Benjamin L. Curtis & Jon Robson. *A Critical Introduction to the Metaphysics of Time*. Bloomsbury 2016. 256 pp. $122.00 USD (Hardcover ISBN 9781472566850); $39.95 USD (Paperback ISBN 9781472566867).

A Critical Introduction to the Metaphysics of Time is a welcome addition to the Bloomsbury critical introductions series, as Curtis and Robson provide an admirably clear exposition of many intertwined debates concerning time that have occupied philosophers. In what follows, I outline the contents of each chapter, before turning to comments on the text.

Chapter 1 covers several early philosophical views concerning time stretching between the Pre-Socratic and Medieval periods. Arguments of Parmenides (5-7) and his student Zeno (7-10) against the possibility of time and motion are defended, with Plato's (10-11) and Aristotle's (12-13) respective theories of time offered as responses to the Parmenidean challenge. Discussion of Augustine's claim that the past and future are unreal closes the chapter (14-16). This chapter, and each subsequent chapter, is flanked by content summaries, and includes comprehension questions and suggestions for further reading. The early modern dispute over whether space and time are substantival—analogous to containers holding material objects—or relational—abstractions from relations among material objects (21)—is the fulcrum of Chapter 2. Descartes is defended as a Relationist and his theory of vortices introduced (25-8) as foil for Newton's clever bucket experiment (29) which is taken to undermine Cartesian motion. Newton is characterized as claiming that Substantivalism is the only explanation for the bucket experiment (28-9, 31-4), which is disputed by Leibniz who provides a Relationist explanation distinct from Descartes's (34-6). An outline of Kant's constitutive theory of space and time ends the historical survey (38-9).

Chapter 3 is devoted to McTaggart's argument against the reality of time, e.g. since time requires change, and change occurs in the contradictory A-series, time does not exist (43-4). McTaggart's notion of events undergoing change is distinguished from Russell's closely related notion of objects undergoing change (45). A-series and B-series are defined (47-8), McTaggart's claim that the A-series is contradictory is elucidated (48-50), and worries are raised for his reliance on events changing (50-2). A stronger version of McTaggart's argument, absent changing events, is introduced (54) and his claims that the A-series is essential to time (59) and contradictory (60-1), disputed. Chapter 4 examines quarrels between those claiming time is dynamic—A-theorists—and static—B-theorists. Moving Spotlight (67), Pure Becoming (70), and Serious Tenser (82) A-theories are introduced, and historically important objections raised, for example, hypertime and rate objections (70-2), as are more recent worries, for example, how would one know if they inhabited the objective present, and how would inhabiting the present explain commonsense intuitions concerning the flow of time (75, 77-9)? Serious Tenser views, which claim tense-talk of natural language tracks reality (68), are contrasted with B-theory attempts to translate tense-talk into tenseless sentences (82), truth-conditions (85), or facts (86). In Chapter 5, Presentism—the view that only the present exists—is contrasted with Eternalism—the view that the past, present, and future exist—and the dispute defended as substantive (91). Two versions of Presentism are distinguished, one requiring primitive tense operators (95) and one providing a reductive analysis of tense (100). The well-known truthmaker objection is leveled against Presentism (102, 104-5), followed by a lesser-known worry concerning the breadth of the presumed objective present (110): too thin and appearances of duration and change seem tough to explain; too thick and Presentism may collapse into Eternalism. Lastly, the Growing Block theory, which mixes an objective present with a static past, is contrasted with Eternalism and Presentism (111-2).

In Chapter 6, the possibility of an open future is scrutinized. Epistemic, modal, causal, and alethic notions of 'open' are distinguished, and alethic openness identified as most relevant: for some time t, there are propositions about the future relative to t that are neither true nor false at t (117). Denying that the future is alethically open suggests future events are necessary (119-20) or free choice is undermined (121), while accepting an open future conflicts with the principle of bivalence, that is, the view that every proposition is either true or false (121). Ways one might reject bivalence, or show bivalence to be compatible with an open future, are dismissed (123-5). Problematic consequences for Eternalism and Presentism on the assumption of an open future are considered (129-32). Chapter 7 examines Endurantism—the view that objects persist as wholly present at distinct times (136)—against the backdrop of versions of Lewis's problem of temporary intrinsics (137-8). Relativized and adverbial property responses to the problem are canvassed before turning to Perdurantism—objects persist as temporal parts occupying distinct times (140)—as providing a straightforward solution (141-4). Problematic fission cases for Endurantism's account of persons as certain wholly present objects and Perdurantism's account of persons as extended space-time worms motivate a discussion of Stage Theory—temporal parts are persons (146)—and its costs (147-9). The chapter closes with a consideration of the extent to which Perdurantism / Endurantism mixes with Presentism / Eternalism (150-3).

Chapter 8 begins by distinguishing the questions of how temporal experiences seem from how they are (157-60). Temporal experiences seem to: have duration (160-1), be of changes (161-2), and flow (162). Two options are considered for whether they are this way. The first, foreshadowed by Augustine (163-4), is Retentionalism—the view that temporal experiences are, despite appearances, momentary events (165)—according to which duration, change, and flow are explained by temporal experiences carrying traces of previous sensations (167-9). The second, foreshadowed by Locke (164-5), is Extensionalism—temporal experiences are accurate (170)—according to which temporal experiences reflect the duration, change, and flow of time (171-2). To what extent Retentionalism / Extensionalism combines with A-theory / B-theory / Presentism / Endurantism is reviewed (173), and the breadth objection to Presentism revisited (173-4). The penultimate chapter examines Lewis's argument for the possibility of time travel. Three putative paradoxes are discussed: a time travel version of the problem of incompatible properties (181), causal loops (182-3), and the grandfather paradox (184). The first and second are claimed mere oddities rather than impossible, while the last is claimed to rest on an equivocation (186-7). It is argued Presentism is incompatible with time travel (192), and sparring over whether this is correct occupies the remainder of the chapter (193-4). Lastly, Chapter 10 explores the relationship between the metaphysics of time and contemporary physics. An historical overview (198-202) and explications of Special and General Relativity are provided (203-10). It is suggested that contemporary physics vindicates Substantivalism (212-3) and that Presentism is incompatible with Special Relativity (213-5). This latter discussion is accompanied by responses which deny the incompatibility (215-6) or the truth of Special Relativity (217). Tension between relativity and quantum mechanics is taken to suggest time may not exist (218-9).

Turning to evaluation of the book, while there is certainly much to praise, a few critical points are worth making. First, early chapters move so quickly through certain historical figures whose views do not reappear that one wonders why, say, Kant (38-9), is discussed at all. Curtis and Robson anticipate this puzzlement (38), but their justification—'[Kant] is a towering figure'—is underwhelming. If Kant is to be included, he ought to be given equal attention and integrated better with other topics in the text. Similarly for Zeno (7-9) and Plato (10-11). Second, while discussing Newton (28) it is claimed from 'Material bodies undergo true motion' and 'If material bodies

undergo true motion they must move relative to absolute space that exists independently of any material body,' it follows by *modus ponens* that 'Absolute space exists independently of any material body.' However, what follows by *modus ponens* is 'Material bodies must move relative to absolute space that exists independently of any material body', and from this one may infer the claimed conclusion, but not by *modus ponens*. Third, while discussing the possibility of an alethically open future, Curtis and Robson claim that violating classical logic is a cost as it is 'employed' by 'the vast majority of philosophers' in their 'reasoning' (123). But classical logic is concerned with argument, not reasoning. Moreover, even if classical logic were concerned with reasoning, it is doubtful philosophers would employ *all* aspects of classical logic in their reasoning, e.g. principle of explosion. Better: *some* principles (e.g., bivalence) of classical logic *reflect* reasoning common among philosophers, and violating these principles is costly. Fourth, and related, in discussing how advocates of an open future might reject the principle of bivalence as applying universally, Curtis and Robson focus on the tactic of applying a third truth-value 'indeterminate' to future propositions (123-4). They then object that this tactic does not address the underlying metaphysical issue (125). While correct, the salience of this objection seems an artifact of how deniers of bivalence are presented, i.e. as merely introducing a formal tag 'indeterminate' to address a metaphysical problem. Surely, though, metaphysicians denying bivalence are aware that a formalism is only as good as what underwrites it. I suspect that, had more motivation for introducing a third truth-value been provided, deniers of bivalence would not have been so easily dispatched.

Quibbles aside, this is an invaluable intermediate-level introduction to contemporary philosophical issues concerning time. The clear and concise presentation of such a wide range of material is impressive, and Curtis and Robson maintain a happy balance between breadth and depth. As the main reading or supplement, students taking an advanced undergraduate or graduate course in the metaphysics of time would benefit immensely from careful study of this book.

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