that are globally self-consistent. However, Earman points out that the kill-your-grandfather paradox and the like are, by themselves, of no help in assessing the status of the constraints a local solution of the Einstein field equations has to fulfill in order to be extendible to a global solution. Instead he turns to recent developments in physics to help assess them. Earman proposes that for spacetimes with closed timelike curves (like Gödel's model of general relativity) we should grant law-status to these consistency constraints.

Apart from its clear expository merits, this book's principal values lies in the authors' radically different perspectives on the problems surrounding "time." For a notion with such a multitude of aspects, this variety is satisfying.

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THE CONCEPT OF TIME. By ROGER TEICHMANN. New York: Macmillan, 1995. Pp. x, 196.

Teichmann's book falls into three parts. Part 1 is concerned with various facets of the slogan "time is tenseless." In chapter 1, McTaggart's argument that tense is incoherent is briefly considered, and dismissed. In chapter 2, the claim that "facts" (or "truth-makers") are tenseless is discussed, and ultimately rejected owing to the phenomenon of irreducibly tensed belief (and knowledge). In chapter 3, the claim that tensed statements can be given tenseless truth conditions is given a lengthy treatment. Teichmann rejects the claim, ultimately arguing that "for general philosophical reasons *there could be no* genuinely, non-parasitically tenseless sentences, in any possible language" (8).

Part 2 is concerned, in chapter 4, with semantic features of dates and duration terms (such as 'second', 'day', and 'year'), and, in chapter 5, with the conventionality of measurements of duration, and the incoherence of durationless instants.

Part 3 is concerned, in chapter 6, with a defense of the possibility of time without change, and, in chapter 7, with a defense of (a "non-reductionist" version of) the causal theory of time. Central to Part 3 is the introduction of a "criterial semantics" according to which the sense of an expression is tied to its paradigmatic applications. Teichmann argues, for example, that the sense of a duration term, such as 'five seconds', is tied to the operation of "true" clocks, and that the sense of the tense operator 'it was the case that' is tied to memory, where the ties in question are said

to be "constitutive," not "reductive." Finally, in an appendix, Teichmann defends his notion of a criterion against an objection due to Crispin Wright.

I cannot recommend this book. To be sure, Teichmann pronounces on a wide range of interesting topics, with arguments aplenty. But his arguments too often meander down unpromising byways. And even when Teichmann's conclusions are plausible, his arguments fail to convince. Indeed, it is sometimes unclear what precisely he is arguing for. In this review, I have space only to register a couple of general complaints, and to respond to one of Teichmann's arguments.

(*Caveat lector.* I am not a friendly reviewer. With respect to fundamental philosophical presuppositions, both substantial and methodological, Teichmann and I are worlds apart. No doubt, Teichmann's book would have more appeal for those who share his broadly Wittgensteinian approach to philosophy.)

A pervasive complaint has to do with the fuzziness of Teichmann's treatment of semantic issues. Throughout the lengthy discussion of truth conditions for tensed sentences, and of the possibility of tenseless languages, it is never made clear how truth conditions are to be individuated, or even what a tenseless sentence (or language) is supposed to be. (Oddly, Teichmann appears to take the truth conditions for a sentence 'S' to be given by the entire biconditional "'S' is true iff p", thus confusing conditions with conditionals (38–39).) Teichmann makes no use of crucial distinctions from intensional semantics and pragmatics. Are truth conditions individuated by *content,* or by *character* (to use David Kaplan's terminology)? Is the truth or falsity of a tenseless sentence independent of the time of utterance, or independent of time altogether (so-called "eternal" or "timeless" sentences)? With basic questions such as these left hanging, not much else can be clear.

In the end, Teichmann plumps for a "criterial semantics" for tense, something I find obscure. With respect to the past tense, it goes roughly as follows: uses of the past tense in certain "paradigm circumstances," those involving remembered observation, are "indubitably correct"; other uses of the past tense "effectively derive" their sense from those uses in paradigm circumstances; the resulting connection between the past tense and memory is "constitutive," not "reductive" (141–42). From these theses, Teichmann attempts to tease out substantial claims as to what is and is not logically possible. On the one hand, a "backwards world" (where the direction of past to future coincides with the direction of effect to cause) is deemed logically impossible, owing to the causal nature of memory. On the other hand, the concepts of past and future meaningfully apply to a (causally regular) "creatureless world" because it is logically possible that a creature speaking a tensed language inhabit that world (180). (But

why couldn't the creature be injected "either way," so that the direction of its personal time (and memory) either does, or does not, coincide with the (predominant) direction of causation at the world?) Now, I ask: Are there general principles that support these claims as to how our concepts of past and future apply beyond the paradigm circumstances? When do "constitutive connections" have logical force? Teichmann does not say.

A second complaint has to do with the role of science. For Teichmann, the philosophy of time can be done independently of the physics of time. The overriding method for resolving problems in the philosophy of time is to analyze our temporal concepts as they occur in ordinary language and thought. This raises a question. What if features of our ordinary temporal concepts conflict with the scientific description of the world (as I think they do even with respect to Special Relativity)? Should we say that science has discovered that time does not exist (or, worse, that Special Relativity must be mistaken)? No—for it is part of our concept of time (as with natural kind concepts generally) that what time really is is to be discovered by science, even if these discoveries conflict (within limits) with our ordinary conception. Can Teichmann agree? Yes, if he draws a clear distinction between time, *as we conceive it,* and physical time, and claims only to be discussing the former. But, in fact, he seems to reject any such distinction. According to the book's final paragraph: to say that past, present, and future are fundamental "features of reality" just means, and can only mean, that the concepts past, present, and future, and the phenomenon of tensed talk, are "basic to our language" (184). Whither science as purveyor of fundamental features of reality?

I conclude with a sample argument of Teichmann's, and a response. Teichmann argues that positing durationless instants leads to distinctions without a "real difference," and that talk of durationless instants is therefore "senseless" or "incoherent" (120–21, vii). He supports this by considering the following case: Albert is told to synchronize his tea drinking with Bernadette's sandwich eating, so that at no time is he drinking when she is not eating, or vice versa. If we admit durationless instants, then Bernadette's eating either has a last instant, or it does not. But, Teichmann claims, even if we suppose that Albert starts when Bernadette starts, and drinks for just as long as Bernadette eats, there is nothing Albert can do to ensure that his drinking has a last instant just in case Bernadette's eating does. If durationless instants existed, there would be two things that Albert could (in principle) do; in fact, there is only one.

I am not convinced. Teichmann allows the idealization that the temporal boundaries of acts can be precisely determined. Consider the following idealization, which seems no more objectionable: acts divide into two kinds, those that do, and those that do not, have a last instant. Thus, suppose a "gulp" always has a last instant; a "sip" never does. This could be

discovered (in principle) because only sips, not gulps, can follow one another without a (finite) break in between (assuming both sips and gulps have a first instant). Now, the positing of durationless instants coincides with a "real difference" in what Albert can do. Suppose Bernadette's sandwich eating has a last instant. Then Albert can do what he is told by making sure his tea drinking finishes, not with a sip, but with a gulp.

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ARISTOTLE'S THEORY OF MATERIAL SUBSTANCE: HEAT AND PNEUMA, FORM AND SOUL. By GAD FREUDENTHAL. Oxford: Oxford University Press, Clarendon Press, 1995.

"Without heat," says Freudenthal, "Aristotle's world would be devoid of all good" (47). The reasons that this should be so turn out to be highly technical and in some ways uncomfortably idiosyncratic to Aristotle. In broad outline, Freudenthal argues that without heat as a kind of binding force, there would be no structured entities; without structured entities, there would be none of the immanent forms whose actual existence is required for the persistence of individual substances and the species to which they belong; and without individual substances and their species, there would be no actual flourishing or failing. Without heat, the world would be a sea of undifferentiated matter where questions of goodness and badness would have no place.

Fortunately, there is heat; and Freudenthal is keen to promote it as an overlooked central factor in Aristotle's theory of material substance. He begins in agreement with the many scholars who argue that Aristotle's theory of the four elements underdetermines the plain fact that there are organic substances which exhibit both synchronic and diachronic unity. He goes further than most, however, by arguing that left unaugmented Aristotle's account of the four basic elements would positively preclude the existence of these forms of unity. For Aristotle embraces the Presocratic picture of the four elements as engaged in "endemic strife" (12), so constituted that their natural propensities lead them to separate and dissolve rather than to unite and synthesize. Thus, for example, each of the four elements has a natural direction, which ought to result in fire and air ever moving upward and away from earth and water, which will move downward if unimpeded. Hence, as Aristotle himself recognizes (DA 416a6–9), some agent force is required to hold the four elements together when they are mixed.