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ical speculations in an attempt to “get closer to some real (even if inarticulate) sense of life’s meaning by reflecting on what it has been like to live one” (200).

Along with the introduction, these last two essays serve to remind the reader of Nozick’s extraordinary creativity and originality—as well as of his intellectual restlessness, his spectacular readiness to make impetuous (sometimes reckless) forays into unknown subject matters and unfamiliar genres, and his unwillingness (for better and for worse) to respect traditional disciplinary boundaries.

Together, the essays collected in this volume provide a fine tribute to one of the most wide-ranging and imaginative philosophers of our age.

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Theodore Sider, *Four-Dimensionalism: An Ontology of Persistence and Time*. Oxford: Clarendon Press, 2001. Pp. xi, 250.

How do the familiar concrete objects of common sense persist through time? The *four-dimensionalist* argues that they *perdure*, that is, they persist through time by having temporal parts at each of the times at which they exist. The *three-dimensionalist*, on the other hand, holds that ordinary concrete objects *endure*; they lack an additional temporal dimension and persist, instead, by being (as they say) “wholly present” at each of the times at which they exist.

Theodore Sider’s excellent book provides an extremely lucid, persuasive, and detailed defense of the four-dimensionalist position, one that poses formidable challenges to the three-dimensionalist. Sider begins, in chapter 2, by offering powerful considerations in favor of the B-theory of time, which is in his view most plausibly combined with four-dimensionalism. His remarks in chapter 3 clarify and advance the dispute over how four-dimensionalism is best formulated in a way that is intelligible to all parties involved in the debate over persistence. The brunt of his case for four-dimensionalism comes in chapters 4, 5, and 6, where he masterfully surveys the existing evidence for and against this view, and, with great insight and subtlety, takes a stand on the relative strength of arguments given by others. What is more, at certain crucial places in the book, Sider adds powerful new considerations of his own creation to the existing stockpile, which no doubt will engender a flurry of serious philosophical scrutiny in the literature to come. The version of four-dimensionalism that Sider in the end embraces is also new: instead of the more familiar “worm-theory” (according to which ordinary concrete objects are analyzed as extended space-time worms), Sider adopts the “stage-theory,” which views ordinary concrete objects as momentary stages; they persist by having temporal counter-

parts at other times. Sider prefers the stage-theory over its competitors because it is the theory that has “on balance, the most important advantages and the least serious drawbacks” (140); it provides, in his view, the best-unified treatment of an unusually wide range of metaphysical puzzles (for example, those concerning *fission*, *fusion*, *longevity*, *vague identity*, and *conventional identity*, alongside the more usual suspects involving *constitution* and *undetached parts*).

Sider’s case for four-dimensionalism also has the virtue of being unusually fair-minded in its assessment of evidence. For example, after careful discussion in chapter 4, Sider in fact finds most of the arguments that have been traditionally advanced in favor of four-dimensionalism to be unpersuasive (for example, arguments concerning *special relativity*, *analogies between space and time*, as well as David Lewis’s famous argument from *temporary intrinsics*).<sup>1</sup> Sider’s insightful criticisms of competing analyses, in chapter 5, inevitably cut right to the heart of what is objectionable about these views; many of the alternative treatments will, I think, have a difficult time recovering from Sider’s objections. His responses to prominent objections to four-dimensionalism, in chapter 6, are, I think, largely successful (though I will mention some notable exceptions below). As a result, Sider arrives at an extraordinarily thoughtful, informative, and balanced assessment of the debate over persistence from which misleading rhetoric is largely absent.

Despite its many significant virtues, Sider’s defense of four-dimensionalism is, in my view, ultimately inconclusive.<sup>2</sup> The reasons for this, very briefly, are as follows. The single most powerful and innovative argument offered by Sider in favor of his position is the *argument from vagueness*, discussed in chapter 4.<sup>3</sup> This argument is inspired by some cryptic and condensed remarks made by David Lewis in defense of *unrestricted mereological composition*, the thesis that, for any plurality of objects whatsoever, there is a single object that they compose.<sup>4</sup> Sider’s argument from vagueness, if successful, establishes that objects are constantly coming into and going out of existence, regardless of how bits of matter are arranged at any given time, since *no principled line* can be drawn between conditions and arrangements of matter that support this circumstance and ones that fail to do so. In its properly temporalized form, so Sider argues, the argument from vagueness entails four-dimensionalism: my “today-part,” for example, is one of the objects against whose existence no cogent arguments can be provided, if Sider has his way.

As I have argued elsewhere (see “The Crooked Path”), the argument from vagueness is fatally flawed, in that it fails to provide independent evidence for the thesis that mereological composition is unrestricted. Moreover, the debate over whether mereological composition is restricted or unrestricted is in any case independent of Sider’s main topic, the dispute between the three-dimensionalist and the four-dimensionalist over the nature of persistence. There are, after all, coherent versions of three-dimensionalism, such as Judith Jarvis Thomson’s, that also embrace unrestricted mereological composition.<sup>5</sup> Thus,

even if the argument from vagueness were successful, it would fail to establish four-dimensionalism.

The argument from vagueness is, in my view, the dialectical centerpiece of Sider's case for four-dimensionalism. Without it, there is a relative stand-off between the two competing analyses of persistence. To establish this, we would of course have to address in more detail than the present context allows the wealth of interesting additional evidence Sider amasses in favor of his view. For example, chapter 4 contains intriguing discussions concerning the nature of space-time, as well as such "exotic" possibilities as time travel and worlds without time, all of which (in Sider's view) favor four-dimensionalism.

Sider combines the outcome of the argument from vagueness (namely, unrestricted mereological composition) with other powerful and controversial Lewisian views (in particular, counterpart-theory and Humean Supervenience), which are not themselves defended in the book. As a result, he is committed to an exceedingly deflationary conception of *ontology* in at least the following two respects. First, any collection of bits of matter whatsoever, no matter how gerry-mandered, counts as an *object*, according to this conception. Second, the question with which Sider began—"What is the nature of the persistence of the familiar concrete objects of common sense?"—turns out not to be one about which the *ontologist* proper has much to say. For the familiar concrete objects of common sense are simply somewhere to be found among the great plethora of fusions; to say where exactly is not, strictly speaking, a matter of ontological concern, but rather a question that involves the organization of our *conceptual* household (that is, the nature of the similarity-relations that are invoked in particular contexts).

The potential dangers that lie lurking in this deflationary approach to ontology are, I think, interestingly brought to light by considering the well-known objection from *motion in homogeneous spheres*, as well as Judith Jarvis Thomson's famous *ex nihilo* objection. In the first case, it turns out that, under certain circumstances, Sider's deflationary metaphysics (by his own admission) lacks the resources to make distinctions that are strikingly intuitive (such as that between a motionless homogeneous sphere and one that is rotating). In the second case, Sider's approach is unable to tell an interesting *causal* story where one might reasonably expect such a story to be told. For example, when we ask the Lewisian stage-theorist why momentary stages *go out of existence* when they do, it seems that the only answer we can hope to get is that "their time was up," so to speak.

In sum, there is, I think, still hope at the end of the day for the three-dimensionalist, despite Sider's powerful case for the opposing view. If the preceding remarks were successful, however, they should also have brought out just how much is to be gained by wrestling with Sider's arguments. For many years to

come, this book is sure to be the *locus classicus* with respect to which all those engaged with the literature on persistence must position themselves.

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Notes

<sup>1</sup> See David Lewis, *On the Plurality of Worlds* (Oxford: Basil Blackwell, 1986), 198ff.

<sup>2</sup> For more detail, see Kathrin Koslicki, "The Crooked Path from Vagueness to Four-Dimensionalism," *Philosophical Studies* 114 (2003): 107–34.

<sup>3</sup> See also Theodore Sider, "Four-Dimensionalism," *Philosophical Review* 106 (1997): 197–231.

<sup>4</sup> See Lewis, *On the Plurality of Worlds*, 211ff.

<sup>5</sup> See Judith Jarvis Thomson, "Parthood and Identity Through Time," *Journal of Philosophy* 80 (1983): 201–20.

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Nalini Bhushan and Stuart Rosenfeld, eds., *Of Minds and Molecules: New Philosophical Perspectives on Chemistry*. New York: Oxford University Press, 2000. Pp. xvi, 299.

J. Van Brakel, *Philosophy of Chemistry*. Belgium: Leuven University Press, 2000. Pp. xiv, 246.

The appearance of these two books marks an important step in the arrival of the philosophy of chemistry in the philosophical imagination. Long the missing tooth between the philosophy of physics and the philosophy of biology, the philosophy of chemistry has come into its own only in the last decade. After numerous symposia and conferences, special issues and articles, and even the appearance of two journals devoted specifically to philosophical issues raised by chemistry, the field has lacked the visibility that a book provides. Now there are two—one an anthology and the other a monograph—that both in their own ways help to set the field on firmer footing.

I shall start with the anthology *Of Minds and Molecules*. Before his untimely death in 1999, Stuart Rosenfeld was Professor of Chemistry at Smith College. He and his wife Nalini Bhushan, Associate Professor of Philosophy at Smith College, co-edited this volume. In doing so they have achieved a rare collaboration of effort between a chemist and a philosopher, to examine what lies at the intersection of these two fields, and the philosophy of chemistry is the richer for it. Bhushan and Rosenfeld have put together a collection by some of the most prestigious authors in this newly emerging field, whose prior work has been spread over numerous journals and other venues that were rarely devoted singly to the philosophy of chemistry. For this alone the book is commendable.