Ulrich Meyer, *The Nature of Time*, Clarendon Press, 2013, pp. 176, £ 37.50, ISBN 9780199599332

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Meyer's book is both a valuable introduction to the classical topics of the debate in Philosophy of time and a well-articulated defence of the *modal view* of time, the thesis that time is a type of logical space.

The first three chapters criticise two traditional accounts of time, the so-called spatial views of time, namely temporal *substantivalism* and temporal *relationism.* Both substantivalism and relationism entail that space and time have a strongly related nature, and that times should be treated as we may treat locations in space. So, a theory of time should mirror a theory of space. Temporal relativism and substantivalism, however, disagree at the level of ontological commitment. A substantivalist holds that times are metaphysically basic entities, while a relationist builds times out of temporal relations.

Meyer argues against two main versions of relationism. On the one hand, he considers Whitehead's theory, according to which, times – that are called *abstractive classes* – are taken to be sets of events. The construction of times from sets of events simulates the construction of real numbers as equivalence classes of Cauchy's sequences on rational numbers. Abstractive classes, indeed, are nothing but infinite sequences of shorter and shortened events. This view, as Meyer correctly points out, seems to suggest that, in the world, every instant is made of infinitely many events, so "there could thus be events that occur without occurring at any time" (p.9). In a slogan, Whitehead's perspective ends up with too many events and not enough times. On the other hand, Meyer analyses Russell's relationism, which tries to avoid the difficulties affecting Whitehead's account by defining times as maximal sets of pairwise overlapping events. Meyer highlights that Russell's relationism shares with that of Whitehead two key ingredients. Both theories, indeed, entail that: (i) events are the primary component of times, and that (ii) events are metaphysically simple.

In chapter 2 Meyer argues against (i) and (ii). If events are primary entities, the before-after relation between times must depend on the overlapping relation among events. And what is far from clear, Meyer contends, is the topic of which properties the

overlapping relation should exemplify. Since relationists take events as metaphysically simple, moreover, they find it difficult to account for "numerous events, such as the repeated oscillations of an electron, that only differ in the time of their occurrence" (p.16). In chapter 3 Meyer analyses substantivalism, according to which times are primitive entities, the existence of which is independent of that of events. The author highlights that substantivalists can avoid the shortcomings affecting relationism. Substantivalism, however, seems to be at odds with a very intuitive principle, deeply rooted in the way we identify things, which is known as Leibniz's Indiscernibility of Identicals.

Chapter 4 provides some preliminaries needed for Meyer's modal account of time. As clearly stated by the author, a modal view of time is based on two main ingredients: tense operators – that is the temporal version of the usual modal ones – and a set of times. The metaphysical peculiarity of the proposal is what the author calls *tense primitivism,* according to which "all temporal notions are treated in terms of conceptually primitive tense operators". (p.39) The rest of the chapter recalls some basic notions about modal logic and its tensed version. Section 4.3 is particularly relevant as it defines the propositional version of the temporal logic Z (*Zeitlogik*), which Meyer adopts for his theory about the nature of time. As the author stresses, Z "is a minimal theory of time, according to which there is a very little to be known about time itself". (p.47)

Chapters 6 and 7 deal with two very important issues: how to define instants of time, and how to isolate the structure that best fits Meyer's view. The proposal is to adopt a *linguistic ersatzim* about time, that is, to consider instants as maximal consistent sets of sentences of the language of Z (recall that the sentences of Z may contain tense operators). In a Kripke model for modal logic, moreover, possible worlds are usually identified with maximal consistent sets of sentences. It is clear, then, what it means to take tense operators as primitive concepts over instants of time, and why instants can be seen as possible worlds.

Chapter 8 extends the notions introduced in chapter 4 to first order logic, leading to a quantified version of the tense logic Z. The distinctive feature of this part is the rejection of Prior's tensed account of reality, in favour of an *un*tensed reading of quantifiers. The topic of Chapter 9 is the role of the present moment with respect to past and future times. This is where we find one of the most original theses of Meyer's view, the rejection of *presentism,*

which is usually supported by most of the authors sympathetic with the modal account of time. The upshot of presentism is (P): "Nothing *exists* that is not present". (p. 88) The main argument against this view is the so called "triviality objection", which reduces (P) to two sentences that, as Meyer argues, are respectively trivial and false. In sum, presentism appears as a non-substantial thesis. If not presentism, then what? The answer is contained in the last section of the chapter, where Meyer explains why in many modal accounts the present time is treated as privileged. The author argues that the present can be considered as privileged just from a semantic point of view. Indeed, the present time is the only one which we may refer to using indexicals. However, as far as times are just maximally consistent sets of sentences, there is no reason to hold that the present is *metaphysically* privileged. So, Meyer concludes, "In this respect, time is quite similar to space. Just as there is no principled difference between *here* and other places, *now* is a time like all others" (p.99).

The remaining chapters face a decisive matter: whether a modal account of time is compatible with our best empirical theories. In particular, Meyer focuses on the so-called *inseparability argument*. According to many interpretations of the theory of relativity, any account that treats time as independent from space is deeply misleading. One of the most profound insights that Einstein's discoveries entail, advocates of the inseparability argument contend, is that spacetime is one, inseparable entity. And since Meyer's modal account involves time only, it seems to be at odds with the inseparable nature of spacetime. In Meyer's view, the inseparability argument has force only if one is a substantivalist (relationist) about both space and time. The solution suggested by the author is called the *hybrid view.* Its main thesis is that one can consistently assume a substantivalist view about space – as Newton's famous rotating buckets suggest – while being an advocate of a modal view about time. In order to satisfy the constraints imposed by the Theory of Relativity it is sufficient to relativize the behavior of tense operators to frame-independent, physical features (such as, for instance, the future light-cone and the past light-cone of an arbitrary point event). This topic concludes the book.

In sum, Meyer's work offers a wide insight into the main topics in Philosophy of time, and explores a new application of tense

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primitivism. *The nature of Time* is accessible reading and, in general, does not require a deep technical background.