Time and Modality

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Abstract: This chapter offers a brief overview of the main analogies between time and modality. The first part of the chapter is devoted to the analogy between presentism and actualism. The second part explores the analogy between non-presentist theories and possibilism. The third part discusses the analogy between temporal and modal persistence.

0 Introduction

Time and modality show remarkable similarities. Each of the most discussed theories in philosophy of time finds an analogous counterpart in modal metaphysics, suggesting that the parallel between the two notions is metaphysically deep. This chapter offers a brief overview of their analogies. Section 1 addresses the analogy between presentism and actualism. Section 2 explores the analogy between non-presentist theories and possibilism. Section 3 discusses the analogy between temporal and modal persistence.

1 Presentism and Actualism

In this chapter, I will treat *presentism* (Prior 1967; Hinchliff 1996; Markosian 2004; Ingram 2019; see also the chapter *Presentism and Eternalism* of this book) as the view that everything there is is present. The expression "there is," understood as the quantifier ∃, can be interpreted in two ways. If ∃ is taken as existentially *loaded*, "there is" becomes essentially equivalent to "there exists." If taken as *un*loaded, the quantifier carries no existential commitment, allowing the distinction between "there is" and "there exists" (a distinction that Meinongians consider crucial, as they believe that there are things that do not exist; see Bricker 2016: Section 1.6.3 for more details). When defining presentism, the quantifier is commonly interpreted as existentially loaded: presentism is understood as equivalent to the view that everything which *exists* is present. As frequently emphasized in the literature (see, among others, Stalnaker 1984: Chapter 3; Sider 2001: Chapter 2; Noonan 2019: 490-493), presentism has a modal analogue known as *actualism*, the view that everything there is is actual (Linsky and Zalta 1994; Menzel 1990; Adams 1974; Plantinga 1976). Assuming once again that the quantifier is existentially loaded, actualism can be equivalently formulated as the view that everything which exists is actual.

The presentist inventory of the objects inhabiting the temporal dimension includes no past or future entities, like dinosaurs or the first child born in 2050, for objects are taken to exist if and only if they are *presently* existing. Analogously, the actualist inventory of all the objects inhabiting the modal dimension includes no (merely) possible entities, like unicorns or talking donkeys, for objects are taken to exist if and only if they are *actually* existing. Presentism and actualism can thus be seen as two ways of articulating a more parsimonious ontology than the rivals.

It is no surprise, then, that presentism and actualism address the (alleged) limitations of such a minimalist ontology in a similar way. A common objection against presentism concerns the truth-makers for past-tensed propositions. If Socrates lacks existence, he cannot serve as the truth-maker for the proposition that Socrates was a philosopher. What entity, then, accounts for its truth? To address this issue, the presentist must demonstrate that reality possesses the inner resources to do without past entities. For instance, according to Bigelow (1996), the mereological fusion of all present entities instantiates primitive "Lucretian" properties, like *being such that Socrates was a philosopher*. It is the instantiation of these properties that serves as a truth-maker for the proposition that Socrates was a philosopher. Broadly speaking, the approaches in the literature usually involve either refining the ideology with new properties or enriching the ontology with present entities that stand proxy for past objects. These adjustments would allow presentists to recover all the required truth-makers without resorting to non-present objects.

Versions of actualism that are similar in spirit have been discussed in attempts to reconcile actualism with the simplest quantified modal logic (SQML), a logic that validates the Barcan (1946) formula:

(BF) $\Diamond \exists x \varphi \rightarrow \exists x \Diamond \varphi$

BF informally reads: "If it is (metaphysically) possible that there is an entity x such that φ, then there is an entity x such that possibly φ." Many actualists reject SQML in favor of a logic that invalidates BF. The reason is that, unless the actualist picture is appropriately expanded (further details shortly), BF turns out to have false instances. I have no daughter, yet it is possible that I have a daughter. It follows by BF that there is an entity that possibly is my daughter. However, given some plausible assumptions on the essentiality of origin, it seems that no actual entity can possess this property (Linsky and Zalta 1994: 436-437; Williamson 1998: 258). Another approach, which might be labelled *non-standard actualism*, preserves SQML by inflating the ontology with actually existing entities that stand proxy for (merely) possible objects. Linsky and Zalta (1994, 1996) and Williamson (1998, 2000), for instance, argue in favor of *contingently non-concrete* entities. Similar to abstract entities, such as sets and numbers, contingently non-concrete entities lack spacetime location. However, unlike abstract entities, which lack spacetime location necessarily, they only lack it contingently, allowing for a distinction based on their modal properties (Linsky and Zalta 1994: 446-447). The resort to these entities allows the actualist to preserve the truth of BF without appealing to non-actual entities. What makes the instance of BF discussed above true is a (contingently non-concrete) actual entity, which would have been my daughter if only it had been concrete.

2 Non-presentist Theories and Possibilism

Consider now the view that there are non-present objects. The first way to substantiate this idea is to allow for the existence of past and present entities, while rejecting future ones. This is essentially the picture of reality offered by the *growing block view*, where the present is the "edge" of an ever-growing universe (Broad 1923; Tooley 1997; Forbes 2016; Briggs and Forbes 2017; Correia and Rosenkranz 2013, 2018; see also the *Growing Block* chapter of this book). There was a time when dinosaurs, qua future entities, lacked existence. Over time, they came into existence, acquiring the property of being present. Upon their extinction, they joined the past, where they remain part of the ever-growing inventory of what exists. The second way to substantiate the view that there are non-present objects is called *eternalism*, the view that there are both past and future objects, in addition to present ones.

While presentism and the growing block view are naturally seen as dynamic views — according to which the flow of time is a genuine, mind-independent feature of the universe — eternalism comes in two forms: one dynamic and one static (for a detailed discussion, see the chapter *Presentism and Eternalism*). The dynamic interpretation is known as *moving spotlight view* (Broad 1923; Dummett 2004; Skow 2009, 2012; Deasy 2015; Cameron 2015). According to this view, the present "moves" along the temporal dimension, "shining upon" objects that are ontologically on a par. There was a time when dinosaurs lacked presentness, yet, as future entities, were as concrete as we are. They later transitioned into presentness and, upon extinction, into pastness. Throughout this process, however, the inventory of what exists remains unaffected: as time passes, no object comes into or goes out of existence (see the chapter on the *Moving Spotlight* for further details).

The static interpretation of eternalism is called *block universe view* (Smart 1949; Williams 1951; Quine 1960; Mellor 1998; Oaklander 2004; Le Poidevin 2007). According to this view, all objects are ontologically equal, yet no moment in time can be distinctly labelled as *the* present. Consequently, no moment can be deemed past or future in an absolute sense. The flow of time is nothing more than an illusion, so, strictly speaking, no object gains or loses the property of being present. Instead, each object is present, past, or future in a purely perspectival sense. We are present relative to us, past relative to the first child born in 2050, and future relative to dinosaurs.

Non-presentist theories like the growing block view and eternalism find their modal analogue in *possibilism*, the view that there are merely possible objects, that is, objects that are not actual. Assuming the quantifier ∃ is existentially loaded (more on this in due time), one way to substantiate possibilism is to conceive possible objects as *non-actual concrete entities*. This essentially leads to embracing some form of *concretism*. Things might have been different from the way they actually are. For example, donkeys might have been able to talk. It is thus contingently the case that donkeys are unable to talk. This is how things are in our world. Concretism posits the existence of other worlds, as concrete as the one we inhabit. In some of them, talking donkeys are physically realized. In technical terms, concretism is the view that possible worlds exist qua mereologically structured concrete particulars (Bricker 2001: 28).

Does each possible way things could have been correspond to (at least) one concrete world, or do some possibilities go unrealized? Some concretists, like David Lewis, argue in favor of a *plenitude* of worlds: the number of worlds is such that there are "no gaps in logical space; no vacancies where a world might have been, but isn't" (1986: 86). If we accept this thesis, the possibilist ontology is structurally analogous to the eternalist one: no possible world lacks (concrete) existence, mirroring how, within eternalism, every moment in time, whether past or future, is equally real. As we discussed earlier, eternalism can take two forms: static and dynamic. The static version maintains that no moment in time is metaphysically privileged, meaning none is absolutely present. Concretism is similarly understood as denying any privileged world: no world can be deemed, absolutely speaking, as *the* actual one. It is however possible to develop a version of the view that incorporates a primitive property of absolute actuality. Even if all worlds are ontologically equal, one can still be considered absolutely actual. In this respect, there is a strong similarity with the moving spotlight view, where among equally real moments in time, one stands out by instantiating a primitive property of absolute presentness. However, there is an important difference in terms of dynamicity. Presentness is supposed to move from one moment to the next, thus capturing the flow of time, whereas in the modal case there is clearly no parallel flow to capture. According to Bricker (2001, 2006), who defends a version of this view where more than one world can be absolutely actual, this form of concretism offers

interesting solutions to some issues in Lewis' modal framework, such as the problem of island universes.

If the plenitude of possibilities is instead rejected, the possibilist ontology aligns more closely with the growing block view. In this case, not every possible world is real, paralleling the idea that not every moment in time is real. However, once again, there is a crucial sense in which the analogy breaks down. The growing block view articulates the flow of time through an ever-changing, growing ontology: as time passes, new moments come to light, altering the inventory of what exists. As anticipated above, the same does not hold for possible worlds: there is no flow in the modal dimension, not even in a version of concretism supplemented with a property of absolute actuality, and thus no possible alteration of the number of worlds.

More generally, one could question the metaphysical tenability of these analogies by highlighting a significant difference in the *relationships* between moments of time and between possible worlds. According to Lowe, for instance, "the former [relations] put instants of time into a unique linear order not paralleled by any analogous linear ordering of possible worlds" (1986: 195), to the point that "time constitutes a dimension in a way that possibility does not" (p. 195). Lowe seems to make the following point. There is a fact of the matter about the "unique" position of each moment along the temporal dimension: each moment is literally earlier or later than another. An ordering can be recovered in the modal case as well, but not by virtue of genuine facts about the "unique" position of each world with respect to the others. Instead, it is recovered in terms of a particularly construed accessibility relation, which "seems […] at best merely a logician's fiction" (p. 197). Lowe's argument underscores a significant difference between time and modality, but whether this is sufficient to deny modality the status of a proper dimension is debated (Torrengo 2011; see also Over 1986). For a defense of the idea that ordering possible worlds based on their comparative similarity is all we need to regard modality as a proper dimension, readers can refer to Lewis (1973: Chapter 4; 1986: Chapter 1; a reply to Lowe within the framework of an indexical analysis of tense can be found in Dyke 1998: 98-99).

Before concluding this section, let us take a moment to discuss the assumption that the quantifier ∃ is existentially loaded. When defining presentism, as anticipated in Section 1, this assumption is generally accepted without much dispute. The assumption is similarly regarded by authors in modal metaphysics as a *defining* feature of actualism (Linsky and Zalta 1994: 436). However, differences emerge when comparing non-presentism and possibilism. While versions of non-presentism rejecting the existentially loaded reading have received virtually no attention, there has been some interest in corresponding versions of possibilism.

When discussing the metaphysical interpretation of the Barcan formula, for instance, Linsky and Zalta (1994: 435-436) observe that the possibilist, in contrast to the actualist, has two different readings at their disposal. The first one is in line with concretism: what makes BF true is the existence of a concrete object that satisfies the property of being my daughter in a possible world different from mine. The second reading, which stems from the assumption that the quantifier ∃ is existentially unloaded, allows the distinction between the quantifier and an (independently defined) existence predicate. In this version of possibilism, BF merely permits the inference that there is an object that possibly is my daughter; it does not warrant the conclusion that this object also exists (Linsky and Zalta 1994: 435).

3 Temporal and Modal Persistence

Much of the contemporary metaphysical debate centers around the issue of persistence over time: do material objects remain identical to themselves over time? If so, under what circumstances? Currently, at least three theories of persistence are available: endurantism, perdurantism, and exdurantism (for an in-depth discussion, see the chapter on *Persistence*). Each one of them has a counterpart in modal metaphysics. In this section, after briefly exploring them, we will see how they are extended to the modal case.

According to *endurantism*, material objects have no temporal parts; rather, they are *wholly present*, as three-dimensional wholes, at every moment at which they exist. Objects persist by being located, in their entirety, at different moments (Baker 2000; Zimmerman 1999; Hinchliff 1996). For example, consider Socrates, who was seated and is now standing. The three-dimensional whole we refer to as "Socrates" persists in virtue of his successive locations at one moment, m, and at a later moment, m'. While at m, Socrates instantiates the monadic property of being seated; while at m', he instantiates the monadic property of being standing. This means that one and the same entity undergoes real change, by gaining and losing monadic properties. In instantiating these properties, Socrates is fully located at every moment at which he exists. Although it is common to associate endurantism with the idea that ordinary objects have monadic properties, it is important to note that this is not a necessary aspect of the view. An alternative version of endurantism interprets what we typically take as monadic properties, such as *being seated* or *being standing*, as relations to moments of time: Socrates is not seated or standing *simpliciter*, but rather seated relative to m and standing relative to m'. Socrates is thus wholly present at m by instantiating the relation of being seated with m, and wholly present at m' by instantiating the relation of being standing with m' (Lewis 1986: 204).

Perdurantism characterizes ordinary objects as literally extended in time as they are in space. Specifically, they are defined as mereological fusions of instantaneous spatiotemporal parts — called "stages" — belonging to different moments (Quine 1950; Lewis 1986; Heller 1990). It is by being composed of such stages that objects can persist. Ordinary objects, in this view, are four-dimensional "worms," entities literally spread through time. Within perdurantism, the change Socrates undergoes from being seated to being standing is understood as mere *qualitative variation* of Socrates' stages. His current stage bears the property of being standing, while another stage, located at an earlier point of the worm, bears the property of being seated. All the stages are ontologically on a par: no matter how far in the past the seated stage is, it is just as concrete as the one currently standing.

Exdurantism shares with perdurantism the idea that there are mereological fusions of stages. However, while perdurantism identifies ordinary objects with the fusion of all their stages — the four-dimensional worm — exdurantism identifies ordinary objects with the stages themselves (Sider 1996, 2000, 2001; Hawley 2001; Varzi 2003). The term "Socrates" does not refer to the fusion of Socrates' stages, but rather to the current stage of the four-dimensional worm. Thus, all the stages that are earlier or later than the current one are not, as per perdurantism, past or future parts of Socrates, but rather past and future *counter*parts of Socrates. Socrates exdures by instantiating counterpart theoretic relations to other stages of the worm. Assuming that Socrates was sitting and is now standing, there is a stage, the one we name "Socrates," bearing the property of being standing. This stage is counterpart theoretic related to an earlier stage bearing the property of being seated.

This concludes the list of theories about temporal persistence. In analogy to the temporal case, as anticipated above, at least three theories of modal persistence are available (for all

the technical details, the reader can refer to Mackie and Jago 2022). In presenting them, we will dwell a bit more on the definition of concretism. As mentioned in Section 2, concretism treats possible worlds as mereologically structured concrete particulars. David Lewis (1986) offers a first way to fully articulate this idea, characterizing possible worlds as maximal mereological fusions of spacetime related objects. Two crucial points need emphasis: firstly, any material entity in a world must be spacetime related to *all* other things in that world; secondly, no entity can be spacetime related to another without *both* being part of the same world (Menzel 2023: Section 2.1.1). Taken together, these two theses ensure that no possible world overlaps with another; possible worlds are all spacetime disconnected (an informal proof can be found in Menzel 2023, n. 16).

Within Lewis' framework, material objects are *world-bound*, meaning they cannot be part of more than one world. Given that for a material object to exist is for that object to be part of a possible world, the commitment to world-boundedness leads to the rejection of *transworld identity*, where one and the same object exists in more than one world. I am part of this world and exist only in this world. But other equally concrete worlds contain *modal counterparts* of me. Intuitively, these counterparts are the modal analogue of the temporal counterparts posited by the exdurantist. A modal counterpart of me is a material entity situated in a world distinct from mine, sharing some significant features with me, much like a temporal counterpart of me is a material entity, located in the past or future, sharing certain salient features with me.

Lewis also adopted *mereological universalism*, the principle that for every plurality of objects, there exists their mereological fusion. Following mereological universalism, there exists a transworld fusion of me and all my counterparts. This fusion is analogous to the cross-temporal fusion of stages proposed by both perdurantism and exdurantism. It is a modally extended entity, just as the other is a temporally extended entity. In analogy with exdurantism, Lewis identifies ordinary objects with specific modal stages instead of the transworld fusions that encompass them.

According to Lewis, this framework allows for a reduction of modal facts to facts about worlds and their material inhabitants. For instance, the modal fact that I am a human being necessarily reduces to the fact that all my counterparts and I satisfy the property of being human. Similarly, the modal fact that I am a philosopher contingently reduces to the fact that I satisfy the property of being a philosopher, while some of my counterparts do not. The way material objects persist modally in this view parallels the way objects persist temporally according to exdurantism: objects persist modally by instantiating counterpart theoretic relations to entities located in other possible worlds.

Another view on modal persistence is presented in Yagisawa (2010). While Lewis sees the modal dimension as a pluriverse, where each world is the modal counterpart of the others, Yagisawa sees all worlds as "modal *parts* of one and the same *uni*verse" (pp. 44-45, emphasis mine). This idea extends to ordinary objects, which are identified with transworld fusions of modal parts, rather than individual modal stages. Ordinary objects are thus regarded as "modal worms," entities stretched out through modal space. They persist modally by having parts located in different worlds, just as they persist temporally, according to perdurantism, by having parts located in different moments. All their modal parts are ontologically on a par, equally concrete, no less than those we find in our world. These transworld fusions and the properties of the parts they comprise allow for a "reduction of modal facts to facts of modal dimensions" (p. 150). The fact that I am a human being necessarily is reduced to the fact that all my parts satisfy the property of being human. Similarly, the fact that I am a philosopher contingently is reduced to the fact that I

have a part in this world that bears the property of being a philosopher, while other parts do not.

A third interpretation of concretism, explored by McDaniel (2004), shifts the focus from fusions of objects, as in Lewis, to *regions of spacetime*: "possible worlds are maximally spatiotemporally related regions of spacetime" (p. 147). In Lewis' concretism, where worlds are maximal mereological fusions of material entities, all objects contained by a world are *ipso facto* mereological parts of that world. In contrast, if we define worlds in terms of regions of spacetime, then, technically, "an object can be contained by a world [...] without being a part of that world" (p. 147). In analogy with endurantism, material objects have no modal parts; they modally persist by being wholly present in every world in which they exist. In this framework, material "objects are literally present at more than one possible world" (p. 137), leading to genuinely overlapping worlds. A reduction of modal facts to facts about possible worlds can be offered by treating *being human* or *being a philosopher* as relations to possible worlds, in analogy with the second version of endurantism mentioned above (McDaniel, though, opts for a much more complex view of properties; see pp. 148-150). The fact that I am a human being necessarily reduces to the fact that I am a human being relative to all the maximally spatiotemporally related regions of spacetime in which I exist. Similarly, the fact that I am a philosopher contingently is reduced to the fact that I am a philosopher relative to this but not all the maximally spatiotemporally related regions of spacetime in which I exist.

In summary, no matter what theory of temporal persistence is embraced, a fully analogous theory of modal persistence will be available, supporting the idea that the similarity between the two notions is metaphysically robust. One might be tempted to invoke a fundamental *phenomenological* datum against these analogies: while we experience material objects moving from one moment to another, there is no equivalent impression of modal dynamism; no one experiences material objects moving from one world to another. Why not use this perceived difference as evidence that time and modality are metaphysically disanalogous? An objection along these lines can be found in Forbes (1983: 127, although he focuses on a more specific topic, namely, the indexical analysis of the term "actual"; see Yourgrau 1986: 413-416 and Dyke 1998: 99-100 for an in-depth criticism of his argument).

The problem with this line of thought is that it assumes precisely what a theory of temporal persistence disputes: unless *independent* reasons are offered for taking the phenomenological datum at face value, it is metaphysics that must determine whether we can trust our phenomenology, not the other way around. According to perdurantism and exdurantism, where *no* object literally moves from one moment to another, the only evidence offered by our phenomenology is that we commonly experience the *illusion* of movement (see the chapter *Temporal Experience and Cognitive Science*). If we cannot trust our experience to assess the presence of movement, it becomes difficult to justify its use in evaluating the analogy between time and modality. Even within a theory allowing objects to move through time, such as a form of endurantism coupled with the idea that objects instantiate monadic properties, one can only take our experience as evidence of a real, mind-independent feature of reality if there are underlying *metaphysical* reasons to believe that objects truly move. Pointing at the absence of an analogous phenomenology in the modal case, interesting as it is, is thus insufficient to conclude that time and modality are disanalogous. It is metaphysics that will have the last word in accounting for this perceived difference.

Further Reading

Embracing actualism while considering the theory of relativity and the grounding objection as reasons to reject presentism seems to pose no significant problems. Nina Emery ("Actualism without Presentism? Not by way of the Relativity Objection," *Noûs* 53: 963-986, 2019; "Actualism, Presentism and the Grounding Objection," *Erkenntnis* 85: 23-43, 2020) offers compelling reasons to doubt it. What lessons can we draw from the analogies between theories in spatial and temporal metaphysics when assessing the similarities between time and modality? The answer is discussed, among others, in Markosian ("Critical Study of Robin Le Poidevin, editor, Questions of Time and Tense," *Noûs* 35: 616-629, 2001). Timothy Williamson (*Modal Logic as Metaphysics*, Oxford: Oxford University Press, 2013) proposes replacing the debated presentism-eternalism and actualism-possibilism distinctions with the seemingly clearer temporaryism-permanentism and contingentism-necessitism distinctions. For an exploration of the analogy between time and modality within non-standard tense realism, see Fine ("Tense and Reality," in K. Fine, *Modality and Tense*, Oxford: Oxford University Press, pp. 261-320, 2005) and Iaquinto ("Modal Fragmentalism," *The Philosophical Quarterly* 70: 570-587, 2020).

Related Topics

Persistence — Antony Eagle
Presentism and Eternalism — Dave Ingram
Temporal Experience and Cognitive Science — Kristie Miller
The Growing Block — Fabrice Correia and Sven Rosenkranz
The Moving Spotlight — Ross Cameron and Daniel Deasy

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