tensed language in this way, and concludes that nothing corresponding to tense need be admitted as a fundamental feature of the world. (p. 13)

He continues,

> . . . only the eternalist seems to be in a position to offer the aforementioned reduction of tense. The alleged truth condition for a current token of 'there existed dinosaurs in the past' is that there exist dinosaurs before t, where t is the time of the token. But this truth condition says that *there exist* dinosaurs, albeit located before t, which . . . commits . . . one to dinosaurs. Reductionists about tense, then, are invariably eternalists. (p. 14)

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3. See Alvin Plantinga, *Essays in the Metaphysics of Modality*, ed. Matthew Davidson (Oxford University Press, 2003).
4. This is tantamount to claiming that Lewis is an actualist. Plantinga, in conversation, says that he considers Lewis to be an actualist. One could modify Plantinga's conception of actualism such that Lewis turned out to be a possibilist. But then Sider's claim still wouldn't be quite right, for eternalism wouldn't be analogous to possibilism *simpliciter*, but rather to Lewisian possibilism.
5. I am ignoring the 'moving spotlight view' of Quentin Smith. See Dean Zimmerman, 'Temporary Intrinsics and Presentism' in Zimmerman and Peter van Inwagen (eds.), *Metaphysics: The Big Questions* (Blackwell, 1998) for what I take to be serious criticisms of this view.

He says that presentists cannot make use of the reduction of the tenses because they cannot countenance the existence of past and future objects. Sentential tense operators like 'WAS' and 'WILL' will be taken as primitive (p. 15).

However, it seems to me that the presentist may go some way towards a reduction of tensed discourse that is very similar to that of the B-theorist. In particular, the presentist may give truth conditions for propositions of the form *it was the case that p* using the same sorts of indexicals the B-theorist uses. To see this, suppose we take times to be abstracta, maximal states of affairs. A time *t* will be a state of affairs which includes or precludes every non temporally-indexed state of affairs A.[6] As such, times will be exactly analogous to Plantinga's possible worlds, though the states of affairs which compose Plantinga's worlds are non-transient, that is, if they obtain at any time they obtain at every time.[7] The presentist may say that a proposition of the form *it was the case that p* is true at *t* iff p is true (*simpliciter*) *before t*. So far, the 'reduction' mirrors that of the B-theorist. But obviously the presentist must say more; in particular, she must analyse what it is for a proposition *p* to be true before *t*. To do this, we may define the notion of *truth at a time*: Necessarily, a proposition *p* is true at a time *t* iff were *t* present, *p* would be true. Then, we may say that a proposition *p* is true *before t* iff there is (now) a past time *t′* at which *p* is true. Thus, the presentist may ground temporal propositions in a manner very similar to the manner in which the eternalist does. The issue of presentism and truthmakers for propositions on a presentist view arises again in another guise (see below).

After rejecting Arthur Prior's famous 'Thank goodness that's over' argument for presentism (we are thankful that an unpleasant event is in the *past* even if we know all along when the event will cease occurring), Sider says, "Prior succeeds in showing that psychological attitudes are not simply relations to [atemporally true] propositions" (p. 20). As a surrogate, Sider suggests that we take the objects of attitude to be "temporal propositions", "the linguistic meanings of sentences expressed using temporal indexicals". These are analogues to Kaplan's characters (p. 20); in particular they are functions from contexts (times) to contents (atemporally true propositions).

Initially, claiming that something which is the analogue to Kaplan's character is the object of propositional attitudes might strike one as odd. For Kaplan, of course, character is not the object of our attitudes. It may serve as a mode of presentation for the object which is an object of our attitudes, a content—a (Kaplan-style) singular proposition, given the directly referential nature of indexicals.[8] In fact, Kaplan has good reason not to take the character of an utterance to be the object of propositional attitudes. The character

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6. See Matthew Davidson, 'Presentism and the Non-Present', *Philosophical Studies*, 113 (2003), p. 77.
7. See Alvin Plantinga, '*Replies*', in J. Tomberlin, and P. van Inwagen (eds.), *Alvin Plantinga* (Reidel, 1985), pp. 313–329.
8. The singular proposition here is a proposition that has as a constituent the referent of the indexical in question.

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of an indexical term is the term's linguistic meaning, and this stays constant from context to context.

So, Sider wants to say that the object of our attitude when we believe that 'Ted's pain is just now over' is true is the linguistic meaning of this sentence. But I don't see how this could be; I'm not at all sure how the linguistic meaning (in Kaplan's sense) could be what we believe in this case. If he wants to use character-like entities to escape Prior's argument, it seems better to take the 'temporal proposition' to be a *mode of presentation* of the proposition that is believed. This is exactly what many direct reference theorists have attempted to do with indexicals to escape problems of opacity (though it's well-known now that character by itself won't suffice for eliminating problems of opacity—one may assent to an indexical sentence token and dissent from a token of the same type when both tokens express the same proposition). Linguistic rules just aren't the sorts of creatures that can do the work of the objects of our attitudes, though they may be thought of, perhaps, as 'lenses' through which we apprehend the objects of our attitudes. This would allow the B-theorist Sider to have atemporal propositions be the object of our attitudes (and thus not have to worry about eliminating tense), while at the same time give plausible psychological explanations of our behaviour. So, we may believe all the time that an event E will be over at *t*, and only feel relief with respect to this belief at a time after *t* because we come to believe the relevant atemporal proposition under a new mode of presentation (analogous to what Sider calls "*Over*").

Presentism and Truthmaking

Sider (pp. 36ff.) takes the presentist to task for not having any truthmakers for tensed discourse. He claims that the presentist must take the truth of propositions like *It was the case that Socrates is sitting* as primitive.[9] Someone who is a realist about concrete past times may ground this proposition in the same sort of way that propositions about presently existing entities that have properties are grounded. So the truthmaker for *John is sitting* where John is a presently existing entity has to do with John and the property *sitting*. (Things get deep here, but intuitively John's having the property *sitting* is key in explaining why it is that *John is sitting* is true.)

Sider offers the presentist a solution: tensed properties. So the world has properties like *being such that Socrates was sitting*. He takes this to be a "cheat",

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9. Sider gives various examples of ungrounded propositions to motivate his claim that the presentist's lacking a truthmaker for tensed propositions is objectionable. One example he gives occurs in Plantinga's freewill defence (*The Nature of Necessity* (Clarendon Press, 1974), Ch. 9). Plantinga famously appeals to what now usually are called 'counterfactuals of freedom' in formulating his defence. Sider claims that these counterfactuals are ungrounded, with very little argument. I happen to think that Sider is right here, but he's not *obviously* right. Indeed, there are many working in philosophical theology today who claim to have given truthmakers for counterfactuals of freedom (see, for starters, Thomas Flint, *Divine Providence* (Cornell University Press, 1998).

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however. Suppose we agree with Sider that grounding propositions about the past and future with primitive temporal properties is problematic. Is there anything else that might serve as a truthmaker for the presentist? As we've seen, there is—abstract times. Just as a non-Lewisian actualist may ground the truth of *Socrates is possibly a nose-model* in that there is (actually) a world possible relative to the actual world in which Socrates exists and he is a nose-model, the presentist may ground the truth of the proposition *Socrates was snubnosed* in that there is (presently) a time at which Socrates is snubnosed. Indeed, this seems to be an obvious move for the presentist to make; I'm surprised that Sider doesn't consider it.[10]

The eternalist clearly is better off with respect to truthmaking for tensed propositions (*de dicto* or ascription of *de re* temporal properties), I think. But the presentist does have *something* to say; indeed, the fact that it parallels an answer that can be given by adherents to a widely-accepted philosophical position, non-Lewisian actualism, is an advantage. However, there are potential problems for the presentist, even on this solution. Suppose Frank exists and *Frank was frank* is true. Then Frank has the property *having been frank*, and the state of affairs *Frank's having been frank* obtains. We might ask for the analogue for a truthmaker for this state of affairs (call it an 'obtainingmaker'). We can't appeal to the fact that Frank has a temporal property if we side with Sider in objecting to irreducibly-tensed properties. Furthermore, suppose we do appeal to Frank's having the property *having been frank* as an obtaining-maker for this state of affairs. Suppose at t Frank has this property, and at $t + 1$, just after t, Frank goes out of existence. Suppose, also, the truth of *serious presentism*—objects have no properties at times at which they don't exist[11]. At t and at $t + 1$ the state of affairs *Frank's having been frank* obtains.[12] However, at $t + 1$ the obtainingmaker can't be the fact that Frank has *having been frank*; he doesn't exist at $t + 1$. So what is it? It's difficult to see what the obtainingmaker would be after Frank's demise if it had to do with Frank and a property at t. Yet we want to claim that the state of affairs obtains at t and $t + 1$. Thus, for reasons of parity, it seems that we should claim that the state of affairs *Frank's being frank* isn't grounded in Frank's having a property (or Frank and a property). We may appeal to times as an obtainingmaker for this state affairs, of course.

But this still leaves us with a bifurcation in truthmakers/obtainingmakers, and some might find this uncomfortable. Take the proposition *Frank is frank*. What is the truthmaker for this? It seems that what makes *Frank is frank* true is that Frank has the property *being frank*. But now we have different sorts of truthmakers—abstracta for modal and temporal propositions, and substances and properties for presently true propositions. Parity across truthmakers

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10. I consider it further in 'Presentism and the Non-Present', p. 77. It should be noted that a presentist's using abstract times no more eliminates tense than an actualist's appealing to abstract worlds eliminates modality.
11. See 'Presentism and the Non-Present', p. 87.
12. The state of affairs is to be taken as 'impredicative'; the 'pastness' of the state of affairs shows up not in an ascription of a past-property, but in the entire state of affairs being past. (In short, this is a *de dicto* temporal claim.)

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seems desirable, I think. The eternalist non-Lewisian actualist comes closer to achieving this than does the presentist-actualist, but even she is left with two different sorts of truthmakers. Only the Lewisian actualist-eternalist may achieve parity in truthmakers. Of course, one may appeal to irreducible modal and/or temporal properties, but then not only must one answer Sider's 'cheating' claim; one must address the sudden change of truthmakers when an object goes out of existence. The bifurcation of truthmakers makes me uncomfortable, but the thought of giving up ersatz actualism makes me more uncomfortable. I suspect that most philosophers who have thought about these issues would feel the same. So perhaps the fact that the presentist is left with a bifurcation of truthmakers shouldn't bother her; so are the rest of us who don't want to adopt Lewisian concretism about non-actual objects.

Presentism and Physics

Sider argues that presentism cannot be squared with special relativity, and this is "the fatal blow to presentism" (pp. 42–52). It seems to me that Sider is right to take contemporary physics as a damning objection to presentism. Indeed, I think that too many working on issues in the philosophy of time have ignored physics. Ned Markosian says, "There has been a relatively small amount of literature on the argument from the theory of relativity [with respect to the passage of time], but this is perhaps not surprising, since most of us philosophers don't understand that theory".[13] Things have got somewhat better in ten years, but they still are not where they should be.

I am puzzled as to why Sider focuses only on special relativity, however. General relativity also would present problems for presentism if special relativity does. (Special relativity predicts that the 'rate of time' for a frame of reference will vary depending on its velocity (constant) relative to other frames of reference. General relativity predicts that the 'rate of time' will vary with accelerated motion and gravity. Both of these theories are well-established empirically; their predictions of time dilation have been demonstrated experimentally.)

Sider, as most seem to do with discussions of relativity and presentism, incorporates Minkowski spacetime into his main argument. Einstein himself didn't frame special relativity in Minkowskian terms; in fact, Minkowski developed his spacetime notions three years after Einstein developed special relativity. The problems with presentism from relativity can be set out without mention of Minkowski spacetime. This has the virtue of avoiding the appearance of begging the question against the presentist (since Minkowski spacetime is four-dimensional). Roughly, the problem is this. There are many, perhaps infinitely many frames of reference which give different answers as to 'what time it is'. Relative to one frame of reference, an event may be past; but relative to another that same event may be future. There is no principled reason for privileging metaphysically any one frame of reference over another;

13. 'How Fast Does Time Pass?', *Philosophy and Phenomenological Research*, 53 (1993), p. 829.

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there is no reason for claiming one gives a definitive answer as to when *now* is. Without any sort of privileged 'now', presentism becomes highly implausible. What will exist will be relative to each frame of reference, and each spatiotemporal point may be taken as a reference frame.

There is an additional potential problem presented by contemporary physics. Given our current knowledge of the physical world, this problem may only rise to the level of a worry (as opposed to the significant problems posed by relativity). It is thought that one of the difficulties in unifying quantum mechanics and general relativity (producing a theory of quantum gravity) is that at distances below the Planck length (roughly 10^{-34}cm) spacetime itself is subject to quantum indeterminacies.[14] At distances smaller than the Planck length, it is theorised that spacetime becomes a perturbed, frothing sort of entity due to quantum indeterminacies. John Wheeler has called this phenomenon *quantum foam*. His description of quantum foam is vivid.

> So great would be the fluctuations that there would literally be no left and right, no before and no after. Ordinary ideas of length would evaporate. Ordinary ideas of time would evaporate. I can think of no better name than quantum foam for this state of affairs.[15]

In discussions of presentism, often one is asked (I am, at least) about the 'length' of the present. At first, this might strike one as naïve. But, it is an important question, I think. Most presentists talk as if the present has no temporal extent; what exists (physically, at least) is a three-dimensional slice of spacetime with a temporal length of zero. Or, one might think that perhaps time is discrete and comes in 'packets'. This would square best with quantum theory. (In fact, physicists call these temporal quanta 'chronons'. It is not clear whether they exist.) Either way, though, the presentist is 'slicing' spacetime very thinly, much more thinly than the Planck length.[16] With such fine slices, there are legitimate worries about being able to pin down a 'now'. If time itself is subject to quantum indeterminacies, then quite apart from relativity, the presentist would seem to have problems specifying a privileged foliation of spacetime.[17]

14. See Kip Thorne, *Black Holes and Time Warps: Einstein's Outrageous Legacy* (W.W. Norton & Company, 1994); Paul Davies, *About Time* (Touchstone, 1995); John Wheeler, *Geons, Black Holes, and Quantum Foam* (W.W. Norton & Company, 1998); Brian Green, *The Elegant Universe* (Random House, 1999).
15. *Geons, Black Holes, and Quantum Foam*, p. 248.
16. There also is a *Planck time*, the amount of time it takes light to travel the Planck length. It is roughly 10^{-43} seconds. The above problems don't rest on focusing on a certain length of spacetime which is four-dimensional, which has temporal extent. The presentist presumably might object to such a notion of spacetime. Problems with quantum foam also arise with very short durations of time, in particular durations shorter than the Planck time (see *Geons, Black Holes, and Quantum Foam*, p. 247).
17. There are ways of dealing with quantum indeterminacies which are consistent with a deterministic world (e.g. Bohm's theory of superposition is one example of this). However, most physicists think that quantum mechanics implies that there is real metaphysical indeterminacy in the world.

Special and general relativity are well-tested and serious physical theories. They certainly cannot be rejected because of *a priori* metaphysical arguments for presentism, no matter how strong such arguments might seem to be. The presentist must learn to live within the confines of relativity. Quantum foam, on the other hand, is something which has not been shown to exist. We still are far from having a theory of quantum gravity, and most of our beliefs about what goes on at scales smaller than the Planck length are speculative. As one very prominent string theorist told me in conversation, "Below the Planck length all hell breaks loose."[18] But quantum foam isn't an empty speculation. It is what we expect to encounter, someday, when we have the ability to probe spacetime at such short distances. For the presentist, quantum foam isn't a problem of the same magnitude as relativity is. But, the fact that we have good reason to think that it exists should cause the presentist some restlessness at night.

Three and Four-Dimensionalism

Sider first formulates *four-dimensionalism* on p. 59. He says, "Four-dimensionalism may then be formulated as the claim that, necessarily, each spatiotemporal object has a temporal part at every moment at which it exists." I think that this may be a good definition of *perdurance*, but I think that it is too strong to be a definition of four-dimensionalism. Intuitively, a four-dimensional object is an object that is 'spread out in time', and this definition will classify some objects which aren't 'spread out in time' as four-dimensional.[19] To see this, first we note Sider's definition of an *instantaneous temporal part*:

> x is an instantaneous temporal part of y at instant t = df(1) x is a part of y; (2) x exists at, but only at, t; and (3) x overlaps every part of y that exists at t. (p. 60)[20]

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18. For what it's worth, when I explained presentism to another prominent physicist, he responded with Wolfgang Pauli's famous quip, "That idea isn't even wrong."
19. Elsewhere Sider doesn't carefully distinguish between perdurance and four-dimensionalism. On pp. 68 and p. 71 he equates the two positions. Perhaps the only tenable perdurance theory is a four-dimensional one, but there still is conceptual space between the two positions such that they shouldn't be equated, it seems.
20. Some three-dimensional coincident object theorists might balk at this definition. Suppose that we consider the lump of clay L which constitutes a statue S a part of S (as some do). Then this definition (setting aside metaphysical issues surrounding artifacts) entails that L would be a temporal part of S if S and L exist only for a moment. One of the primary motivations of accepting three-dimensional coincident objects is to avoid a temporal parts ontology, the complaint would continue. So much the worse for the coincident object theorist here, then, I think. She could claim that L isn't a part of S (more on this later), or she could take solace in the fact that the fact that S has a temporal part, here, at least, doesn't entail it perdures rather than endures because the object doesn't persist. But I don't see this as any sort of serious challenge to Sider's definition.

Consider a three-dimensional object o such that for each time at which it exists it wholly coincides with an object o′ that exists for only a moment of time. The instantaneous object o′ on this picture will count, by Sider's definition of 'instantaneous temporal part' as an instantaneous temporal part of o. It seems to me that an object of this sort is a *perduring* object, yet is three-dimensional, not four-dimensional.[21] There is a simple fix here, of course: stipulate that at least one temporal part of a four-dimensional object exists for more than a moment. Then one captures the 'spread out in time' notion crucial to four-dimensionalism. But Sider won't want to avail himself of this solution because of his affinity for a 'stage view' of four-dimensionalism. Sider thinks that though there are four-dimensional spacetime worms (this follows from unrestricted spatiotemporal composition), the objects to which we refer in ordinary discourse aren't worms, but *stages* (pp. 188ff.). He defines counterpart relations on three-dimensional temporal slices to provide truth conditions for discourse about continuants. Sider is strongly wedded to his 'stage view' of four-dimensionalism; he no doubt would reject the suggestion that for an object to be four-dimensional it must have at least one temporal part which lasts for more than a moment.

Sider investigates various conceptions of what it might be to be 'wholly-present' as the three-dimensionalist uses the term. He finds these conceptions wanting, and concludes with a challenge to the three-dimensionalist to say what the essence of three-dimensionalism is apart from a resistance to four-dimensionalism (p. 68). It doesn't seem to me to be a huge burden for the three-dimensionalist to take something like 'wholly-present' as primitive. I think I have a good grasp on concepts like 'being wholly-present' or 'not being temporally-extended'. Nonetheless, a reductive analysis of three-dimensionalism would be nice, and there are philosophers working on just this at the present time. It will be interesting to see if any forthcoming analyses truly are *reductive*, in the sense that they give us a better grasp of three-dimensionalism than the notion being analysed ('being wholly-present' or something close to this). Producing an analysis that is both reductive and not open to obvious counterexamples is not easy.

Sider gives a very compelling argument against three-dimensionalism from the possibility of time travel. Physicists sometimes talk as if objects travel 'back in time'; for instance, on the Feynman-Wheeler conception of positrons they may be construed as electrons travelling back in time. Furthermore, Feynman diagrams make no distinction as to the arrow of time; they may be read such

21. Merricks, 'Persistence, Presentism, and Parts', argues (or stipulates, by virtue of his definition of endurance) that such an object wouldn't perdure, but would endure. Things get difficult here because so much follows from one's definition of various terms. For instance, if necessarily, every object were like the object mentioned above, then four-dimensionalism would be true (given Sider's definitions), and the object supposedly would be four-dimensional. This would be true in spite of the fact that it is stipulated to be 'wholly-present' at each time it exists (and hence has a strong claim to being a three-dimensional object). It seems to me that both Sider and Merricks are wrong here; such an object would not be four-dimensional, yet it would perdure. That is, it wouldn't be spread out in time analogous to the way it is in space, yet it would persist by way of having a series of temporal parts.

that the events occurring in the diagram are going 'forward' in time or 'backward' in time. But, I think, these may be taken to be interpretations or models of data, and not pictures that need give the "sober metaphysical truth of the matter". Leading theoretical physicists disagree about the physical possibility of time-travel.[22] Sider may present a rosier picture about the physical possibility of time-travel than actually exists among physicists (see, especially p. 109). But, given some *prima facie* evidence in favour of its physical possibility, plus further and stronger evidence of its *metaphysical possibility* from thought experiments, the three-dimensionalist ought to take time-travel seriously.[23] Sider presents compelling cases in which Leibniz's Law appears to be violated because the same three-dimensional object has different properties at the same time in the same world. The four-dimensionalist may imagine a worm 'twisting back on itself' in an explanation of time-travel. The discussion of time-travel is extremely nice, and it is very clear that the three-dimensionalist is the loser in this battle.

Interestingly, though, it's not at all clear that Sider's own favoured form of four-dimensionalism, the stage view, fares any better than the three-dimensionalist does with time-travel. In n. 30 on p. 101 Sider briefly describes how the stage-theorist will avoid the fate of the three-dimensionalist: Strictly, there will be *two* people present in the alleged case of 'time-travel'. This is a way to escape the three-dimensionalist's problems with time-travel, certainly, but it is successful only if one accepts a counterpart-theoretic conception of persistence and change through time. If one finds this implausible (as do I), then it seems that what Sider *really* has shown is that time-travel is impossible for a stage-theorist. I will have more to say about counterpart semantics later.

The Main Argument for Four-Dimensionalism
(pp. 120 ff.)

Sider calls his main argument for four-dimensionalism 'the argument from vagueness'. It is a version of an argument from his 1997 paper in *Philosophical Review*, 'Four-Dimensionalism', and Sider develops it with great care. He begins defending an argument for universal composition.

P1. If not every class has a fusion, then there must be a pair of cases connected by a continuous series such that in one, composition occurs, but in the other, composition does not occur.

P2. In no continuous series is there a sharp cut-off in whether composition occurs.

P3. In any case of composition, either composition definitely occurs or composition definitely does not occur.

22. See *Black Holes and Time Warps*, and *About Time*.
23. See David Lewis, 'The Paradoxes of Time Travel', *American Philosophical Quarterly*, 13 (1976), pp. 145–152.

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Later, after seeing how the above argument functions, he will tweak the argument so that it is a straightforward argument for four-dimensionalism.

What are we to make of this argument? First, it is crucial to understand that Sider is working with a linguistic conception of vagueness which uses supervaluations to assign truth conditions to sentences with vague terms. People who think there is 'real' vagueness in the world may reject P3. Sider argues plausibly that if composition is vague then the number of objects there are will be vague, and this means that some sentence using first-order logic and the predicate 'concrete' will be vague. But, Sider argues (along with Lewis) that it is implausible to think that any of the logical connectives are vague.

There is a problem here, though, for people like van Inwagen and Parsons claim that the '=' of first-order logic *is* vague when the domain of discourse is objects in the world, and they go to elaborate lengths to defend this claim.[24] Sider cites quickly Gareth Evans's argument that existence cannot be vague,[25] and says of the claim that '=' is vague, "I find this doctrine obscure but have nothing to add to the extensive literature on this topic; here I must presuppose it false" (p. 130). Sider claims that his main argument for four-dimensionalism is aimed at people who accept a linguistic theory of vagueness (LTV). Because many people accept this theory of vagueness, his argument has bite, he thinks. He may be right, but it would have been nice for him say *something* about 'real' vagueness. He might at least explain why he rejects the view, even if he doesn't produce any new arguments against the view. I think that too many people accept real vagueness and it is too well-developed a theory to dismiss without a hearing.

Likewise, Sider rejects the epistemic theory of vagueness (ETV). Someone who held this view could reject P2. Sider gives an argument against ETV based on his "best-candidate" theory of meaning, according to which meaning is determined by "use and intrinsic eligibility" (p. 131). He discusses this view somewhat in the introduction, as well. I am very much in the dark as to what this semantic view is. I should say that I am one (the only one?) who hasn't a clue what 'meaning is use' means. So, the fault may well be with my own lack of imagination. One can see how certain properties would be better candidates for meanings than others if one tells some sort of a causal theory of content with robust natural kinds in the world and the like. But, I'm not sure how 'use' factors in Sider's view, nor am I sure how the two parts of Sider's view fit together. Nonetheless, I think that there are things to say about Sider's argument here.

Sider claims that (based on his best-candidate semantics), either (1) "one candidate is more intrinsically eligible, carves nature at the joints better than the rest, thus granting it *metaphysical* privilege, or (2) one candidate fits use better than the rest, thus granting it *semantic* privilege" (p. 131). He claims that

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24. See Peter van Inwagen, *Material Beings* (Cornell University Press, 1990), and Terence Parsons, 'Entities Without Identity', *Philosophical Perspectives*, 1 (1987), pp. 1–19.
25. Gareth Evans, 'Can There Be Vague Objects', *Analysis*, 38 (1978), p. 208.

one who accepts ETV should opt for (2). So, let's follow Sider's lead and choose the second disjunct. But suddenly P2 is not in trouble, Sider says, for the cutoffs of the proponent of ETV

> would not be metaphysical. Instead of corresponding to unexpected joints in reality, they would represent unanticipated powers of humans to draw metaphysically arbitrary lines. They cannot, therefore, be used to give a plausible objection to premise P2 in my argument. (pp. 131–132)

I'm not sure what "unanticipated powers of humans to draw metaphysically arbitrary lines" are. Is this suggesting some sort of anti-realism? If so, I can't see why he would think that (2) implied that we have these powers. Nor would most proponents of the ETV want to accept (2). Here's the world as the proponent of ETV sees it, or at least one plausible way for a proponent of ETV to see it. We have a vague term T. There are many properties—say, for simplicity, 10—that T might express. Call these F1–F10. The instantiation conditions for F1–F10 are extremely similar, so similar that it is beyond our ken to know which of F1–F10 are expressed by T. Suppose T is satisfied by an object O. This will be in virtue of two things: The meaning given to T (Fn), and the properties of O. The picture, at least for a realist, then is that O satisfies T because T expresses some property (say F6) and O exemplifies F6. O's exemplifying F6 is not dependent on our cognising activity or language use; it exemplifies F6 independently of these human factors. T's expressing F6 *is* dependent on our conventions (or intentions), and it is these conventions (or intentions) that give F6 semantic privilege.

So far, this might seem incredibly implausible—it might seem on this picture as if our terms were semantically cut off from the world unless we happened (luckily!) to pick the 'right' property—the property exemplified by O. But, the proponent of ETV may insist, there is no 'right' property; O may exemplify all of or many of F1–F10. In fact, since each Fn has indiscernibly different instantiation conditions from each Fn+1 and Fn−1, we should *expect* all sorts of these very similar properties to be exemplified by O if O expresses some Fn. There's no carving up here; the properties already are out there in the world, and there are a plentitude of them.

Sider points out that if there were a sharp cut-off in composition on ETV, then one of our basic terms in first-order logic (again, it must be '=') will be vague. On the epistemic theory, this is just to say that though '=' (when the domain of discourse is ordinary objects) has a determinate meaning, we don't know what it is. But this seems quite plausible to me, and it is exactly what the proponent of ETV should say.[26] 'Composes' is a vague relation, she may argue. It has a determinate meaning, but we're not smart enough to pin down exactly what it is. As a result, we can't pin down the precise extension of

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26. The claim about the identity relation being vague here may be translated (at least in terms of 'counting objects') into claims about the existential quantifier being vague. One will need to do so if one isn't using names in the first-order language.

'composes'. Therefore, there will be a sharp cut-off in reality with respect to composition, and this cut-off isn't created by us in any sexy 'I'm carving up the world as if I had a metaphysical cookie-cutter' way.

Perhaps the way to see this response is as accepting P1 and P2. A certain meaning—a property—is semantically privileged, though we're not sure which one it is; and there are a plethora of joints in the world, each one special in God's eyes. So I don't see Sider's argument against ETV here as very threatening. Obviously there are other arguments against ETV, and these are worth pursuing, but not here.

Furthermore, it's not at all clear that the linguistic theory of vagueness (LTV) is correct, either. Many people have argued against LTV by pointing out that it forces us to give up classical logic. This certainly is true, but I'm not sure if it's the best way, at least rhetorically, to highlight the unpalatable consequences of LTV. In particular, along with the giving up of classical logic, there are very odd metaphysical consequences. What LTV entails is that for a sentence S with a vague term there are a variety of propositions S might express. These are the 'precisifications' of the 'meaning' of S. Suppose, for simplicity, that S has 3 precisifications—$p1$, $p2$, and $p3$. LTV allows us to say that S is meaningful—it's not the case that S expresses no proposition. In fact, it is true that it expresses either $p1$ or $p2$ or $p3$. However, if we ask of each proposition pn whether S expresses it, the answer will be no. The main problem with LTV, it seems to me, lies not in being forced to give up classical logic *per se*, but in the metaphysical and semantic consequences of this abandonment.

After arguing for unrestricted composition, Sider modifies the argument to argue for diachronic fusions of classes of objects (D-fusions). In particular, he is concerned with "minimal D-fusions", fusions that are specified by an assignment (a function which takes times as arguments and assigns classes of objects as values) that yields for each time at which an object exists the particles that are part of the object at that time. This will entail a proposition which entails four-dimensionalism (pp. 134, 138). The modified argument proceeds as follows:

P1′. If not every assignment has a minimal D-fusion, then there must be a pair of cases connected by a continuous series such that in one, minimal D-fusion does occur but in the other, minimal D-fusion does not occur.[27]

P2′. In no continuous series is there a sharp cut-off in whether minimal D-fusion occurs.

P3′. In any case of minimal D-fusion, either minimal D-fusion definitely occurs, or minimal D-fusion definitely does not occur.

27. One might note that P1′ isn't a necessary truth, since it entails that there are material objects. This might be thought to be problematic since the conclusion of the argument is four-dimensionalism, a necessary truth. But this is easily fixed by building into the antecedent of P1′ that there are (enough) material objects, and suitably modifying (U).

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The above premises entail

(U) Every assignment has a minimal D-fusion.

And (U) entails four-dimensionalism (p. 138).

The same sorts of concerns which surfaced above with respect to P2 and P3 will arise here for the counterpart of each premise.

With respect to Sider's main argument, then, I think there are problems. I think that the issue of 'real vagueness' needs to be addressed, and I think he needs to say more against ETV and in favour of LTV.

The Stage Theory

Sider's definition of four-dimensionalism doesn't require that there be worms for there to be four-dimensional objects. (It is for this reason that I think that what he calls 'four-dimensionalism' really should be called 'perdurantism', and at most all he can say about the objects generated by the argument (pp. 138–139) is that they *perdure*.) In fact, as previously mentioned, Sider doesn't think that objects to which we normally refer and over which we normally quantify are 'wormy;' he is a 'stage theorist'. Worms exist, but we don't concern ourselves with them in ordinary discourse. He motivates and presents an intricate defence of this sort of perdurantism in the book (pp. 188–208).

If we refer to stages with our ordinary terms, how can it be that sentences entailing the persistence of objects come out true? Stages have momentary existence; they have no temporal extent. Sider follows Lewis and defines a counterpart semantics on stages that will allow him to claim that (some, at least) sentences which entail that material objects persist are true. The stage view is an interesting sort of perdurantism. Its main virtue, in Sider's mind, is that it allows us to 'count' persisting objects correctly. The worm theorist is forced to say, as Lewis does, that we sometimes count by 'identity' and sometimes count by 'relation'. (Sider considers the familiar case of an S-shaped road. Suppose we're giving someone directions, and she never will have any idea that the road doubles back on itself. Do we tell her to cross three roads, or one, when we give her directions? Sider thinks the right answer is 'three', and his stage view allows us to say this. She will cross three 'road stages'.)[28]

Semantically, things get interesting once one allows for temporally and spatially unrestricted composition. All the worms to which the worm-theorist

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28. I think that Lewis is correct in his analysis of how we count. Suppose the woman crosses the three road segments and notes that they're all labelled 'Beck Road'. She might say to someone, 'An odd thing occurred to me today. I crossed three Beck Roads on my way home.' A natural (and appropriate) response, I think, would be to tell the woman that she didn't cross three Beck Roads, but the same road three times. However, in giving her directions, if we are aware that she doesn't know that the road is S-shaped, we might say that she should cross three roads to get to her destination. In fact, if any intuition here prevails, it's that she crosses *one* road, and not three roads. But the stage-theorist isn't allowed to say this sort of thing when it comes to material objects. The worm-theorist is.

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thinks she's referring exist. Indeed, take any counterpart relation which allows us to pick out a series of stages over time. There will be an object, a worm, which is composed of just these slices. How is it that we refer to stages and (almost) never to worms? We can refer to worms, sometimes, if we're careful (p. 196). But our ordinary discourse involves stages. The worm theorist would say that we refer to a worm in virtue of referring to one of its temporal parts (perhaps, even if we're quick enough, a stage). We are not causally connected to the worm composed of the discrete stages which we've picked out via a counterpart relation any differently than we are to the stages themselves. I doubt any sort of Fregeanism will help here either; I can't imagine that most of humanity is sophisticated enough to have 'in mind' that they are talking about temporal stages rather than worms. Unrestricted composition is something to which Sider is strongly committed, especially given the premises in his main argument for 'four-dimensionalism'. This is but one argument in the dialectic between the stage and worm theorist, but it seems to me a compelling one.

By my lights the most compelling argument against both the worm theory (as presented) and the stage theory is that both rely on counterpart semantics to preserve the truth of sentences which seem clearly to be true. The main criticisms of Kripke and Plantinga with respect to counterpart theory seem obviously right to me: Claims about what I could be [or, in the temporal case, was or were] are true or false in virtue of the way *I* am in another world [or *I* am at another time].[29] One can set up whatever relations one wants to in order to pick out a class of objects across worlds or times. These classes of objects are relevant to *de re* temporal and modal claims about me *only if* each of these objects is identical with me.

Furthermore, insofar as *we* pick out the counterpart relation with which we will evaluate temporal and modal claims, and which relation we choose will affect the truth conditions of modal and temporal propositions, counterpart theory smacks of a highly-unpalatable conventionalism about modality and persistence. Some people have gone to great lengths to defend conventionalism, but few philosophers are willing to accept the view.[30] (Sider makes it clear in his introduction that *he* certainly isn't.)

In response to this criticism, I think Sider makes the right sort of move in suggesting that the intuitions in favor of four-dimensionalism (and against rival views) give us reason to accept counterpart theory if we need it in order to save ordinary temporal and modal discourse. But, I suspect to most philosophers who previously had the above sorts of quarrels with counterpart theory, such an appeal ultimately will carry little weight. That a proposition entails the need for counterpart theory is a strong *reductio* for many, myself included. I realise that this is an area where people butt heads and little progress is made; the appropriateness or inappropriateness of counterpart

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29. *The Nature of Necessity*, and *Essays in the Metaphysics of Modality*; and Saul Kripke, *Naming and Necessity* (Harvard University Press, 1980).
30. For a defence of conventionalism, see Alan Sidelle, *Necessity, Essence, and Individuation: A Defense of Conventionalism* (Cornell University Press, 1989).

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semantics as giving 'the sober metaphysical truth of the matter' with respect to *de re* claims seems obvious to each side.

Where To Go?

There is a compelling case to be made against presentism. Sider shows this in his second chapter. In particular, the need for the presentist to choose arbitrarily a privileged frame of reference as being 'present' is, to my mind, deeply problematic. Special and general relativity give us potentially infinitely many frames of reference; that one is 'the correct one' such that we should say that what exists *simpliciter* is what exists relative to it seems an extraordinary claim to me. It seems to me that Sider's argument having to do with cross-temporal relations (pp. 25ff.) also is strong.[31] The argument from temporary intrinsics from non-presentism to perdurance is well-known and robust. So, suppose one finds oneself convinced of the truth of perdurantism, yet unwilling to accept counterpart-theoretic semantics. What should one do? I have the following ghastly and heretical suggestion: One should accept an ontology of four-dimensional coincident worms. There is some satisfaction in adopting a position which is sure to displease everyone on all sides of a debate, I suppose. But, I suggest this view because it seems to me that the objections to coincident objects aren't sufficiently strong to obviate the strength of Van Inwagen's 'modal argument' against (non-coincident) four-dimensionalism.[32] (Obviously I cannot begin to do justice to this claim in the present paper.) Yet, it seems clear to me that presentism cannot be true, and none of the various ways of gerrymandering property ascriptions to avoid problems three-dimensionalists have with temporary intrinsics work.

Conclusion

Ted Sider has written an exciting and admirable book which deals rigorously with host of interconnected issues in the metaphysics of time and material objects. It is bound to generate much criticism: At times, he could be more thorough in dealing with certain metaphysical issues. Proponents of some of the views he attacks no doubt will have things to say in response to Sider's arguments. Yet, this book is a marvellous piece of metaphysics. It is very difficult to deal with the range of topics with which Sider deals while providing argumentation that is as subtle and deep as that which he provides. One might think to respond, 'Well, then maybe he should have covered fewer topics and made the book airtight.' This is misguided. First, as all who deal with the metaphysics of time and identity over time know, very few if any arguments in these areas are 'airtight'. Indeed, it is remarkable how 'up for

31. See 'Presentism and the Non-Present' for an extended defence of this sort of argument.
32. Peter van Inwagen, 'Four-Dimensional Objects', *Noûs*, 24 (1990), pp. 245–255.

grabs' things seem. Second, one *cannot* investigate deeply the nature of material objects without exploring the nature of time. Sider's book itself presents probably the most compelling case to date for the interconnectedness of the nature of time and the nature of physical objects. In *Four Dimensionalism*, Sider has produced the standard against which other works dealing with time and material objects will be judged, for at least the next few years.[33]

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ARISTOTLE ON MEANING AND ESSENCE

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Charles's book[1] is in the tradition of recent readings of Aristotle's *Posterior Analytics* (*Apo*) where the treatise is taken seriously as a means of inquiry not as a statement of a finished science that has little if any relation to the practice of the biological or philosophical sciences as Jonathan Barnes and G.E.L. Owen argued in the seventies. This book deserves a wide audience, for Charles not only does first rate work unearthing a coherent theory of meaning and essence in *Apo* and examining how it is used in both the metaphysical and the biological works, he also shows that Aristotle's contributions in this area are philosophically important to contemporary discussions of meaning and essence.

Charles reveals an Aristotle who challenges two contemporary dogmas on meaning and essence. In Chapters 2–6 Charles argues that in the *Apo* Aristotle offers an account of the meaning of kind terms that does not require that the knower be able to specify the individual members of the kind to which she refers, thus challenging the Fregean doctrine that individual referents fix meaning. In Chapters 7–10 Charles shows how Aristotle sketches an account of how we come to know essences that relies on explanatory practices relative to us. Definitions rest on our explanatory practices which rely on the causal structure of the world. In this way our practices which are unique to us, put us in contact with mind-independent reality. This challenges a second dogma, popularised by Quine, that any epistemic account relative to us cannot be known to be a correct account of a mind-independent reality.

Consider how Charles shows Aristotle challenging the first dogma. According to a contemporary essentialist like Putnam, a theory of meaning enables us to render intelligible essentialist claims about kind terms. Nothing is required from a further metaphysical account of essences. On this view, dubbed 'modern essentialism' by Charles, essential features of a kind are made such because we have a set of definitional procedures. The source of necessity is in the conventions we adopt. For example, one cannot understand the term 'water' as a natural kind without believing that water possesses a fundamental scientific feature. The epistemic warrant for ascribing predicates necessarily to a kind, on this view, is a set of pre-scientific linguistic intentions which fix the identity of the kind in all possible worlds in which it exists. For this reason, it is necessary to know that the kind in question is instantiated in order to know the meaning of the kind.

While the differences between Aristotelian and modern essentialism are well known, Charles uncovers roots of this difference in Aristotle's account of

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1. *Aristotle on Meaning and Essence*, by David Charles (Clarendon Press, 2000). 432 pp. £35.00.

the meaning of kind terms. He finds Aristotle affirming that we can know the meaning of a kind term without knowing either the essence of the kind or the existence of individuals of the kind. Charles not only shows that this reading is integrally connected with Aristotle's conception of explanation and scientific knowing, he gives reasons for thinking that it is plausibly true.

The key to Charles's analysis is Aristotle's three stage inquiry into what something is. The first stage is achieved when one knows an account (*logos*) of what a name or name-like expression signifies (93b3–32). This stage allows for knowledge of what a name signifies without any knowledge of the existence or essence of the kind. When one knows that what is signified by a name or name-like expression exists, the second stage is reached (93b32). The final stage is realised when one knows the essence of the object/kind signified by a name or name-like expression (93b32–33).

Knowledge of the first stage seems un-Aristotelian. Without reference to individuals of the kind it may seem that there is nothing that can fix the reference of the meaning of the term. On the other hand, if meaning is established by causal relations, then meaning would also seem to require that there actually be an individual object that causes the knowledge claim. The alleged first stage seems out of keeping with Aristotle's anti-Platonic insistence on no essence without existence. In addition, several passages seem to undermine Charles's interpretation of stage 1. At 92b26–28 Aristotle limits the term 'definition' (*horismos*) to accounts of things that exist. At 90b16–17 definitions are said to be accounts which give knowledge of essence. Since non-existents lack essences (92b28), there can be no definitions of non-existents. At 90a36 Aristotle introduces the phrase 'what something is' in the context of proof and demonstration. Since there can be no demonstrative proofs about goatstags, for example, there cannot be a 'what something is' of this type. Finally, throughout *Apo* B Aristotle seems to restrict the use of the phrase 'what something is' to accounts of existing objects or kinds.

Charles effectively responds to these philosophical and interpretative concerns. He acknowledges that Aristotle's third stage of inquiry realises a strong sense of definitional predication which requires that the knower can refer to instances of the definition. That represents the third stage of inquiry. Before reaching that level of understanding a knower can refer to a kind without knowing whether there are instances. The first lines of *Apo* B.10 support Charles's reading.

Since definition is said to be an account given in reply to the 'What is?' question, it is clear that one kind of definition will be an account given in reply to the question, 'What is it that a name or other name-like expression signifies?'. An example of such a question is 'What does "triangle" signify?'. When we grasp that what is signified exists, we seek the answer to the 'Why?' question (93b29–32).

In this passage Aristotle explicitly recognises a weak sense of definition which is an account of what a name or name-like expression signifies. Such an account makes inquiry possible, for it is the condition for the second step of determining whether there are instances of the kind so identified. Another reason for recognising the distinction between stages 1 and 2, is that it makes

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possible the resolution of the *Meno* paradox. One can know the account of the meaning of a kind term without knowing that there are instances. Coming to know that there are instances of the kind signified counts as learning something. Finally, Aristotle explicitly designates this kind of account as a definition contrasting it with accounts that prove or explain.

There are deeper interpretative challenges for this account, however, since Aristotle explains the content of thought causally in a way that requires an existing object as cause. In the *De Anima* Aristotle holds that the grounding of knowledge is the transference of the form of the thing known into the knower in a way that differs from the form's existence outside the knower. As a realist Aristotle holds that the content of the thought is determined by a type of likening that occurs when the object or kind is the efficient cause of the thought. From this it seems reasonable to conclude that stage 1 knowledge of a kind is impossible. Charles expresses the argument:

1. Our thoughts about a kind are individuated in part by the kinds that cause them.
2. When we have a thought, we know which thought we have.
3. So when we know which thought we have, we know what individuates the thought.

Charles correctly notes that 1 and 2 do not entail 3. While Aristotle's account does require the existence of at least one instance of the kind, it does not require that the knower be cognisant of that instance. We can know which thought we have without knowing what individuates the thought. While the content of the thought can be fixed by the object to which the thinking faculty is likened (*De Anima*), the thinker need not know which kind that is, in the way required to distinguish that kind from all others, real or imaginary. The way the thought is presented may mask the identity of the thought.

This distinction allows Charles to observe that 3 can be entailed by 1 and 2 given Frege's theory of meaning, since on that view grasping the sense of a term is grasping something which determines its reference. Such is not the case for Aristotle. On Aristotle's account, meaning is not object-determining with the exception of the meaning of 'I' or 'now' or 'this'. Stage 1 knowledge is possible, because Aristotle does not accept that grasping an object in thought involves 'knowing which object it is that is grasped' (in the way required to distinguish it from all others). Charles shows us that for Aristotle, content determination is not identical with the account of what a competent thinker knows. While content determination requires the likening relation and the existence of the object, the competent thinker need not be able to correctly discriminate the kind, which is the causal source of the information. Charles culls this insight from Aristotle and appropriates it to contemporary standard accounts of thought and meaning. Neither causal accounts nor fallibilistic accounts of meaning succeed. Causal accounts of meaning fail to explicate thoughts about kinds, for Aristotle insists on some understanding of a common nature at the generic level. So, a bare causal theory is too weak an account. On the other hand, fallible ability to discriminate the object referred

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to in the thought is too strong, because the lack of such discrimination is consistent with something of the nature of the kind being understood by the inquirer.

Although this shows that it is possible to have the meaning determined by something that one is not aware of existing, Charles persuades us that Aristotle shows how it is possible in the way that we move from knowledge of stage 1 to stage 2. The paradigms are that of the craftsman and physician, based on his reading of *Apo* 2.19 (100a5–9) and *Metaphysics* 1. 2 (981a5–12). These passages aim at distinguishing knowledge based on experience from knowledge of a universal. The person of experience has knowledge that essentially involves the particular. The medical practitioner knows that a specific treatment works on specific manifestations of an illness and can judge that these particulars are like the one in question. But she cannot say what it is that these particulars have in common. That judgement requires the person to have knowledge of the universal which is not essentially particular. Knowledge based on experience need not be knowledge of the universal or essence. Although there need be no recognition of an essence, there is an awareness of the kind as located in an appropriate genus possessed of some of its non-accidental properties. The knowledge of the craftsman or the doctor exemplifies this relation. The craftsman may know that oak is a type of wood or the doctor that a condition is the activity of an organism without being able to give the essence of the wood or of the disease. Still, they have knowledge of the general type. To recognise the essence is to recognise that a feature of the kind has explanatory power and that it accounts for characteristic properties of the kind. Such recognition belongs to stage 3. The craftsman need not be aware of all that. On the other hand, the craftsman does need to be aware of many of the characteristics of the kind and how they work together to make the wood suitable for some structures and not for others, for receiving paint or not, for offering support in certain conditions, but not others. None of this, however, requires any understanding of the deep structure of the wood as oak. All that is needed is that the craftsman thinks of certain kinds of wood as having interlocking features that can be used in given ways in his work. The carpenter need have no views about what holds together these features of the wood. Thus, one element of the modern essentialist's program is overturned: the idea that knowledge of a kind entails knowledge of the deep structure of the kind or knowledge that there is such a deep structure.

In order to show that reference to a kind can be made without knowledge that the kind has existing instances, Charles considers a physician who has not established the existence of a disease, but who has formed an idea of the kind of disease that is afflicting several patients. The doctor may have been interacting with the kind without knowing that she was. The interactions would be sufficient to give her thoughts about the kind. Her thinking faculty is likened to the kind without her knowing that this is the case. In light of the impression that the kind has made on her, she is able to go on and search for answers to questions about existence and essence.

This account may be too strong, for it seems to preclude meaning for kind terms that do not exist. Aristotle allows for the meaning of such terms, for he

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refers meaningfully to the vacuum and goatstag, while insisting that there are no instances of either. Yet Aristotle can claim that goatstag is an organism with horns and a tail. We have a non-accidental property and a genus, so we have reference to a kind. On Charles's reading, Aristotle would reject that goatstag signifies a kind. This consideration suggests that Charles's interpretation of Aristotle is mistaken.

Although Charles does not respond to such an objection in his text, he has the resources to respond. We do not come to make a reference to goatstag through an inquiry. We simply take images from our sense experience and assemble them in ways we have not experienced. The *Apo* focuses on inquiries into the actual world. With goatstag we lack experience and history that the craftsman and the doctor provide to their encounters with kinds. There must be the context of inquiry in order to refer to kinds. Hence, Charles's reading is not falsified. We cannot refer to the kind goatstag. We may use the term meaningfully, since it does have universals associated with it, but that does not mean that it counts as a kind term. We learn that the conditions for meaningful ascriptions of terms are more easily met than the conditions for meaningful ascription of kinds. Charles has done a masterly job of culling such a theory from the very difficult texts of *Apo* B 8–10 and following.

The second half of Charles's book is devoted to fleshing out the metaphysical and epistemological grounds for an account of essence that is the object of the inquiry begun by the first two stages of inquiry. Charles finds in Aristotle an account of essence and how we come to be in touch with it that is resistant to many of the critiques of such a program articulated by Quine and Putnam. One of the central criticisms Quine and Putnam make is that the determination of what is relevant or essential when one conducts an inquiry is relative to our own interests, and hence is not objective. Charles shows that Aristotle's account of what counts as a proper definitions depends on factors that are relative to our explanatory practices that we as human knowers employ. Yet this relativisation of the explanatory practice need not entail the denial of objectivity. Charles notes that in *De Anima* Aristotle reasons that colour is real, even though we can only access it because we have faculties proportioned to the colours.

The central thesis of the book's second half is that the human practices of definition and explanation are interdependent. Charles believes that this thesis entails that definition rests on demonstrations about the mind-independent world's causal structure. So, a practice relative to how we explain is grounded in objective reality. It also entails that no purely intuitive account of definitions independent of explanation is genuinely Aristotelian. Hence a Platonic reading of Aristotelian *nous* cannot be correct. To anyone acquainted with *Apo* B, Charles's thesis is fraught with interpretative challenges. Aristotle says many puzzling things about the relation between definition and demonstration, Aristotle's paradigm of explanation. The conclusions of demonstrations are not in the right form required for definitions (93b11–13). Definitions are starting points, delivered via *nous*, and as such cannot be the conclusions of demonstrations (92a35–b3). Finally, definitions are arrived at via division (*Apo* B13–15). Division is not demonstration. The schemata of demonstrations

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implies that definitions be premises in demonstrations, for the definition expresses the basic unifying essence which is causally explanatory of other characteristics. Since such premises cannot be demonstrated themselves, the only way they can be known is through *nous*. Given these texts explanation's role in definition seems otiose. These texts appear to support Barnes's reading of the *Apo* as a finished science where all that remains is cranking out the logical relations obtaining between the premises secured via *nous*.

Charles argues that *nous* does not deliver definitions outside a context of inquiry and research. Charles carefully delineates how definitions are relative to our explanatory practices for Aristotle. We come to know that certain features are definitionally prior because they are causally prior. Things are prior by nature, because they are causes. (71b31). For example, the quenching of the fire is causally prior to the noise in the clouds, so quenching of the fire said of thunder is definitionally related in a way that noise in the clouds is not. Priority in explanation thus becomes a defining feature of definition.

The practice of explanation is informed in its turn by the requirements of definition. On Aristotle's account thunder has teleological, efficient and grounding causes. Which one of these causal stories gives knowledge of the definition? For thunder, it is the one that gives the efficient cause, because that provides the most complete understanding of what it is to be thunder. In defining anger, by contrast, the teleological cause is most illuminating of what anger is. Anger may always be brought about by an insult, an efficient cause, but that it aims at revenge makes the phenomenon fully intelligible to us. When we understand the purpose of anger we can explain why anger has its other characteristic features. In short, the feature which is explanatorily basic is the feature that reveals the 'what it is to be' of the thing or event to be defined. For Aristotle, the explanatory aim is to say what it is to be that thing. Given such a goal, we seek the feature that will be able to explain any other features that belong necessarily to the subject.

In a carefully reasoned chapter Charles shows how *Apo* B13–15, which presents a division method of obtaining genus and differentiae for definition, is made intelligible by seeing how the differentiae are selected for their explanatory role. He traces his hypothesis through the definition of two, the triplet and other numbers. Charles refers to ancient commentators as well as modern ones to make his case. It is paradigmatic of the rich set of resources he brings to sustain his inventive reading of these very difficult passages.

Charles shows how this interdependence of explanation and definition illuminates other difficult parts of Aristotle's corpus. The principles of form or actuality and matter or potentiality are the basic elements in Aristotle's ontology, precisely because they are what are needed to account in an explanatory way for the unity of a composite substance. The definition of substance as a composite of matter and form is a special case of the general account of definition developed in the *Apo*. This helps Charles motivate an account of the form as an answer to the 'what is the substance?' question and as an answer to why the substance has the characteristic features that it does. Form plays the definitional role by playing the explanatory one.

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In the last chapter Charles spells out what he takes to be important philosophical implications of this thesis. Since the practices of definition depend upon the practice of explanation and the practices of explanation depend upon the causal structures of the world, then the way the causal structures of the world are organised grounds the practice of explanation and so also the practices of defining. Charles maintains that this interdependence of definitional and explanatory practices entails that those who have this type of definitional and explanatory processes grasp something of the world and its causal structures and that those who lack such processes fail to fully grasp the world and its causal structures.

I will argue that Charles needs an additional assumption for these two consequences to follow validly. While it is true that the interdependence entails successful reference to the world, it is not true that this successful reference need be recognised by the knower. It would be possible to claim that one's explanations worked, without claiming that they corresponded to reality. Charles would remind us that the fine work of the craftsman and the success of the doctor's disease treatment count as reasons for believing that the reference is correct.

Yet these considerations hardly prove the truth of the objective claims. The success of the craftsman and doctor can be accounted for as pragmatic success, rather than objective truth. Moreover, the analytics model is found wanting when Aristotle himself applies it to biology, his paradigm case of a science. In fact, the conventionalists might cheer that this is just what they expected to happen. Aristotle adopts one and then another kind of cause to suit the purpose he has while 'defining'. On the other hand, Charles argues that this failure does not mean that Aristotle must reject his analytics model, for such rejection means that one must reject the very experiences that led one to begin inquiring in the first place. In those experiences we get the very idea of kinds that we use and we can come to know specific things about the kind. Charles's idea seems to be this: a reductionistic account without reference to undivided wholes misleads and undercuts the very phenomena that begin the inquiry.

Without this paradigm we cannot get a fix on the realities to be understood. In a curious way, we can be more certain of the vague grasp we have of these things as wholes, than we can of the more specific grasp we have of these items at the material level. This also ties into another important insight of Aristotle's method. The foundations of a science need not be clear and distinct as Descartes would have them. Rather they can be vague and rough. It is only through the refinement of experience, conceptualising and abstraction that we come to have clear and distinct ideas and ones that may be less correct as well. Too often the objectivist has been required to meet the clear and distinct criterion. Charles suggests that that need not be part of the realist's program and that the vague sloppy whole delivered by *nous can* be seen as realistic and objective.

While Charles has not toppled the conventionalist's paradigm, he has rehabilitated the realist's model with insights culled from Aristotle's *Apo* and

Metaphysics. This is but one rich consequence of a book that finds a rich theory of meaning and essence that Aristotle employs in his own metaphysical works, even if not simply applied in his own biological ones. Charles's book deserves serious study by both Aristotelians and contemporary philosophers of language and metaphysicians.