



Processes and their modal profile

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Abstract

A widely debated issue in contemporary metaphysics is whether the modal profile of ordinary objects has to be explained in non-modal terms (that is, *Thesis 1*). However, how to solve such an issue with respect to occurrences – namely, processes and events – is a question that has been largely neglected in the current metaphysical debate. The general goal of this article is to start filling this gap. As a first result of the article, we make it plausible that, if *Thesis 1* holds for objects, then it also holds for processes and events. Then, we develop a metaphysical account of processes derived from Fine's (1999, 2022) suggestions, according to which a process is a variable embodiment that is manifested by different events at the different times it goes on – namely, *Thesis 2*. We raised *the challenge from the completion of a process* that asks the Finean account of processes to explain relevant modal features of processes in non-modal terms. As a second result, we argue that four initially plausible strategies for solving such a challenge fall short of solving it. As a third result, we show that the theory of variable embodiments Fine formulates for objects must differ from the theory of variable embodiments that aims to model processes. We conclude by investigating some revisions to a theory of variable embodiments that aims to model processes.

Keywords Process · Object · Variable embodiment · Rigid embodiment · Modality

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1 Introduction

The modal profile of an entity concerns the modal features such an entity has. Consider the *David* of Michelangelo: it is *necessarily* a statue, it is *possible* for it to lose some small parts without ceasing to exist, it *cannot* be spherical in shape. The previous claims express some of the modal features of the statue that compose its modal profile. A contemporary line in metaphysics, which counts Fine (2008) among its adherents, holds that the modal profile of an object stands in need of explanation – where such an explanation should not rely on modal facts. Call such a thesis “*Thesis 1*”.¹ If *Thesis 1* were successful, then it would provide a solution to long-standing challenges in metaphysics – e.g., the *grounding problem*.² Consider *David* the statue, and the piece of marble, call it “*Marble*”, it is made of. *David* and *Marble* are spatially co-located. We may even think that they are also temporally co-located throughout their existence. However, they have different modal profiles – viz., *David* is *necessarily* a statue and *cannot* be spherical in shape, while *Marble* is not *necessarily* a statue and *can* be spherical in shape. So, *David* and *Marble* appear to be different. But *David* and *Marble* share many of their properties. Specifically, they are spatially and temporally co-located, and they have the same worldly properties – as Fine (2008, p.102) puts it – viz., the properties that capture how they are in the world in question. The *grounding problem* is the problem of explaining, or grounding, the apparent modal differences between coincident objects that, nevertheless, share all their worldly properties. Now, if one succeeds in accounting for *Thesis 1* – viz., explaining the modal profile of an object in non-modal terms –, then one is also able to explain the modal differences between coincident objects, thereby solving the grounding problem. As it is clear from the accounts provided by, for example, Fine (2008) and Koslicki (2018), an account that provides a non-modal explanation of the modal features of ordinary objects, as well as a solution to the grounding problem, requires one to adopt a metaphysical account of objects that fixes at least partially their essence – what they are.

Rather surprisingly, and despite the great number of discussions on these issues, few philosophers, if any, have addressed these questions with respect to processes and events. However, processes and events are citizens of our reality, just as objects are; moreover, they possess modal features, just as objects do.³ For instance, according to some accounts of what an event is, it is an entity that has an end – that is completed. Moreover, it *cannot* continue after its end. Further, according to some accounts of what a process is, a process that is happening at a certain time *can* continue to happen at later times.⁴ So, if one adopts *Thesis 1* for objects, it does make sense to ask whether the modal profile of processes and events is to be explained in non-modal terms as well. Our goal in this article is to start filling this gap. Consis-

¹ Supporters of *Thesis 1* include Fine (1994, 2008), Oderberg (2007), Lowe (2008), Shalkowski (2008). Opponents of *Thesis 1* include Wildman (2021), Bovey (2022).

² See, e.g., Bennett (2004), Fine (2008), Koslicki (2008; 2018).

³ The modal profile of events is investigated in McDonnell (2016) who endorses a “coarse-grained, world-bound, anti-essentialist and counterpart-theoretic view of events” (2016, p.1293).

⁴ Such modal features will be clarified in Sect. 2.1 and 6.

tently with this, the first aim of the article is to make it plausible that, if *Thesis 1* holds for objects, then one is better off also accepting *Thesis 1* for processes and events. Thus, given such a result, one must also account for the modal features of processes and events in non-modal terms.

The second aim of the article is to sketch a specific metaphysical account of processes, and – given this account – to investigate how some of their relevant modal features can be explained in non-modal terms. Specifically, since *Thesis 1* has been supported by Fine (2008), the account we shall develop derives from suggestions elaborated by Fine himself (1999, 2022), and it holds that a process is a variable embodiment that is manifested by different events at the different times it goes on.⁵ Call this thesis “*Thesis 2*”.⁶ One can elucidate the notion of variable embodiment by considering a variable embodiment as an entity that is embodied, or manifested, by different things at different times. An initial reason to adopt *Thesis 2* is that it readily explains the claim that it is the same process that goes on over time. Indeed, if processes are variable embodiments, then it is the same process that goes on over time, because this process is a variable embodiment that is embodied by different events at the different times it goes on.

In what follows, we shall raise a challenge, called “the challenge from the completion of a process”, that asks the Finean account of processes as variable embodiments to explain relevant modal features of processes in non-modal terms. Our aim is to investigate solutions that make *Thesis 1* compatible with *Thesis 2*. Specifically, we shall examine and reject four initially promising strategies, including the solution Fine (2008) offers to explain the modal profile of objects, construed as combinations of variable and rigid embodiments, in non-modal terms. The results of this article are not only relevant because they constitute a challenge that the supporters of both *Thesis 1* and *Thesis 2* need to address. They also make it clear that Fine’s (1999, 2008) original theory of variable embodiments for objects must differ from a theory of variable embodiments that aims to model processes.

This article is structured as follows. In Sect. 2, we clarify the notions of process and event by relying on Stout’s distinction.⁷ In Sect. 3, we show that *Thesis 1* also holds for processes and events. In Sect. 4, we introduce Fine’s theory of embodiments and show how it models objects and processes. In Sect. 5, we raise the challenge from the completion of a process. In Sects. 6–8, we refute four strategies the theory of processes as variable embodiments can adopt to address this challenge. Finally, in Sect. 9, we examine the results achieved in this article.

⁵ While Fine (1999) holds that a process, conceived as a variable embodiment, is manifested by different states at different times, Fine (2022) suggests that an activity is a variable embodiment that is manifested by different acts, where acts may be temporally extended. In this article, in line with Fine (2022)’s suggestions and in agreement with, e.g., Steward (2013) and Stout (2016), we don’t differentiate between activities and processes. Then, we provide an account of processes as variable embodiments whose manifestations may be instantaneous states as well as temporally extended events.

⁶ For a different conception of processes as variable embodiments, see Guarino (2017). For a reply, see Galton (2019).

⁷ Stout (1997, (2016, 2018a, b; Fine, (2022).

2 Processes and events

In this article, we investigate the account according to which processes are variable embodiments whose manifestations are events – namely, *Thesis 2*. Such an account elaborates some of Fine’s suggestions (1999, 2022), such as the following:

Activities are to acts as processes are to events. Intuitively, an event or act is something that happens or occurs while a process or activity is something that is going on or occurring (Stout [1997]). [...] I should like to suggest that an activity be identified with a variable embodiment whose manifestations are particular acts. (Fine, 2022, p.27)

In what follows, we adopt a version of Stout’s (1997, Stout, 2016, 2018a, b) distinction between processes and events for the sole reason that this distinction is endorsed by Fine (2006, 2022).⁸ As we understand it, such a distinction does not provide a metaphysical theory of processes and events. Instead, it has to be underpinned by a specific metaphysical account.⁹

To begin, let us establish that processes and events are *occurrences*. For the aims of this article, we stipulate non-ambiguous ways of referring to processes and events, respectively. First, we fix that perfect gerundial nominals, such as “John’s crossing of the street”, pick out events, while imperfect gerundial nominals, such as “John’s crossing the street”, pick out processes. Second, there are gerundial nominals that are ambiguous between perfect nominals and imperfect nominals, such as “John’s walking to the station”. When this is the case, we stipulate that we will use gerundial nominals as nominals for processes, and the related derived nominals, such as “John’s walk to the station”, as nominals for events.¹⁰ To be clear, we do not use the previous expressions of natural language in their ordinary meaning, but as technical expressions that allow us to unambiguously speak about processes and events. So, it is not problematic that the technical uses of such expressions may be at odds with the ordinary language uses in some cases. With these stipulations in hand, let us introduce Stout’s distinction.

According to Stout (1997, Stout, 2016, 2018a, b), a process is an *on-going* occurrence – namely, it is a thing that is/was/will be happening at a certain time. Examples include John’s crossing the street that is happening at *t*. Moreover, as Stout claims, on-going processes may be happening not only at a moment of time, but over an

⁸ Stout’s Distinction (1997, 2016, 2018a, 2018b) is not the only view in the market. A rival view is adopted by Vendler (1957), Kenny (1963), Simons (1987). Another rival distinction is endorsed by, e.g., Mourelatos (1978), Crowther (2011), Hornsby (2012). Other views are adopted by, e.g., Galton & Mizoguchi (2009), and Galton (2019). We don’t presume that the starting points of this article are non-negotiable assumptions.

⁹ Such a distinction may be underpinned by different metaphysical accounts. For instance, Stout (1997, 2016, 2018a) holds that his processes persist by enduring – viz., by being wholly present at each moment at which they exist –, while events persist by perduring – viz., by being temporally extended and having different temporal parts at different moments of time. Against Stout’s (2016) arguments for this thesis, see Baratella (2022). According to the Finean account we suggest, processes are variable embodiments whose manifestations are events.

¹⁰ For more details concerning the features of the previous nominals, see, e.g., Bennett (1988, §§ 2–3).

interval of time, such as ‘the ongoing process of my giving a lecture this morning [...] that was happening for a certain period of time’.¹¹ Further, Stout holds that a process is an occurrence that is always going on and never comes to completion.¹² Finally, according to Stout, processes are the ontological correlates of sentences containing predications with a progressive aspect.¹³ An example of a sentence with a progressive aspect is “John was playing a tennis match at t ”. A sentence with a progressive aspect describes some occurrence that has started, is still going on at a certain time, but is not yet finished at that time.

Stout contrasts processes with events. According to his conception of event, an event is an occurrence that happened or will happen. Specifically, a Stoutian event is a completed occurrence with a beginning and an end. Examples include John’s walk to the station that happened yesterday. Moreover, Stout holds that events are the ontological correlates of sentences with a perfective aspect, such as “John wrote a letter in ten minutes”, that describes an occurrence that is a completed whole. Finally, for the aims of this article and differently from Stout (2018a, p.1), we do not require events to be extended in time. Specifically, for ease of presentation and following Kim (1976, p.34), we stipulate to extend the use of the term “event” to include, for example, John’s touching of the summit of K2 as well as Tom’s walk that happened from t_1 to t_n . Let us call instantaneous events like the former “states”. Both states and temporally extended events are ontological correlates of sentences with a perfective aspect, such as “John touched the summit of K2” and “Tom walked from t_1 to t_n ”, respectively.¹⁴

We think that Stout’s characterization needs revision in one key aspect. Stout (e.g., 1997, p.20) speaks of processes that may reach their end, or that may come to completion at a given time. Consider, for example, John’s walking to the station that comes to completion at time t_n . What is a process that comes to completion at time t_n ? First, as Stout (1997, p.20) holds, processes that may come to completion at a certain time are *accomplishment processes*, namely processes that are individuated by sentences that contain an accomplishment verb phrase – where accomplishment

¹¹ Stout 2018a, p.1.

¹² See Stout (1997, p.20; 2018b, p.212).

¹³ While some philosophers take the imperfective aspect to be the right aspect to be focused on in these cases (e.g., Steward 2012, 2013), Stout prefers to focus on the progressive aspect to exclude descriptions of habitual behavior, like “I go fishing on Sundays” (Stout, 2016, footnote 18; 2018a, footnote 1). However, it seems to us that predications with a progressive aspect can also describe habitual performances, like “Mary was baking cakes in those days”. Moreover, there are also predications with an imperfective aspect not marked by the progressive form that seem to describe on-going occurrences, like “John pushed the cart for hours”. For the aims of this article, we follow Stout, and we focus on the class of predications marked by a progressive aspect that intuitively describe on-going occurrences. But we acknowledge that processes may be also described by imperfective predications not marked by the progressive form.

¹⁴ According to Stout, events have a beginning and an end. Can there be events that last forever? Suppose an ideal subject that counts all the natural numbers. What kind of occurrence is this? If such an occurrence has the character of being on-going – namely, a counting that keeps going forever –, then it is likely a process according to Stout. However, suppose to consider this counting all the natural numbers from outside the time-structure – i.e., through the perfective aspect. Then, such an occurrence will be infinite in extension. Moreover, it will likely have a beginning and some sort of end. Indeed, it will be isomorphic to \mathbb{N}_0 . So, it seems a sort of Stoutian event. Thanks to a reviewer of this journal for having raised this point.

verb phrases have a culmination built in (e.g., “smoke a cigarette”).¹⁵ However, such a specification does not fully settle the previous question. Further understanding of such a kind of process can be achieved by considering the truth-conditions of sentences (1) and (2):

(1) The *same* process that was going on at t_i was also going on at the later time t_j .

(2) The *same* process that was going on at t_i came to completion at the later time t_n .

The truth-conditions of (1) and (2) must account for the meaning of the different tokens of “the same” in (1) and (2). In particular, one cannot rule out from the beginning that “the same” in (1) and (2) signifies numerical identity. So, the three most plausible interpretations of the two occurrences of “the same” in (1) and (2) are the following: (i) both occurrences signify numerical identity; (ii) “the same” in (1) signifies numerical identity, and it signifies some other kind of relation in (2); (iii) neither occurrence signifies numerical identity.

To prevent metaphysical bias from sneaking in a distinction between processes and events that intends to be pre-metaphysical, or at least compatible with different metaphysical accounts of processes and events, we suggest reformulating Stout’s characterization of process in a more general way along the following lines. First, we distinguish processes in on-going processes, such as John’s crossing the street that is happening at t_i , and processes that come to completion, such as John’s crossing the street that comes to completion at t_n , without excluding the possibility that a process that comes to completion is identical to some on-going process. Second, on-going processes are clarified according to Stout’s characterization. However, a process that comes to completion at t_n is not on-going at t_n . Moreover, it is the ontological correlate of a sentence with a perfective aspect. Further, corresponding to a process that comes to completion at a certain time, such as Tom’s walking to the station that comes to completion at t_n , there are two kinds of event. First, a temporally extended event identical to the walk done by Tom from t_1 to t_n ; second, a state at time t_n , such as the state of Tom’s being at the station at t_n . Whether the process of Tom’s walking to the station that comes to completion at t_n is identical to one of these two events depends upon which interpretation of “the same” in (2) is adopted. Specifically, if “the same” in (2) signifies numerical identity, then Tom’s walking to the station that comes to completion at t_n is identical to some on-going process, such as Tom’s walking to the station that was going on at a previous time t_i . Further, since on-going processes are numerically different from events, it follows that Tom’s walking to the station that comes to completion at t_n is different from any event, including the walk done by Tom from t_1 to t_n and the state of Tom’s being at the station at t_n . In this article, we adopt such a revised and generalized version of Stout’s distinction, and we suggest that what a process that comes to completion is, how it is connected to the related on-going process, and the corresponding events are issues that must be accounted for by a metaphysical theory that aims to underpin the suggested distinction between processes and events.

¹⁵ See Stout (1997) and Mourelatos (1978). In this article, we only focus on processes that are picked out by *standard* accomplishment verb phrases as those considered by Mourelatos (1978) – viz., we don’t take into consideration verb phrases like “count for more than one hundred” whose status is not clear.

2.1 On-goingness, completion, and their modal features

In this article, we only focus on accomplishment processes. Both on-going processes and processes that come to completion bear modal features. Consider processes that come to completion, such as the process of John's walking to the station that comes to completion at t_n . Such a process *cannot* continue to happen in the following moments, where the expression "can(not) continue to happen in the following moments" is a shorthand and technical expression for the more complex "can(not) be happening at some time beyond t_n or can(not) come to completion at some time beyond t_n ". This modal feature says something about what a process that comes to completion is: if a process comes to completion, it is not possible for that completed process to develop further. Such a possibility is plausibly metaphysical in character. Specifically, if a process has come to completion at a time, that process has completed its course of development, and so it is not metaphysically possible for such a completed process to continue to develop beyond that time. In Sect. 6, we shall clarify further such a modal feature. For the moment being, we provide its general formulation as follows:

(3) If a process comes to completion at a moment t_n , it *cannot* continue to happen in the following moments.

Let us consider on-going processes, such as the process of John's walking to the station that is happening at t_i . It is possible for such an on-going process to continue to happen beyond that time. The idea is that if a process is going on at a certain time, then such a process has not exhausted its course of development, and so it is metaphysically possible for it to develop further. It is worth stressing that the possibility in question is metaphysical in character. Indeed, suppose that the actual circumstances are such that John's walking to the station is happening while a comet is hurtling into the Earth. Suppose further that the comet will destroy the planet before John gets to the station. However, it is surely metaphysically possible for the on-going process of John's walking to the station to continue to happen beyond that time – for instance, because there is a possible circumstance in which the comet is destroyed by a missile. So, on-going processes bear the following modal feature:

(4) If a process is going on at a moment t_i , it *can* continue to happen in the following moments.

Let us briefly examine events.¹⁶ Stout characterizes events as things that happened or will happen, namely as occurrences that have a beginning and an end. Since an event e has an end, it is plausible to hold that event e cannot continue to happen after its end in the same way in which a process that comes to completion at time t cannot continue to happen beyond that time. For instance, the event of John's walk to the station that ends at t cannot continue beyond that time.

¹⁶ It is important to distinguish the way in which sentences with a perfective aspect describe something that is completed from the way in which accomplishment verb phrases have a terminus built in. Sentences with a perfective aspect, like "John wrote a letter in ten minutes", describe something that is completed. Accomplishment verb phrases – e.g., "smoke a cigarette" – specify an intended endpoint that may not be currently achieved – as when an accomplishment verb phrase enters into a predication with a progressive aspect.

3 Processes and events, and *Thesis 1*

Plausibly, if *Thesis 1* holds for ordinary objects, it also holds for processes and events. Fine (2008) motivates *Thesis 1* for objects by the following consideration. Consider two coincident objects, such as a statue and the lump of clay it is made of. They differ modally – e.g., the statue cannot, while the lump of clay can survive by being squashed. Now, if the modal profile of an object were not in need of explanation, Fine claims (2008, p.107), then the modal differences of these coincident objects would not stand in need of explanation. However, Fine holds, ‘it cannot simply be accepted as a brute fact that the one is possibly the way it is while the other not. There must therefore be an underlying nonmodal difference between them, one in virtue of which there is the modal difference’.¹⁷

By analogy, consider a temporally extended event, e.g., Tom’s walk to space-point p over the interval $[t_0, t]$, and the spatio-temporal co-located on-going process Tom’s walking to the shop at t . If the modal profile of these different occurrences were not in need of explanation, their modal differences – e.g., that Tom’s walk to space-point p cannot continue to happen, while Tom’s walking to the shop at t can continue to happen – would not stand in need of explanation either.¹⁸ However, on the face of it, the intuitive force for thinking that the modal differences between coincident objects stand in need of non-modal explanation is as strong as the intuitive force for thinking that the modal differences between ongoing processes and their related events stand in need of non-modal explanation. Hence, by analogy, the modal profile of processes and events also stands in need of a non-modal explanation. Moreover, suppose that the modal features of processes and events do not stand in need of explanation or that they could be explained in terms of modal facts. Then one will owe us an explanation concerning why, contrary to processes and events, the modal profile of objects stands in need of a non-modal explanation. Pending any argument to that effect, and given the previous analogy, we conclude that, if one adopts *Thesis 1* for objects, one is better off also accepting *Thesis 1* for processes and events.

4 The theory of embodiments

The theory of embodiments is called to account for how an entity is capable of having the parts it does, and the ways it has the parts it does.¹⁹ Specifically, as Fine (1999) claims, a ham sandwich possesses its parts timelessly – viz., it makes no sense to ask for how long the ham sandwich possesses the slices of bread that are its parts. However, a car has its parts temporarily – it does make sense to ask for how long the tires have been part of the car. The theory of embodiments is specified in two theories. The theory of rigid embodiments that deals with things that have their parts timelessly, and the theory of variable embodiments that accounts for the variation over time of

¹⁷ Fine 2008, pp.101–102.

¹⁸ Such modal features of on-going processes and events have been introduced in Sect. 2.1. They will be further clarified in Sect. 6.

¹⁹ For a formal semantics for Fine’s theory of embodiments, see Jacinto & Cotnoir (2019).

an entity. While Fine (1999, 2008) formulates his theory of embodiments primarily to account for the nature of ordinary objects, his theory of embodiments has been employed to account for other kinds of entity, such as processes, acts and actions, musical works, groups, intentional collectives as well as abstract things such as bodies of law.²⁰

4.1 The theory of rigid embodiments

According to the theory of rigid embodiments, a rigid embodiment is a *sui generis* kind of whole composed of some entities a, b, c, \dots that are modified or stuck together by a property or relation R they jointly possess. The relation R enters into the rigid embodiment by preserving its predicative role, and it is this feature that allows it to modify or stuck together the entities a, b, c, \dots . Let us designate a rigid embodiment by the term " $a, b, c, \dots/R$ ". Neither a rigid embodiment is identical to the mereological sum of a, b, c, \dots , nor is it identical to the mereological sum of a, b, c, \dots and R . Indeed, such mereological sums may exist even though the entities a, b, c, \dots are not related by R . Instead, it is key for a rigid embodiment to exist that a, b, c, \dots are related by R . As a consequence, the operation of composition for rigid embodiment signified by "/" is different than, and not reducible to, the standard operation of fusion "+". Further, it is a key feature of a rigid embodiment $a, b, c, \dots/R$ that it cannot vary its constitution – viz., a, b, c, \dots and R – over time without ceasing to exist. Moreover, following Fine (1999), let us call the entities a, b, c, \dots the "matter" of the rigid embodiment, and the relation R "the principle of the rigid embodiment". Fine formulates several principles fixing what a rigid embodiment is. In what follows, we only provide some of them relevant for our investigation – viz., those stated in (Fine, 2008, p.112) plus his principle of identity from (Fine, 1999). We keep Fine (2008)'s nomenclature of these principles.

(*Existence*) The rigid embodiment m/F exists iff m and F exist and m has F at some time.

(*Identity*) The rigid embodiment m/F and the rigid embodiment a/P are the same iff $m=a$ and $F=P$.

(*Temporality*) The rigid embodiment m/F exists at time t iff m/F exists, m exists at t and m has F at t .

(*Location*) The rigid embodiment m/F is located at position p at time t iff m/F exists at t and m is located at position p at t .

(*Parthood*) The thing x is part of m/F iff $x=m$ or $x=F$ or x is a part of m or x is a part of F .

While we take the previous principles to be clear enough not to deserve clarification, it is worth stressing that, according to Fine, 'all of these principles should hold

²⁰ Processes are modeled as variable embodiments in Guarino (2017) and Fine (2022). Acts and actions are accounted for in terms of Fine's theory of embodiments in Fine (2022). Musical works and bodies of law are accounted for by Fine's theory in Fine (1999). A version of Fine's theory of embodiments is used to model groups in Uzquiano (2018). Finally, his theory of embodiments is employed to model intentional collectives in Brouwer et al., (2021).

of necessity and should hold not merely of m and F that actually exist but also of any m and F that might exist'.²¹

4.2 The theory of variable embodiments

The key notion of the theory of variable embodiments is the notion of the principle of a variable embodiment. This principle is a function from times to things such that, for any time t the principle f is defined at, it picks out a thing x existing at t , and the principle f fails to pick out anything at the times it is not defined.²² Related to a principle f , there is a new thing, *the variable embodiment* $/f/$ of f that exists at those times at which the principle f is defined. Moreover, *the variable embodiment* $/f/$ of f at a certain time t is manifested by the thing f_t picked out by the principle f at t . Fine stresses that *the variable embodiment* $/f/$ is different from its principle f .²³ Fine formulates several principles governing the notion of variable embodiment. We only provide some of them relevant for our investigation.²⁴ We keep Fine (1999)'s nomenclature of these principles.

(V1) The variable embodiment $/f/$ exists at time t iff it has a manifestation at t – viz. iff the principle f is defined at that time.

(V2) If the variable embodiment $/f/$ exists at t , then its location is that of its manifestation f_t (assuming that f_t has a location).

(V3) The variable embodiments $/f/$ and $/g/$ are identical iff their principles f and g are identical.

(V4) Any manifestation of a variable embodiment at a given time is a temporary part of the variable embodiment at that time.

(V5a) If a is a timeless part of b that exists at t and if b is part of c at t , then a is a part of c at t .²⁵

(V7) The pro tem properties of a variable embodiment $/f/$ at a given time t are the same as those of its manifestation f_t ,

where the notion of pro tem property is defined by Fine (1999, p.71) and Koslicki (2008, p.80) as follows:

Definition 1 A property of a thing is a pro tem property if its holding at a time depends only upon how the thing is at that time.

I take the previous principles to be clear enough not to deserve clarification, except for (V7) and **Definition 1**. As Koslicki puts it, principle (V7) and **Definition 1** establish that 'a variable embodiment inherits those properties from its manifestations which depends only on "how the object is at that time" (whatever exactly that means)'.²⁶

²¹ Fine 2008, p.113.

²² Fine (1999, 2008, 2022).

²³ Fine 1999, pp.69–70.

²⁴ Fine 1999, pp.70–71.

²⁵ This principle links a variable embodiment with a rigid embodiment, and it is relevant for modeling objects. See below.

²⁶ Koslicki 2008, p.81.

For instance, suppose that an object o is modeled as the variable embodiment $/ff$. Then, $/ff$ will be red at a given time *iff* its manifestation is red at that time.

4.3 Objects as combinations of rigid and variable embodiments

Fine holds that ordinary objects, such as a car or a human body, are modeled by combining the two theories of embodiments: the theory of rigid embodiments that accounts for their mereological structure at a given moment, and the theory of variable embodiments that accounts for their variation over time. Specifically, an ordinary object, such as a car C , is a variable embodiment $/ff$ whose principle f is a function from moments of time to rigid embodiments that picks out, at any given moment t the variable embodiment exists, its corresponding manifestation at the given moment t , and it fails to pick out anything at any other time. Such a manifestation, call it " R_t ", is a rigid embodiment existing at the given moment t . Moreover, given (V4), this rigid embodiment existing at t is a temporary part of the variable embodiment $/ff$ at t . The rigid embodiment R_t provides the mereological structure of the car C at moment t via (V5a). For instance, in the given situation, rigid embodiment R_t that manifests car C at t will be the various parts of the car (e.g., the chassis, the engine, the gearshift) arranged in a specific car-wise manner. These parts and the specific car-wise manner of composition are timeless parts of the rigid embodiment R_t . By (V5a), they are part of car C at t .

This view explains the fact that car C changes its parts over time as follows. Car C is a variable embodiment $/ff$, its manifestation at t is rigid embodiment R_t that has an engine E as a timeless part. By (V5a), E is part of car C at t . Now, the manifestation of $/ff$ at a different moment t^* is rigid embodiment R_{t^*} that has a different engine E^* as a timeless part. By (*Identity*), $R_t \neq R_{t^*}$. Further, by (V5a), E^* is part of car C at t^* . So, the combination of the theories of embodiments explains how an ordinary object changes its parts by interpreting it as a variable embodiment whose principle selects different rigid embodiments at different moments of time.

4.4 Processes as variable embodiments

The thesis that processes are variable embodiments underpins the characterization of processes discussed in Sect. 2. As clarified in that Section, the reason why we adopted a version of the Stoutian distinction between processes and events is that this distinction is endorsed by Fine (2022) who, in turn, seems to suggest that processes are variable embodiments whose manifestations are events:

Activities are to acts as processes are to events. Intuitively, an event or act is something that happens or occurs while a process or activity is something that is going on or occurring (Stout [1997]). [...] I should like to suggest that an activity be identified with a variable embodiment whose manifestations are particular acts. (Fine, 2022, p.27)

In what follows, we sketch an account of processes as variable embodiments that is in line with Fine's suggestion. Specifically, a process like *John's walking to the station*

is a variable embodiment $/f/$. Its principle f is a function from moments or intervals of time to events – namely, for each moment or interval t this principle is defined at, it picks out an event exactly temporally located at t and it does not pick out anything at the times it is not defined. Without committing as to a specific metaphysics of events, we characterize them in agreement with standard conceptions.²⁷ First, events have their parts atemporally. This means that the first half of a football match is a part of the football match *simpliciter* – namely, the relation of parthood is not relativized to times. Second, an event x exactly located at period or moment t_1 and event y exactly located at a different period or moment t_2 are different; for instance, because x at t_1 is an initial part of y at t_2 . As a consequence, events are not variable embodiments. Indeed, events have their parts atemporally, while, given (V4), variable embodiments have their parts at a time.²⁸ As a further consequence, a process at the various times it exists will have different manifestations. Indeed, these manifestations are events, and events exactly located at different times are different.²⁹ Now, by (V1), if principle f is defined for an interval t , then the related process $/f/$ exists (or occurs) at interval t . Moreover, the manifestation of $/f/$ at interval t is event e , which is exactly temporally located at this interval t . Since by (V4) the event e that occurs at interval t is a temporary part of process $/f/$ and since event e is temporally extended, it follows that process $/f/$ is also temporally extended. Such facts allow us to stress two crucial differences between the conception of objects as variable embodiments and the theory of processes as variable embodiments. First, while the principle for objects only takes moments as arguments, the principle for processes also takes intervals as arguments. Second, while an object as a variable embodiment only exists at moments of time, a process as a variable embodiment also exists at intervals of time.

Now, as claimed in the Introduction, an initial reason for the adoption of such an account of processes – viz., *Thesis 2* – is that it readily explains the claim that the *same* process goes on over different times. For instance, consider a sentence like “John’s walking to the station was happening at t_1 and the *same* process was happening at t_2 ”. It is the same process that is happening at different times t_1 and t_2 because, if processes are variable embodiments, numerically the same process, identified with variable embodiment $/f/$, has different manifestations at different times t_1 and t_2 , where those different manifestations at t_1 and t_2 are different events.

Finally, such a view provides an account of what a process that comes to completion is, and how it is connected to the related on-going process and the corresponding events, namely the issue discussed in Sect. 2. A first attempt to capture the claim that

²⁷ For the following characterization, see, e.g., Dretske (1967, § 2), Quinton (1979, § 3), Simons (1987, § 4.1), Bennett (1988, § 46), and Stout (2016, § 2).

²⁸ Further, Fine (2022) compares events to acts and argues that at least some acts are rigid embodiments. It is worth clarifying that, in line with other widespread conceptions of processes and events, this account keeps distinct the relations of parthood and participation. Parts of processes or events are only other occurrences. Instead, participation is a relation that holds between processes or events and things, such as objects, that intuitively participate in an event or a process. For instance, if John walked to the station during interval $[t_1, t_n]$, John participates in his event of walk to the station, but neither he is part of the event, nor the event is part of John. This event has only other occurrences as parts. Such a widespread view is rejected by, e.g., Quine (1950, 1960, 1976, 1985) who identifies objects and the events they participate in. This Quinean view is investigated in Baratella (2020).

²⁹ Some of these events may not be cognitively relevant.

the *same* process p that was going on at t_i came to completion at the later time t_n may be through the following account. Process p is identical to variable embodiment $/f/$, where its principle f is defined for both moments t_i and t_n , where moment t_n is the last moment at which principle f is defined. So, according to such a view (specifically, by principle (V3)), “the *same* process p ” is understood in terms of numerical identity. However, such an account plausibly fails to distinguish between a process that comes to completion at moment t_n and a process that is interrupted at moment t_n , such as John’s walking to the station that was interrupted at t_n , when John was run over. Indeed, the last moment at which principle f is defined may correspond to the moment at which process $/f/$ comes to completion as well as the moment at which $/f/$ is interrupted – depending on whether p , that $/f/$ aims to model, is interrupted or comes to completion.

A second attempt involves the introduction of a *condition of completion* in the characterization of what a process that comes to completion is, which will be something like the following principle:

(*Completion*) A process p of kind K , conceived as a variable embodiment $/f/$, comes to completion at time t_n just in case: time t_n is the last moment its principle f is defined at, and the event e that is the manifestation of $/f/$ at t_n is of kind K^* (e.g., being at the station).

We leave it as an open question whether the *condition of completion* is a principle that must be added to the corresponding principle of variable embodiment $/f/$, or whether this condition is already included in the principle of variable embodiment. The answer to such an issue depends on how we clarify the nature of the principle of variable embodiments, and this issue does not pertain to such an article.³⁰ However, the introduction of (*Completion*) stresses a third difference between the conception of objects as variable embodiments and the account of processes as variable embodiments: the conception of objects as variable embodiments does not include any *condition of completion* for them.

Now, such a characterization not only allows one to distinguish between a process that comes to completion and a process that is interrupted. It also allows one to explain the relation between an on-going process and the related process that comes to completion – namely, the claim “the *same* process p that was going on at t_i , came to completion at the later time t_n ” – as the first attempt does. Specifically, process p is identical to variable embodiment $/f/$, where its principle f is defined for both time t_i at which $/f/$ is going on and time t_n at which $/f/$ comes to completion. Thus, according to such a framework (specifically, by principle (V3)), “the *same* process p ” is understood in terms of numerical identity. Moreover, given this view, process $/f/$ at a moment or interval is not identical to the event e that is picked out by its principle at the given time – indeed, event e is the manifestation of $/f/$ at such a time. So, the account of processes as variable embodiments sketched in this Section allows one to solve the issue discussed in Sect. 2.

³⁰ For such an issue, see, e.g., Evnine (2016, § 2.3.6).

5 The challenge from the completion of a process

Given the previous conception of processes as variable embodiments (namely, *Thesis 2*), we formulate a challenge that involves the modal features of processes introduced in Sect. 2.1. Specifically, suppose that the process *John's crossing the street* is happening at t . This means that *John's crossing the street* can continue to happen in the following moments. However, suppose that *John's crossing the street* comes to completion at moment t_n . Then, such a process that comes to completion cannot continue to happen in the following moments. The challenge from the completion of a process asks the Finean framework of processes to account for the following modal difference in such a way that *Thesis 1* for processes and events (namely, the thesis that the modal profile of processes and events stands in need of non-modal explanation) is satisfied:

(3) If a process comes to completion at a moment t_n , it *cannot* continue to happen in the following moments.

(4) If a process is going on at a moment t_i , it *can* continue to happen in the following moments.

In this article, we are interested in exploring solutions to the challenge that broadly respect Fine's (2008) methodology. Specifically, let us first assume that the modality involved in the challenge is metaphysical in character. Second, let us concede that there is the modal difference stated in (3) and (4). This assumption signifies that we reject any kind of determinism that would make (4) false. Third, let us assume that the modal difference between on-going processes and processes that come to completion is a genuine one. So, we won't consider deflationary responses to the challenge, such as the idea that these modal attributions are relative to how a process is described.³¹ Given such constraints, we examine four initially plausible strategies for solving such a challenge, and we show that they fall short of solving it.

6 The modal strategy

According to the modal strategy, the Finean account of processes explains the relevant modal difference between a process that comes to completion and an on-going process *in terms of possible worlds*. In order to formulate this strategy, let us fix the following key premise:

Plenitude The structure of possible worlds contains all the metaphysical possibilities.³² Specifically, it contains possible worlds in which process f comes to completion.

³¹ Given Fine's methodology, deflationary responses also include a broadly counterpart theoretic approach (Fine, 2003, 2008). While in this article we don't investigate whether a counterpart theoretic approach can make *Thesis 1* and *Thesis 2* compatible, we don't have any strong position in favor or against such an option to explain modal attributions in non-modal terms – supposing that compelling arguments in favor of *Thesis 1* can be provided. Thanks to a reviewer of this journal for allowing us to stress this point.

³² Lewis 1986 p.86.

Further, in agreement with a Finean framework, a premise that we adopt is **Transworld Identity**, namely the idea that, at least for some entities x and y , some distinct possible worlds w_1 and w_2 , x exists in w_1 , and y exists in w_2 , and x is numerically identical to y .³³

With the tool of possible worlds in hand, it is important to examine an objection that allows us to clarify the modal features expressed by (3) and (4). The objection holds that (3) is false. Specifically, since we are dealing with metaphysical possibilities, it is plausible to hold that the underlying modal logic is S5, namely that any possible world is accessible from any other possible world.³⁴ Then, if the actual world @ is a world where process p has come to completion at t_n , there is some possible world w in which p continues to happen after t_n – for instance, a world in which p has developed slower than it actually has. So, (3) is false and there is no asymmetry between the modal features of on-going processes and processes that come to completion.

To address this objection, let us call the world of reference fixed by the antecedent of (3) “the supposed actual world”. Now, the objection considers possibilities that are counterfactual with respect to what happened in the supposed actual world before or at time t_n fixed by the antecedent of (3).³⁵ Such an argument allows us to clarify the intended meaning of (3). If we were also willing to consider counterfactual possibilities with respect to what happened in the supposed actual world before or at time t_n , we would have said something like:

(3*) If a process comes to completion at t_n , it couldn’t have continued in the following moments,

where the consequent has the subjunctive form. The previous argument makes (3*) false. However, (3) differs from (3*) in that its consequent has the indicative form. We will use (3) to consider only those possible worlds that are not-counterfactual with respect to the supposed actual world up to time t_n . Specifically, given a claim like (3), we solely consider those possible worlds that are identical to the supposed actual world up to t_n . Since, in all these worlds, the process in question comes to completion at t_n , the consequent is true and so (3) is also true.³⁶ Thus, the previous objection does not apply to (3).³⁷ In the same way, with (4), one only considers those possible worlds that are identical to the supposed actual world up to t_i . Given **Plenitude**, there is some possible world in which the on-going process continues

³³ For this formulation, see (Mackie & Jago, 2022). Fine adopts Transworld Identity in, e.g., (Fine, 2008, p.113). Further, note that the assumption of Transworld Identity is incompatible with the adoption of a broadly counterpart theoretic approach. Thanks to a reviewer of this journal for allowing us to clarify this premise.

³⁴ System S5 imposes that the accessibility relation between possible worlds is reflexive, transitive and symmetric. Thanks to a reviewer of this journal for pushing us to reflect on this objection and allowing us to clarify the intended meaning of (3) and (4).

³⁵ The phrase “what *happened* in the supposed actual world before or at time t_n ” has a neutral meaning in this context: it signifies events, processes as well as objects existing up to t_n in that world.

³⁶ The suggested strategy is inspired by the distinction between supposing-as-actual and supposing-as-counterfactual that is discussed in, e.g., (Stalnaker, 2001; Chalmers, 2002; Yablo, 2002; Divers & González-Varela, 2013; Leech, 2021). Thanks to a reviewer of this journal for stressing such a distinction.

³⁷ The modal feature of events (Sect. 2.1) according to which if an event e ends at time t , e cannot continue beyond that time is clarified in the same way.

to happen after t_i . So, (4) is true. So, there is an asymmetry in the modal features between on-going and completed processes. Summing up: the consequent of (3) and (4) expresses not-counterfactual metaphysical possibilities with respect to the supposed actual world up to a certain time fixed by the antecedent. With that in mind, given the antecedent in (3) and (4), when we say in the consequent “there is some/no/every possible world”, we mean: “there is some/no/every not-counterfactual possible world with respect to the supposed actual world up to time t fixed by the antecedent”.

Given the previous assumptions and discussion, the content of (3) and (4) may be captured in terms of possible worlds and the Finean theory of processes as variable embodiments sketched in Sect. 4.4 as follows:

(3') If $/ff$ comes to completion at t_n in a possible world $@$, then there is no possible world w in which $/ff$ exists at t_n , and its principle f has a value for times later than t_n .

(4') If a process is going on at a moment t_i in a possible world $@$, then there is some possible world w in which $/ff$ exists at t_i , and the principle f has a value for times later than t_i .

Such a strategy fails. Specifically, this strategy accounts for the relevant modal features in (3) and (4) within Fine's theory of processes in terms of possible worlds. Now, an account of the given modal properties in terms of two or more possible worlds – as it is plausibly required in order to explain the truth of, for example, (3) – is an account that explains such modal properties in terms of basic modal facts. Thus, this strategy explains the modal features of processes construed as variable embodiments – namely, the features expressed by (3) and (4) – in terms of basic modal facts. Therefore, given such a strategy, *Thesis 1* is incompatible with *Thesis 2*. Given our willingness to make these theses consistent, we should look for other options.

7 The modal-essentialist strategy

The second strategy appeals to essences – call it “the modal-essentialist strategy”. This strategy explains (3) and (4) by (3'') and (4''), respectively:

(3'') It is in the essence of a process $/ff$ that if it comes to completion at t_n , then there is no possible world w in which $/ff$ exists at t_n , and its principle f has a value for times later than t_n .

(4'') It is in the essence of a process $/ff$ that if it is going on at t_i , then there is some possible world w in which $/ff$ exists at t_i , and the principle f has a value for times later than t_i .

This strategy has the form “ $E_x(Px \rightarrow \Diamond Fx)$ ”, where “ E_x ” is the essentialist operator “it is in the essence of x ”, and “ \Diamond ” is the operator of metaphysical possibility.³⁸ If the notion of essence is understood in modal terms, this strategy is incompatible with *Thesis 1*. So, suppose to adopt, e.g., Fine's primitivist account of essences.³⁹ The following argument suggests that “ $E_x(Px \rightarrow \Diamond Fx)$ ” is still a sentence that describes

³⁸ More precisely, the logical form of (4'') is “ $E_{/ff}(O(/ff, t_i) \rightarrow \Diamond(E!(/ff, t_i) \wedge \exists e f(t_{i+1})=e))$ ”, while the logical form of (3'') is “ $E_{/ff}(T(/ff, t_n) \rightarrow \neg \Diamond(E!(/ff, t_n) \wedge \exists e f(t_{n+1})=e))$ ” where “ O ” is the predicate for “being going on at”, “ $E!$ ” is the predicate for “exist at”, and “ T ” is the predicate for “being completed at”.

³⁹ See Fine (1994).

some kind of modal behavior of x . Thus, it is dubious whether this strategy is compatible with *Thesis 1*. Compare (4'') with sentence (5):

(5) It is in the essence of a process $/ff$ that if it is going on at t , then $/ff$ exists at t , and the principle f has a value for times later than t .

(5) is arguably false. It may very well be possible that $/ff$ is going on at t , and that it will be interrupted right after for any reason. So, it is false that the principle f has a value for times later than t . For instance, Mary's walking to the station was happening at t , when she was run over. Besides this fact, it is clear from this example that (4'') has a modal force that (5) does not possess. Specifically, in (4''), the essentialist operator interacts with the modal operator and the result is a modal-essentialist claim that expresses part of the modal-essential profile of the on-going process $/ff$ – where the modal-essential profile of a thing contains properties expressed by claims like (4'') in which a modal operator is embedded into an essentialist claim, while the pure modal profile of a thing contains modal properties expressed by claims in which a modal operator is not embedded into any essentialist claim.

Now, is the modal-essentialist strategy compatible with *Thesis 1*? One may hold that it depends on how *Thesis 1* is interpreted. *Thesis 1* may have a strong reading, according to which the modal-essential profile of x should be also explained in terms of facts that don't contain any modal feature. If this is the case, the modal-essentialist strategy is incompatible with *Thesis 1*. However, *Thesis 1* may have a relaxed reading, according to which only the pure modal profile of x should be explained in terms of facts that are non-modal. If this is the case, the modal-essentialist strategy seems compatible with *Thesis 1*.

However, it is possible to provide a reason for rejecting both the modal-essentialist strategy and the relaxed reading of *Thesis 1*. First, in the suggested strategy, the essentialist component of, e.g., (4'') does not play any explanatory role concerning the modal component. The reason is that its role amounts to that of stating a brute modal fact as "it is a brute fact about --- that..." does:

(6) It is a brute fact about a process $/ff$ that if it is going on at t , then there is some possible world w in which $/ff$ exists at t , and the principle f has a value for times later than t .

So, the essentialist component of (4'') does not explain the modal component, which in turn receives no explanation within the modal-essentialist strategy. Now, within such a strategy, the modal component of (4'') provides the analysis of the modal feature of on-going processes that is to be explained and that is expressed by (4). So, such a feature is still waiting to be explained in non-modal terms within this strategy – ditto for the case of processes that come to completion. Thus, the modal-essentialist strategy does not provide an explanation of the modal difference between on-going processes and processes that come to completion in non-modal terms.⁴⁰

Such a conclusion provides a motivation to reject the modal-essentialist strategy as well as the relaxed reading of *Thesis 1*. Specifically, this conclusion, derived from

⁴⁰ Wildman (2021) provides further motivations for the thesis that, given a modally loaded essentialist claim like (3'') or (4''), its essentialist component neither explains nor reductively defines its modal component.

the modal-essentialist strategy, contrasts with Fine's motivations for *Thesis 1*.⁴¹ Thus, to the extent that the relaxed reading of *Thesis 1* is compatible with the modal-essentialist strategy and its conclusion, it does not capture the intended meaning that it aims to express. So, this relaxed reading of *Thesis 1* must be rejected. Then, only the strong reading of *Thesis 1* is admissible. But the modal-essentialist strategy is incompatible with the strong reading. Hence, the modal-essentialist strategy makes *Thesis 1* incompatible with *Thesis 2*. Thus, both the relaxed reading of *Thesis 1* and the modal-essentialist strategy must be rejected.

8 The essentialist strategy

Given the results of Sect. 7, it is natural to investigate whether the challenge may be addressed by considering essentialist claims concerning processes or events that do not contain any modal operator. Indeed, this is the strategy Fine (2008) adopts for accounting for the modal profile of ordinary objects in non-modal terms. A key premise of Fine's strategy is that the principles that characterize rigid and variable embodiments from Sect. 4 fix, at least partially, the essence of rigid and variable embodiments. In what follows, we argue that Fine's account for explaining the modal profile of ordinary objects in non-modal terms cannot be applied to explain the modal profile of processes that are going on or that come to completion. Moreover, we examine and refute a further option based on principle (V7).

8.1 Fine's strategy from coincident objects

According to the Finean theory of objects as embodiments, ordinary objects, such as an alloy sphere, are variable embodiments. Fine explains the modal differences between coincident objects at a time t , such as our alloy sphere and piece of alloy, in terms of their different, yet coincident, rigid embodiments at t . The modal differences that are to be explained are the following: an alloy sphere is necessarily spherical, while the coincident piece of alloy at t is not. Fine begins by making the simplifying assumption that the alloy sphere and the piece of alloy are each a rigid embodiment. Then, he shows how his solution can be extended to the general case of objects as variable embodiments.

Fine explains the relevant modal character of the alloy sphere s and the piece of alloy p , conceived as rigid embodiments, in non-modal terms by relying on the principles of rigid embodiments together with other non-modal assumptions. Specifically, as we understand his argument (2008, p.113), one of Fine's key premises is that the principles of rigid embodiments characterize the essence of any rigid embodiment. Then, given the thesis that essentialist truths entail corresponding necessary truths, he holds that these principles 'should hold of necessity and should hold not merely of m and F that actually exist but also of any m and F that might exist'.⁴²

⁴¹ For this motivation, see Sect. 3.

⁴² Fine 2008, p.113. For Fine's principle that essentialist truths entail corresponding necessary truths, see Fine (1994, 2005, p.7), and also Wildman (2021, § 1). Whether all necessary truths can be explained in

Moreover, another Finean premise (2008, p.113) is that being of a certain shape is a matter of location. Fine (2008, pp.113–114) argues that his account satisfies *Thesis 1*. Indeed, this explanation is based on principles governing rigid embodiments together with some non-modal assumptions concerning the notions of shape and location. As Fine holds (2008, p.114), such principles have modal consequences, but they are not themselves modal. Thus, this solution satisfies *Thesis 1*. Or, so, Fine holds.

Given this conclusion, Fine (2008, pp.115–116) accounts for the modal differences of coincident objects in the general case, where the alloy sphere and the coincident piece of alloy at t are conceived as variable embodiments $/s/$ and $/p/$, respectively. Specifically, according to Fine:

A variable embodiment will be like its manifestations—existing at just those times at which it has a manifestation and, given that it exists at a particular time, being exactly where the manifestation is at that time [...]. If an alloy sphere, more realistically conceived, is taken to be a variable embodiment of rigid embodiments of the form a/S , we can then show how an alloy sphere will necessarily be spherical in shape whenever it exists. We can likewise show how a piece of alloy, more realistically conceived, will necessarily be of a piece—and thereby explain the modal difference between the alloy sphere and the piece of alloy.⁴³

We reconstruct Fine's argument as follows. The first premise is that the principles (V1)–(V7) that characterize the nature of variable embodiments hold of metaphysical necessity. The second premise is that $/s/$ will necessarily have manifestations of the form a/S whenever it exists.⁴⁴ Now, Fine showed that the location of each a/S is spherical in any world and time it exists. By (V2), the location of $/s/$ is the location of its manifestation a/S in any world and time $/s/$ exists. Since Fine (2008, p.113) assumes that being of a certain shape is a matter of location, $/s/$ will necessarily be spherical in shape whenever it exists. By the same reasoning, it follows that the piece of alloy $/p/$ will necessarily be of a piece whenever it exists, but that it is possible for it not to be spherical. Hence, Fine explains the modal differences between coincident objects in non-modal terms, and so *Thesis 1* is satisfied for objects.

The account Fine formulates for explaining the modal profile of objects cannot explain the modal profile of on-going processes and processes that come to completion. The reason is that the case of objects concerns spatial properties such as *being spherical* and *being of a piece*. Consequently, the premises that Fine adopts concern the spatial domain – namely, the premise that being of a certain shape is a matter of location and principle (V2) that fixes the spatial location of variable embodiments. Such premises – and in particular principle (V2) – cannot play any role in accounting for the challenge from the completion of a process because this challenge concerns

non-modal terms is an open question – see, e.g., Wildman (2021) and Bovey (2022).

⁴³ Fine 2008, p.116.

⁴⁴ Such a premise is an instance of Fine (1994, 2005, p.7)'s principle that essentialist truths entail necessary truths: if it is in the essence of $/f/$ that it has manifestations of the form a/S whenever it exists, then it is necessary that $/f/$ has manifestations of the form a/S whenever it exists.

temporal properties, namely *continue to happen in the following moments*, as it is clear from sentences (3) and (4):

(3) If a process comes to completion at a moment t_n , it *cannot* continue to happen in the following moments.

(4) If a process is going on at a moment t_i , it *can* continue to happen in the following moments.

Thus, the strategy Fine adopts to account for the modal profile of objects, conceived as variable embodiments, cannot be employed to account for the modal profile of processes, conceived as variable embodiments. Such a fact means that, if both objects and processes are variable embodiments, the theory of variable embodiments captures the respective nature of objects and processes in different ways, and so that their nature is different. Now, the fact that the Finean strategy for explaining the modal profile of objects in non-modal terms fails to explain the modal profile of processes in non-modal terms does not entail that the modal profile of processes cannot be accounted for in non-modal terms by relying on other principles that govern variable embodiments. In what follows, we argue that principle (V7) cannot be employed to account for the modal features expressed by (3) and (4) in non-modal terms.

8.2 The irrelevance of V7

We now show that the modal features of events and principle (V7) cannot be employed to account for the relevant modal difference between on-going processes and processes that come to completion. Specifically, in Sect. 2, we used the term “event” to cover both temporally extended events and instantaneous states. Temporally extended events are *completed occurrences* with a beginning and an end. Suppose that, in the actual world, there is a completed walk to the station that ends at time t . As claimed in Sect. 2.1, such a walk to the station cannot continue to happen beyond t . In Sect. 6, we clarified the previous claim as meaning that we solely consider those possible worlds that are identical to the supposed actual world up to moment t . Since, in all those possible worlds, the event in question ends at t , it is true that that walk to the station cannot continue to happen beyond t . Thus, given a temporally extended event, it neither continues to happen at moments later than its end, nor can it continue to happen at those later moments. Consider, now, instantaneous states. Since a state is instantaneous – viz., it happens only at a moment –, it neither continues to happen at moments later than the moment at which it occurs, nor can it continue to happen at those later moments. Thus, either way, events cannot continue to happen at moments later than the last moment they occur at.

Now, on-going processes and processes that come to completion have events as manifestations. Thus, the event e that is the manifestation of a process $/p/$ going on at time t cannot continue to happen at moments later than t . So, the manifestation e of the on-going process $/p/$ cannot ground $/p/$'s modal profile, according to which $/p/$ can continue to happen in the following moments. In turn, this means that principle (V7) cannot be employed to account for the modal profile of on-going processes.⁴⁵

⁴⁵ A different objection against the use of (V7) in this context may be the following. (V7) is only about prototypical properties of variable embodiments. But presumably one may think that the modal profile of a process

Hence, the modal features of the manifestations of on-going processes and processes that come to completion cannot ground their modal differences – let alone ground them in a way that *Thesis 1* is satisfied. This result contrasts with Fine's solution for coincident objects, according to which the modal differences of coincident objects as variable embodiments are derived from the modal differences of their manifestations.

9 Concluding remarks

The question of whether the modal profile of processes and events stands in need of non-modal explanation is an issue that has been largely neglected in the current metaphysical investigations. As already stated, this article intends to start filling this gap. As a first result, we argued that, if one adopts *Thesis 1* for objects, it is plausible for they to accept *Thesis 1* also for processes and events.

Then, we developed a metaphysical account of processes derived from Fine's (1999, *forth*) suggestions, according to which a process is a variable embodiment that is manifested by different events at the different times it goes on – viz., *Thesis 2*. We raised *the challenge from the completion of a process* that asks the Finean account of processes to explain relevant modal features of processes in non-modal terms. Specifically, that if a process is going on at a moment t_i , it *can* continue to happen in the following moments, and that if a process comes to completion at a moment t_n , it *cannot* continue to happen in the following moments. As a second result, we argued that four initially plausible strategies for solving such a challenge fall short of solving it. Crucially, we showed that Fine's (2008) strategy for explaining the modal profile of objects in non-modal terms fails to explain the relevant modal features of processes in non-modal terms. Thus, such a challenge poses a problem that the advocates of *Thesis 1* and *Thesis 2* need to solve.

As a third result, our investigations showed that a theory of variable embodiments that aims to model processes as well as to solve *the challenge from the completion of a process* needs to be revised in at least two respects with respect to the original theory of variable embodiments devised to model ordinary objects. The first revision concerns principle (V7). As discussed in Sect. 8.2, principle (V7) cannot be employed to account for the modal profile of processes in non-modal terms. So, one natural reaction is to specify or modify such a principle when the theory of variable embodiment is used to model processes. The second revision concerns the principle of variable embodiments. The principle of variable embodiment used to model processes differs from the corresponding principle used to model objects in two crucial features. The first feature is that the principle of variable embodiment for processes has moments as well as intervals of time as inputs. However, the corresponding principle used to model objects only has moments of time as inputs. The second feature is related to the fact that accomplishment processes may come to completion. As discussed in Sect. 4.4, it is plausible to introduce a *condition of completion* in the characterization of what a process that comes to completion is. Nothing similar holds

is a non-pro tem property of it, in which case (V7) is irrelevant. Thanks to a reviewer of this journal for suggesting me this point.

for the characterization of objects, conceived as variable embodiments – indeed, they do not have an intended point of completion. Finally, it is worth stressing that the strategies so far considered do not license the conclusion that no other strategy can be designed that solves the challenge in such a way that *Thesis 1* will be compatible with *Thesis 2*.⁴⁶ Instead, we suggest that, if any of these strategies were to be found, it would likely involve a detailed investigation concerning the plausibility of the principles that make up Fine’s theory of essence. But this is the proverbial story for another time.

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⁴⁶ One may think that the *condition of completion* discussed in Sect. 4.4 offers a solution to the challenge. Consider a process like *John’s crossing the street*. This process is happening at time t_i , and it comes to completion at moment t_n . One difference between the process that comes to completion at moment t_n (in comparison to the same process that is happening at time t_i) is that the *condition of completion* is satisfied at t_n (while the *condition of completion* is not satisfied at t_i). Such a fact amounts to a non-modal difference between on-going processes and processes that come to completion, and it seems to be explanatorily relevant for the modal difference in question. (I) *John’s crossing the street* at t_i can continue to happen at later times *because* the relevant condition of completion is not satisfied at t_i . (II) *John’s crossing the street* at t_n cannot continue to happen at later times *because* the relevant condition of completion is satisfied at t_n . If such claims were explanatorily acceptable, *the challenge from the completion of a process* would be solved. However, the *condition of completion* alone cannot play the desired explanatory role. Consider, for instance, (I). Why is the fact that the relevant *condition of completion* of the on-going process at t_i is not satisfied at t_i the source, or the ground, of the modal fact that this process can continue to happen at later times? In other words, why is the fact that the relevant *condition of completion* is not satisfied at t_i the source of the fact that there is a possible world in which the process continue to happen at later times? Without a principled answer to such questions, sentence (I) does not provide any adequate explanation. It only states a brute fact. Nor can it be an option to appeal to the principle of **Plenitude**, according to which there is such a possible world. Indeed, if so, the explanation would rely on modal facts. Now, a strategy that may be promising to explore is whether the *condition of completion* and the Finean theory of essence can provide the desired explanation. However, this strategy involves an in-deep investigation about the plausibility of the Finean theory of essence, but this issue does not pertain to such an article. Thanks to a reviewer of this journal for inviting me to consider this point.

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