



A continuist formulation of Hirai's multimescale interpretation of Bergson's theory of memory

Kourken Michaelian^{1,2} · Doudja Boumaza¹

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Abstract

The aim of this paper is to answer the question whether Bergson's theory of memory (BTM)—or, more precisely, Hirai's multimescale interpretation of BTM—is compatible with or can be rendered compatible with continuism about memory and future thought. It would appear, at first glance, that the answer to this question is bound to be negative. Continuism, on the one hand, holds that memory and future thought are both forms of imagination and thus that there is no fundamental difference between them. BTM, on the other hand, holds, as Hirai interprets it, that both remembering and future thinking involve constructing an image but that the construction involved in remembering, in particular, targets an experience preserved in pure memory; because there is no future-orientated analogue of pure memory, it would appear that BTM is bound to treat future thoughts as differing fundamentally from the image memories that result from construction in the case of remembering. BTM would therefore appear to be incompatible with continuism. The paper will nevertheless argue that this appearance of incompatibility is misleading: BTM can, in fact, be rendered compatible with continuism if a certain presupposition pertaining to the accessibility of durations located at different timescales is rejected. The thesis of the paper, in short, is that a continuist formulation of Hirai's multimescale interpretation of BTM is coherent.

Keywords Bergson · Memory · Imagination · Continuism · Discontinuism

✉ Kourken Michaelian
kourken.michaelian@univ-grenoble-alpes.fr

Doudja Boumaza
boumazadoudja@gmail.com

¹ Centre for Philosophy of Memory, IPhIG, Université Grenoble Alpes, Grenoble, France

² Institut Universitaire de France, Paris, France

1 Introduction

The aim of this paper is to answer the question whether *Bergson's theory of memory* (BTM) (Bergson, 1911)—or, more precisely, Hirai's multitemscale interpretation of BTM (Hirai, *in press*; cf. Hirai, 2022; Taniguchi et al., 2025)¹—is compatible with or can be rendered compatible with *continuism* about *episodic remembering* (remembering the events of the personal past) and *episodic future thinking* (imagining the events of the personal future).² It would appear, at first glance, that the answer to this question is bound to be negative. Continuism, on the one hand, holds that memory and future thought are both forms of imagination and thus that there is no fundamental difference between them (Michaelian et al., 2024; Rudnicki, Michaelian & Álvarez, *forthcoming*). BTM, on the other hand, holds, as Hirai interprets it, that both remembering and future thinking involve constructing an image but that the construction involved in remembering, in particular, targets an experience preserved in *pure memory*; because there is no future-oriented analogue of pure memory, it would appear that BTM is bound to treat future thoughts as differing fundamentally from the *image memories* that result from construction in the case of remembering.³ BTM would therefore appear to be incompatible with continuism. The paper will nevertheless argue that this appearance of incompatibility is misleading: BTM can, in fact, be rendered compatible with continuism if a certain presupposition pertaining to the accessibility of durations located at different timescales is rejected. The thesis of the paper, in short, is that a continuist formulation of Hirai's multitemscale interpretation of BTM is coherent.

The paper is structured as follows. Section 2 provides background on the continuism-discontinuism debate, the related but distinct causalism-simulationism debate, and the continuist and simulationist interpretation of BTM developed by Hirai in recent work (2025), and Sect. 3 provides a reconstruction of Hirai's multitemscale interpretation of BTM. Section 4 then argues that multitemscale BTM, as reconstructed in Sect. 3, can be rendered compatible with continuism about the relationship between episodic remembering and episodic future thinking and considers whether BTM can likewise be rendered compatible with continuism about the relationship between episodic remembering and *episodic counterfactual thinking* (imagining counterfactual personal past and future events). Section 5 concludes and sets out two open questions.

¹ Our focus here is specifically on Hirai's interpretation of BTM. For general background on Bergson on memory, see Ansell-Pearson (2010); Perri (2017); Sinclair (2019); Vrahimis (2022).

² While Bergson himself did not use the term "episodic memory" (which was coined relatively recently [Tulving 1983; see Andonovski & Michaelian 2025]), we will follow Hirai and other contemporary readers of Bergson in assuming that the form of memory on which he focussed—"true memory"—is equivalent to episodic memory as it is now understood.

³ "Pure memory" and "image memory" are defined in Sect. 2.3.

2 Bergsonism, continuism, simulationism

This section provides background on the *continuism-discontinuism debate* (Sect. 2.1), the *causalism-simulationism debate* (Sect. 2.2), and the continuist and simulationist *interpretation of BTM* developed by Hirai (2025) (Sect. 2.3). Given the aims of the paper, the need to review the continuism-discontinuism debate will be obvious. The need to review the causalism-simulationism debate arises because the two debates have been intertwined in such a way that an understanding of the continuism-discontinuism debate presupposes an understanding of the causalism-simulationism debate. And the need to review Hirai's interpretation of BTM arises because Michaelian (2025) has argued that Hirai's argument for the view that BTM is compatible with continuism and therefore with simulationism fails; identifying the reason for this apparent failure will enable us to identify the key difficulty that any proposed continuist interpretation of BTM will need to overcome.

Before proceeding, a remark on the dialectical situation is in order. Hirai (2025) argues, on the ground that it sees both remembering and imagining as drawing on the same *image materials*,⁴ that BTM is a continuist theory. Michaelian (2025) argues, on the ground that Hirai's argument overlooks the fundamental difference between remembering and imagining that is entailed by the role of pure memory in remembering, that Hirai's argument fails. Hirai and Michaelian's exchange is reviewed below, but it should be noted at the outset, first, that the argument for the view that a coherent continuist BTM can be formulated that is developed in this paper is distinct from Hirai's argument for that view. It should be noted, second, that the argument that is developed in this paper is compatible with Michaelian's claim that Hirai's argument fails to show that BTM is a continuist theory but not with Michaelian's claim that BTM is necessarily committed to discontinuism. The situation, then, is the following: if the argument that is developed in this paper succeeds, then it is possible to formulate a coherent continuist BTM even though the fact that BTM sees memory and imagination as drawing on the same generic images does not imply that it is a continuist theory.

2.1 The continuism-discontinuism debate

Continuism is, as noted above, the claim that there is no fundamental difference between episodic remembering and episodic future thinking—that both are instances of episodic imagining, differentiated only by their distinct temporal orientations (e.g., Michaelian, 2016a). *Discontinuism* is simply the negation of this claim (e.g., Perrin, 2016). There is considerable empirical evidence in favour of continuism. That evidence, however, is not decisive (Perrin & Michaelian, 2017). Thus, the continuism-discontinuism debate, which was initially inspired by psychological research on memory and future thought as comparable forms of mental time travel,

⁴ "Image materials" is defined in Sect. 2.3.

has—though psychologists have occasionally explicitly taken sides in it (e.g., Addis, 2020)—unfolded largely within philosophy.

While some philosophers (Robins, 2020; Sant’Anna 2021) have attempted to shift the focus of the debate to the relationship between remembering and imagining understood as attitudes (attitudinal [dis]continuism), the focus has, for the most part, been on the relationship between remembering and imagining understood as cognitive processes (metaphysical [dis]continuism). A review of the details of the metaphysical continuism-discontinuism debate is neither necessary nor feasible here. It should be noted, however, that, while the debate has centred primarily on the relationship between episodic remembering and episodic future thinking, both continuists and discontinuists acknowledge that it should, strictly speaking, be understood as pertaining also to the relationship between episodic remembering and episodic counterfactual thinking (De Brigard, 2014). Episodic counterfactual thinking has played a peripheral role simply because it has generally been assumed that giving it weight equal to that of episodic future thinking would not make a major difference to the dynamics of the debate. That might be right, but we will see below that giving it equal weight does make a major difference to the attempt to provide a continuist formulation of the multimescale interpretation of BTM.

2.2 The causalism-simulationism debate

The *causal theory of memory* holds that genuinely remembering the past is distinguished from merely apparently remembering it by the presence, in the case of genuine remembering, of an appropriate causal connection between the subject’s apparent memory of the event and his experience of it, where an appropriate causal connection is one that is sustained by a memory trace originating in the subject’s experience of the event (Martin & Deutscher, 1966). The *simulation theory of memory* denies the necessity of appropriate causation, holding that genuinely remembering the past is distinguished from merely apparently remembering it by the reliability, in the case of genuine remembering, of the episodic construction system that is responsible both for remembering the past and for imagining the future (Michaelian, 2016b). Like the continuism-discontinuism debate, the causalism-simulationism debate was triggered by psychological research on memory as a form of mental time travel but has—withstanding occasional interventions by psychologists (Rugg & Renoult, 2025)—unfolded almost entirely within philosophy, with simulationists appealing to empirical evidence in favour of their view (Michaelian, 2021, 2024) and causalists either appealing to intuition (e.g., Bernecker, 2010; Debus, 2014) or, increasingly, arguing that there is equally good empirical evidence in favour of their own view (e.g., Perrin, 2021; Sutton & O’Brien, 2023; Werning, 2020).

A review of the details of the causalism-simulationism debate is neither necessary nor feasible here.⁵ It should, however, be noted that, though the causalism-simulationism debate has been intertwined with the continuism-discontinuism

⁵ See Michaelian and Robins (2018); McCarroll, Michaelian, & Nanay (2024).

debate, the two debates may ultimately be distinct from each other. Because the evidence to which simulationists appeal overlaps with the evidence to which continuists appeal, because Michaelian's formulation of the simulation theory explicitly endorses continuism, and because the necessity of an appropriate causal connection for remembering would seem to entail the existence of a fundamental difference between remembering the past and imagining the future and therefore to entail discontinuism, the standard view has been that simulationism aligns with continuism, while causalism aligns with discontinuism. Langland-Hassan (2023) has nevertheless argued persuasively that continuist causalism is coherent and worth taking seriously, and Alvarez (forthcoming) has similarly argued that discontinuist simulationism is coherent and worth taking seriously. This matter need not be settled here: though Hirai's (2025) attempt to provide a continuist and simulationist interpretation of BTM is part of the background against which the argument of the paper unfolds, the argument is concerned with continuism as such rather than simulationism.⁶

2.3 Hirai's interpretation of BTM

With this background on the continuism-discontinuism and causalism-simulationism debates in place, we are in a position to come to grips with Hirai's (2025) simulationist interpretation of BTM and Michaelian's (2025) response thereto. Hirai's claim is not that BTM qualifies as a simulation theory in virtue of the fact that it sees remembering as involving construction, for he recognizes that, though older causal theories (Bernecker, 2010; Martin & Deutscher, 1966) ignore the constructive character of remembering, more recent causal theories (Michaelian, 2011; Sutton & O'Brien 2023) do not. His claim is, rather, that BTM qualifies as a simulation theory in virtue of the fact that it sees remembering as being continuous with imagining.

The simulation theory of memory, on the one hand, holds, as we have seen, that remembering occurs when the subject's episodic construction system, aiming to produce a representation of an event from the subject's personal past, draws on traces that might or might not originate in the subject's experience of the relevant event in order to produce a representation of it. Episodic future thinking occurs when the episodic construction system, aiming to produce a representation of an event from the subject's personal future, draws on available traces (traces that inevitably do not originate in the subject's experience of the relevant event) in order to produce a representation of it. BTM, on the other hand, holds that remembering occurs when the subject, taking a pure memory (where pure memory as a whole is simply the sum of all of the subject's past experiences, preserved and made available to him in the present) as a target, draws on image materials (where image materials are the raw materials on which one draws when constructing an image) that might or might not originate in the subject's experience of the relevant event in order to produce an image memory (where an image memory is the image output by the construction

⁶ Section 5 will, however, briefly come back to the question of the feasibility of providing a coherent simulationist interpretation of BTM.

process in the case of remembering). Episodic future thinking occurs when the subject draws on available image materials (materials that inevitably do not originate in the subject's experience of the relevant event) in order to produce an image of it. Hirai's claim is thus that both the simulation theory of memory and BTM are continuist in the sense that both treat memory and future thought as being continuous in virtue of holding that memory and future thought rely on the same mechanism (construction of an image) and the same raw materials (image materials).

The argument of the present paper is, again, concerned with continuism rather than simulationism, but reviewing Michaelian's (2025) response to Hirai will nevertheless enable us to identify the key difficulty that any proposed continuist interpretation of BTM will need to overcome. Michaelian argues that Hirai's claim overlooks the fact that, if BTM is right, then there is a fundamental difference between memory and future thought even though both processes rely on the same construction process and the same image materials. As far as remembering is concerned, BTM takes the construction process to aim at a target provided by pure memory. As far as future thinking is concerned, it is not entirely clear at what BTM takes the construction process to aim, but the target of future thinking, whatever exactly it might be, cannot be provided by pure memory, simply because it lies in the future rather than the past. In order to ensure the kind of symmetry between memory and future thought that continuism posits, it would thus need to be the case that the target of future thinking is provided by a "pure future thought". But, if the idea that every experience that the subject has had in the past remains available to him now is somewhat mysterious, the idea that every experience that the subject will (or might) have in the future is already available to him now appears to be obviously false. BTM is thus best read as being a discontinuist theory.

While it might seem unlikely that the difficulty identified by Michaelian can be overcome, the remaining sections of this paper will nevertheless attempt to identify a means of rendering BTM compatible with continuism. The strategy will rely on a possibility afforded by Hirai's multimescale framework, a possibility that Hirai himself seems to overlook. The first step, carried out in Sect. 3, will thus be to get the multimescale framework on the table. The next, carried out in Sect. 4, will be to show that a continuist multimescale BTM is coherent.

3 The multimescale framework

This section reconstructs Hirai's *multimescale framework*, the basic goal of which is to explain how it might be that everything that the subject experiences is preserved in pure memory in such a way that the past remains available to him in the present, focussing on the notions of *multiple timescales*, *the present*, and *contemporaneity* (Sect. 3.1) and on how these come together in the concept of a *transtimescale system* (Sect. 3.2).

Before proceeding, two potential worries ought to be addressed. First, while the multimescale framework is likely to strike analytic philosophers (and other non-Bergsonians) as being somewhat far-fetched if it is taken as an account of memory, our goal here is not to assess the plausibility of Bergson's account of memory, as

interpreted by Hirai, but merely to determine whether that account can coherently be combined with continuism. Second, while the multitime-scale framework might strike some Bergsonians as being somewhat far-fetched if it is taken as an interpretation of Bergson's account of memory, our goal here is not to assess Hirai's fidelity to Bergson but, again, merely to determine whether Bergson's account, as interpreted by Hirai, can coherently be combined with continuism. Both worries can thus be set aside.

3.1 Timescales, the present, contemporaneity

Hirai suggests that the notion of multiple "rhythms of duration" to which Bergson refers can be understood in terms of multiple *timescales*, which, he writes,

refer to characteristic durations or temporal intervals over which certain phenomena or processes evolve or exhibit significant change [...]. [The notion] provides a temporal framework for analyzing events, from microscopic interactions to cosmological developments. Timescales vary widely, ranging from femtoseconds in quantum mechanics to billions of years in astrophysics [...]
(Hirai, [in press](#), pp. 13–14).

Though it would be natural to take the notion of a timescale *epistemically*, that is, as pertaining to a duration imposed on a system by an observer (such as a researcher in quantum mechanics or astrophysics), Hirai emphasizes that it is, instead, to be taken ontologically or, as he puts it, borrowing a term from Lesne (2017), *intrinsically*: intrinsic timescales, Hirai says, "pertain to the temporal dimensions inherent to the system itself" (Hirai, [in press](#), p. 14). The basic idea of the multitime-scale framework, then, is that time is multiple: there is no universal or absolute time with respect to which durations belonging to different timescales can be situated or compared.

This rejection of the notion of universal time and endorsement of multiple intrinsic timescales has an important consequence for the notion of the *present*. In order to see this, it is crucial to note that Bergson treats the present as having a "width" or, in other words, a *duration*. When combined with the claim that there are multiple intrinsic timescales, the claim that the present has a duration has the consequence that

the universe contains multiple presents of different sizes. The size of the present is relative to the system. However, if each system exists independently without any higher-level comparison mechanism already realized and available in the universe, the differences in present size cannot be articulated. In such a case, the universe would not contain past or future as tenses distinct from the present—only a plurality of presents (Hirai, [in press](#), p. 15).

The picture that emerges is thus one according to which there is a multiplicity of timescales, each made up of a series of "presents". Presents that are part of "higher" timescales (for example, in astrophysics) are wider (longer), while presents that are part of "lower" timescales (for example, in quantum mechanics) are narrower (shorter). No timescale is privileged, and no present is privileged. The picture, in

short, is one according to which the world is made up of a series of durations of variable widths.

If this picture is adopted, Hirai argues, the notion of *simultaneity*, or at least the application of that notion to presents belonging to distinct timescales, must be rejected. The reason that Hirai himself offers for rejecting the notion is that, since durations belonging to different timescales are ontologically distinct from each other, they cannot coincide and thus cannot be simultaneous. Another reason for rejecting it is that, even if we do not assume that simultaneity requires coincidence, durations belonging to different timescales do not have the same width, which would seem to be sufficient to imply that they cannot be simultaneous. Having rejected the notion of simultaneity, Hirai introduces the notion of *contemporaneity* as a replacement for it. As an initial approximation, we might say that duration 1 at a “higher” level (for example, that of astrophysics) and durations 2, 3, ... at a “lower” level (for example, that of quantum mechanics) are contemporary to each other just in case the sequence composed of durations 2, 3, ... would be simultaneous with duration 1 if there were such a thing as universal time. Thus, duration 2 might coincide with the first stretch of duration 1, duration 3 with the next stretch of duration 1, and so on. This initial approximation is, however, excessively approximate, for Hirai emphasizes that “contemporaneity is defined locally, through direct *interactions* between multiple temporal layers, rather than by reference to any universal temporal standard” (emphasis added). Thus, what we should say is that duration 1 and durations 2, 3, ... are contemporary to each other just in case, first, durations 2, 3, ... would be simultaneous with duration 1 if there were such a thing as universal time and, second, there is interaction between the timescales in question.⁷

3.2 Transtimescale systems

The obvious question, at this point, concerns the conditions under which timescales interact. Hirai, unfortunately, does not provide an explicit answer to this question, leaving it unclear not only what kind of interaction is at issue but also under what conditions interaction of the relevant kind is supposed to occur and how widespread interaction of that kind is supposed to be. He leaves it unclear, in particular, whether interaction of the relevant kind can occur in nonbiological systems. He does make clear, however, that interaction of that kind can occur in biological systems in general and in human beings in particular:

since systems are defined by timescales, it is possible for a system occupying the same spatial domain to incorporate multiple timescales within its temporal evolution. Biological organisms in general are examples of such systems, and human individuals represent especially complex cases, exhibiting interactions across multiple hierarchical timescales. When the same entity spans multiple timescales, we refer to this system as a “Trans-Timescale” (TTS) system.” (Hirai, [in press](#), p. 15).

⁷ Depending on what is required for interaction, the second condition might make the first redundant.

However interaction is ultimately to be understood, then we know that a *transtimescale* system is an entity characterized by multiple interacting timescales.

Hirai describes the specific transtimescale system characteristic of human beings as being composed of four timescales or “layers”. Taken in “ascending” order, these are as follows. *Layer 0* is the layer of physical interaction. The durations making up this layer are extremely narrow, below the level of sensory discrimination. *Layer 1* is the layer of “temporal resolution”, that is, “[t]he smallest timescale detectable by human perception”. The durations making up this layer are thus somewhat broader. *Layer 2* is the layer of the psychological present. The durations making up this layer are thus broader still. *Layer 3*, finally, is the layer corresponding to the lifespan of an organism. It is natural to ask whether there might not be layers, corresponding, for example, to hours, days, years, or life periods, intermediate between layers 2 and 3. This question will be bracketed here. It is also natural to ask whether the entities located at each level are *events* or, rather, *experiences*: given that layer 0 is the layer of physical interactions, the entities located at this layer are presumably events, but the entities located at layers 1–3 might, in principle, be either events or experiences. This question will be discussed in Sect. 4.

It is vital to note that, because the durations of which layers are composed increase in width as we ascend layer by layer within the human transtimescale system, a “present” located within a higher layer will be contemporary to multiple presents located within a lower layer. For example, a duration located at level 2 has, according to Hirai, a width of about a second, whereas a duration located at level 3 has a width of many years; a given layer 3 duration will thus be contemporary to many layer 2 durations.

We know that the contemporaneity relation obtains between the four layers because they interact, but contemporaneity does not imply *accessibility*. Layer 0 is, Hirai emphasizes, inaccessible to the subject, and it will therefore be disregarded in what follows. Layer 3, however, is “accessible through memory”. It, along with layer 2, will play an important role in what follows. Note that Hirai says little about what he means by “accessibility”. It is clear that accessibility presupposes contemporaneity, it is clear that not everything that is contemporary is accessible, and it is clear that accessibility is meant to be a psychological notion. But it is unclear what kind of psychological access is at issue here, and it is unclear under what conditions, exactly, access of the relevant kind occurs. This matter will be taken up again in Sect. 4.

A final detail: despite the fact that, strictly speaking, no present is privileged, Hirai suggests that it is useful to single out a sort of privileged present in the case of the human transtimescale system. This is the *window of the present*, which refers to “a trans-scale region spanning from Layer 1 (lower bound) to Layer 2 (upper bound).” The window of the present thus corresponds to ongoing experience.

Figure 1 sums up the multitimescale framework.

4 Multitimescale BTM and continuism

The aim of the previous section was to provide a reconstruction of the multitimescale framework. The aim of the current section is to show that a continuist multitimescale BTM is coherent. It begins by reviewing Hirai’s application of the framework to

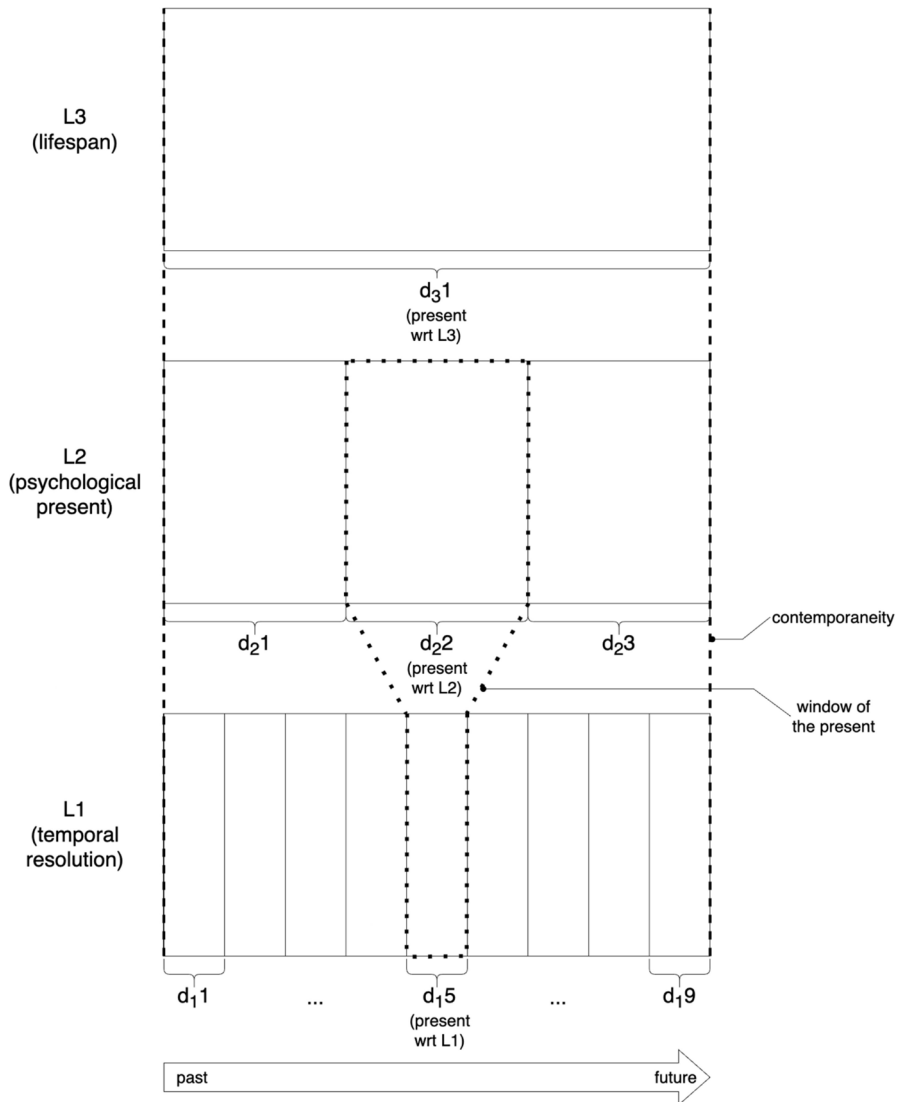


Fig. 1 The multitimescale framework. Based on Fig. 1 in Hirai (in press). Layer 1 (L1) is composed of durations d_{11} through d_{19} . L2 is composed of d_{21} through d_{23} . L3 is composed of d_{31}

BTM (Sect. 4.1). It goes on to argue that, if we restrict our focus to the relationship between episodic remembering and episodic future thinking, then BTM can arguably be rendered compatible with continuism at little to no metaphysical cost beyond what is already involved in accepting the multitimescale framework (Sect. 4.2). It also concedes, however, that, if we broaden our focus to include the relationship between episodic remembering and episodic counterfactual thinking, then the cost of rendering BTM compatible with continuism may increase considerably (Sect. 4.2).

4.1 Multitimescale BTM

Hirai's goal, in developing the somewhat exotic metaphysical framework reviewed in Sect. 3, is to enable us to understand why Bergson says the somewhat mysterious things that he says about the past remaining available, through memory, in the present. As we saw in Sect. 2, Bergson holds that everything that the subject experiences is preserved in pure memory and that remembering occurs when a pure memory is taken as a target and an image memory of that target is constructed. The question that Hirai attempts to answer is how it might be that the past remains available in pure memory to be taken as a target.

Hirai's key move, in attempting to answer this question, is to point out that, given the multitimescale framework, there is, in a sense, no real mystery here:

At a lower time layer, the past does not exist because of their transience, whereas at an upper time layer, events that belong to the past in the lower layer may still constitute the present. The interaction between these temporal layers makes it possible for an event that is "past" in one layer to coexist as "present" in another, thereby allowing the event to remain available in the upper layer (Hirai, *in press*, p. 18).

In particular, he emphasizes, elements that are past from the perspective of layer 2 (the layer of the psychological present) may be present from the perspective of layer 3 (the layer of the lifespan of the organism):

At t_2 , [experience] x_1 has already exited [the window of the present]. If our [transtimescale] system were confined to only Layer 2, x_1 would be lost entirely. However, since we possess Layer 3, x_1 remains preserved. [...] [I]t persists as a constitute element of the "present" in Layer 3, which appears as past from the perspective of Layer 2 (Hirai, *in press*, p. 20).

This, then, is the central idea of the multitimescale interpretation of BTM: the past remains present in the sense that a single experience can be located both at layer 2 and at layer 3. From the perspective of layer 2, the experience is in the past. From the perspective of layer 3, however, the experience is in the present. Layer 3, in other words, gives us pure memory. In remembering, the subject—a transtimescale system—accesses layer 3, takes the (past) experience as a target, and constructs an image memory of it (in the present) at layer 2.

Consider, for example, one's experience of one's tenth birthday party. This occurred, let us suppose, many years ago and is well outside the window of the present. From the perspective of layer 2, it is past and, were the subject confined to layer 2, it would be out of reach. But it is present from the perspective of layer 3, to which the subject has access. The subject is thus, in principle, able to take it as a target and construct, at layer 2, an image memory of his tenth birthday party.

Three obvious questions arise here. First, there is a question about why one cannot, in practice, remember everything that one has experienced, given that everything that one has experienced is, in principle, available to one in pure memory to be taken as a target. One might, for example, attempt to remember one's tenth birthday

party but find that one cannot do so—one has forgotten it. We come back to this question below. Second, there is a question about why one often cannot remember accurately, given that everything that one has experienced is, in principle, available to one in pure memory to be taken as a target. One might, for example, remember one's tenth birthday party as involving a round cake when in fact it involved a rectangular cake—one misremembers it.⁸ We come back to this question, too, below. Third, there is, as pointed out in Sect. 3, a question about the nature of the entities located at levels 1–3—about whether they are events or, rather, experiences. Though there is disagreement among Bergsonians about the matter (e.g., Ansell-Pearson, 2010), Hirai (2025) makes it clear that he takes pure memory to preserve experiences rather than events. Given that level 3 can be identified with pure memory, the entities located at level 3 are thus experiences. Given that the same entities are located at levels 2 and 3, the entities located at level 2 must likewise be experiences. It is unclear what Hirai means to say regarding the entities located at level 1, but the aims in this paper do not require that this question be answered.

Figure 2 sums up the multitimescale interpretation of BTM.

4.2 Continuist multitimescale BTM I: future thinking

It initially seemed obvious that BTM is neither compatible with nor capable of being rendered compatible with continuism: because there is no future-oriented analogue of pure memory, the partisan of BTM is unable to provide, as continuism requires, an account on which there is no fundamental difference between episodic remembering and episodic future thinking. With our reconstruction of Hirai's multitimescale framework and our review of his application of that framework to BTM in place, this section contends that should seem much less obvious. Indeed, the section contends, given that the multitimescale interpretation of BTM is adopted, continuism should begin to seem natural, if not inevitable.

In order to see that multitimescale BTM can, in fact, coherently be combined with continuism, two points should be noted. The first is that, given the multitimescale interpretation of BTM, there is, after all, a future-oriented analogue of pure memory. Layer 3, we have seen, is to be identified with pure memory. Because the durations that make up layer 3 are wider than those that make up layer 2, a single layer 3 duration will inevitably be contemporary to multiple layer 2 durations. This means—as Hirai emphasizes—that a given layer 3 duration will include experiences that are past relative to a layer 2 duration with which it is contemporary. It also means, however—as Hirai fails to emphasize—that the layer 3 duration will include experiences that are future relative to the layer 2 duration. Thus, if the multitimescale interpretation of BTM is right, there is a future-oriented analogue of pure memory: the future-oriented analogue of pure memory is simply pure memory itself.

⁸ This formulation of the question disregards the distinction between *authenticism*, the view that the accuracy of a memory requires correspondence to the relevant past experience, and *alethism*, the view that the accuracy of a memory requires correspondence to the relevant past events (Sant'Anna & Camillo 2025). But the question—which concerns failures of memory to correspond to past experience, rather than accuracy as such—arises given either view.

The second point to note is that the availability of future experiences in pure memory implies that the partisan of BTM is, after all, able to provide an account on which there is no fundamental difference between episodic remembering and episodic future thinking. On the multitime scale interpretation of BTM, as we saw above, the past is present in the sense that a single experience is located both at layer 3 and at layer 2. From the perspective of layer 2, the experience is in the past. From the perspective of layer 3, the experience is in the present. Remembering occurs when the subject accesses layer 3, takes the experience as a target, and constructs an image memory of it in the present at layer 2. Similarly, on the multitime scale interpretation of BTM, the future is present in the sense that a single experience is located both at layer 3 and at layer 2. From the perspective of layer 2, the experience is in the future. From the perspective of layer 3, the experience is in the present. Future thinking occurs, it is natural for the partisan of BTM to say, when the subject accesses layer 3, takes the experience as a target, and constructs an image of it in the present at layer 2. Thus, if the multitime scale interpretation of BTM is right, the partisan of BTM is able to provide an account on which there is no fundamental difference between episodic remembering and episodic future thinking.

Consider, for example, one's experience of one's sixtieth birthday party. This will, let us suppose, occur some years in the future and is well outside the window of the present. From the perspective of layer 2, it is future and, were the subject confined to layer 2, it would be out of reach. But it is present from the perspective of layer 3, to which the subject has access. The subject is thus, in principle, able to take it as a target and construct, at layer 2, an image of his sixtieth birthday party.

In short, it appears that multitime scale BTM can coherently be combined with continuism. Admittedly, it might be thought that, once more is said about the notion of access, the continuist formulation of the multitime scale interpretation of BTM given above will turn out to be incoherent. As Sect. 3 noted, it is unclear what, exactly, is involved in accessing a layer. Hirai evidently holds that what might be called *backwards access* is possible—that is, that an experience that is past from the perspective of a given layer 2 duration but that is present from the perspective of a layer 3 duration that is contemporary to that layer 2 duration can be accessed by the subject and taken as a target for the construction of an image memory at layer 2. He also seems to presuppose that *forward access* is not possible—that is, that an experience that is future from the perspective of a given layer 2 duration but that is present from the perspective of a layer 3 duration that is contemporary to that layer 2 duration cannot be accessed by the subject and taken as a target for the construction of an image at layer 2. There is, however, nothing in the framework that requires us to adopt this “no forward access” assumption. Indeed, given the overall thrust of the framework, it would be more natural to adopt a “forward access” assumption. If we do so, we end up with a picture that is both recognizably continuist (in the sense that it denies that there is any fundamental difference between remembering the past and imagining the future) and (as long as we accept the multitime scale interpretation of BTM) recognizably Bergsonian. We thus arrive at the conclusion that *a continuist multitime scale BTM is coherent*.

Figure 3 sums up the continuist multitime scale interpretation of BTM.

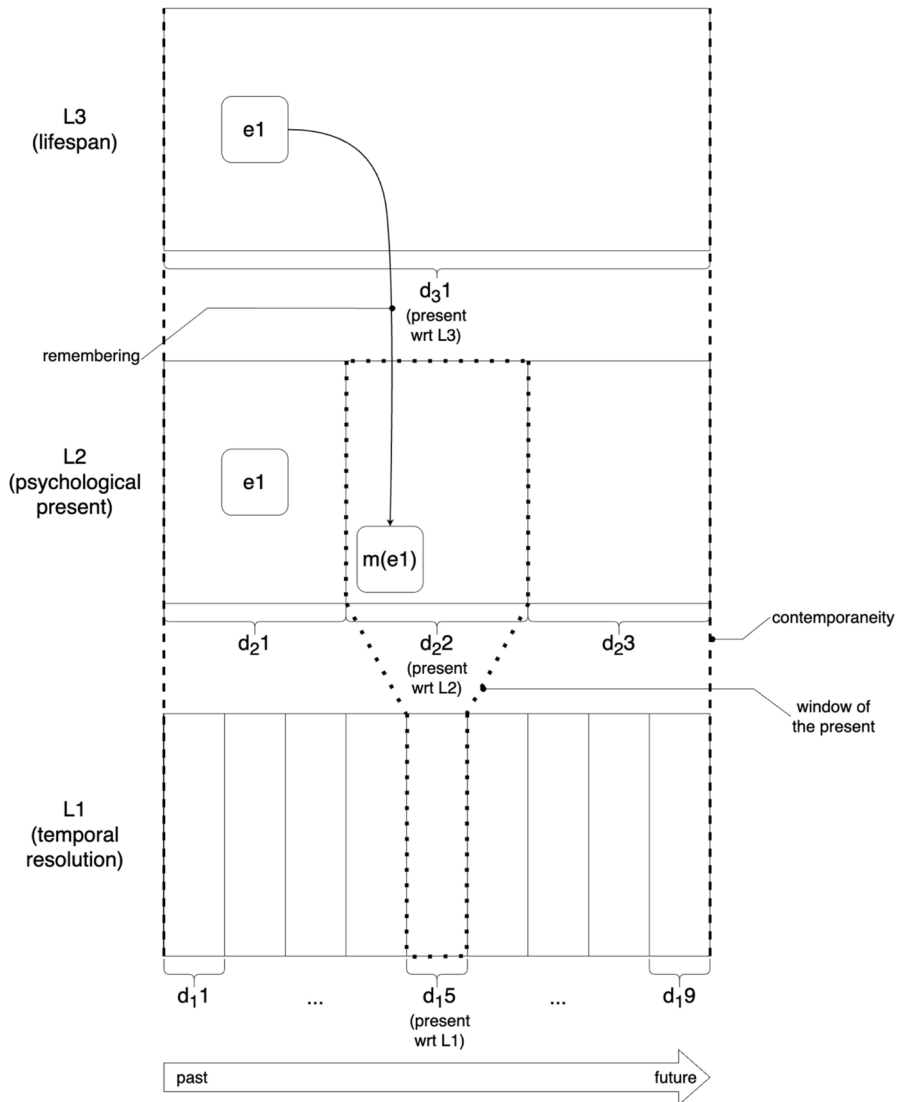


Fig. 2 The multitimescale interpretation of BTM. Experience $e1$ is located in the past with respect to L2 and in the present with respect to L3. In remembering, the subject accesses $e1$ at L3 and takes it as a target for the construction of a memory of $e1$ ($m(e1)$) in the present with respect to L2

Two obvious questions arise here. The first is why one cannot, in practice, imagine everything that one will experience, given that everything that one will experience is, in principle, available to one to be taken as a target. One might, for example, attempt to imagine one's sixtieth birthday party but find that one is unable to do so. This question can be answered by noting, first, that it is exactly analogous to

the question that arose in Sect. 4.1 regarding inability to remember the past (forgetting) and, second, that the answer proposed by Hirai (2025)⁹ works just as well with respect to the question about inability to imagine the future as it does with respect to the question about inability to remember the past. In the case of memory, Hirai suggests, one is sometimes unable to remember a given event that one experienced in the past because one lacks the image materials required to construct an image memory of it. Remembering, on the multitime scale interpretation of BTM, is not a matter of retrieving a pure memory but rather a matter of constructing an image on the basis of a pure memory taken as a target. If appropriate image materials are unavailable, then one will be unable to remember the relevant event. In the case of future thought, one might similarly be unable to imagine a given event that one will experience in the future because one lacks the required image materials. Future thinking, on the continuist formulation of the multitime scale interpretation of BTM, is not a matter of “retrieving” a “pure future thought” but rather a matter of constructing an image on the basis of a pure future thought taken as a target. If appropriate image materials are unavailable, then one will be unable to imagine the relevant event.

The second question is why one often cannot imagine the future accurately, given that everything that one will experience is, in principle, available to one to be taken as a target. One might, for example, imagine one’s sixtieth birthday party as being a joyous occasion, when it will, in fact, be marred by personal or professional difficulties. This question, like the previous one, can be answered by noting that it is analogous to the question that arose in Sect. 4.1 regarding inaccuracy in remembering (misremembering) and that the natural answer to give to the question about inaccuracy in remembering works just as well with respect to the question about inaccuracy in imagining as it does with respect to the question about inaccuracy in remembering. Because remembering is not a matter of retrieving a pure memory but rather a matter of constructing an image on the basis of a pure memory taken as a target, remembering might produce an inaccurate representation for any one of a wide variety of reasons, ranging from use of unsuitable image materials to biases built into the construction process. Because future thinking is a matter of constructing an image on the basis of a pure future thought taken as a target, future thinking might produce an inaccurate representation for precisely the same reasons.

In addition to these questions, several objections to the continuist formulation of the multitime scale interpretation of BTM arise. It might be objected, first, that pure memory, by definition, pertains only to the past and that the claim that the future-oriented analogue of pure memory is pure memory itself is therefore confused. This objection can be met by pointing out that, while it does, admittedly, sound odd to say that pure memory includes both past and future experience, that is, if Hirai is right, nevertheless the case. The oddness of the claim that the future-oriented analogue of pure memory is pure memory itself thus merely reflects the fact that if the multitime scale interpretation of BTM is right, then “pure memory” is to some extent a misnomer.

It might be objected, second, that there is nothing in Bergson that suggests that he endorses the kind of continuist view described here. This objection can be met

⁹ Hirai draws here on Sinclair (2019).

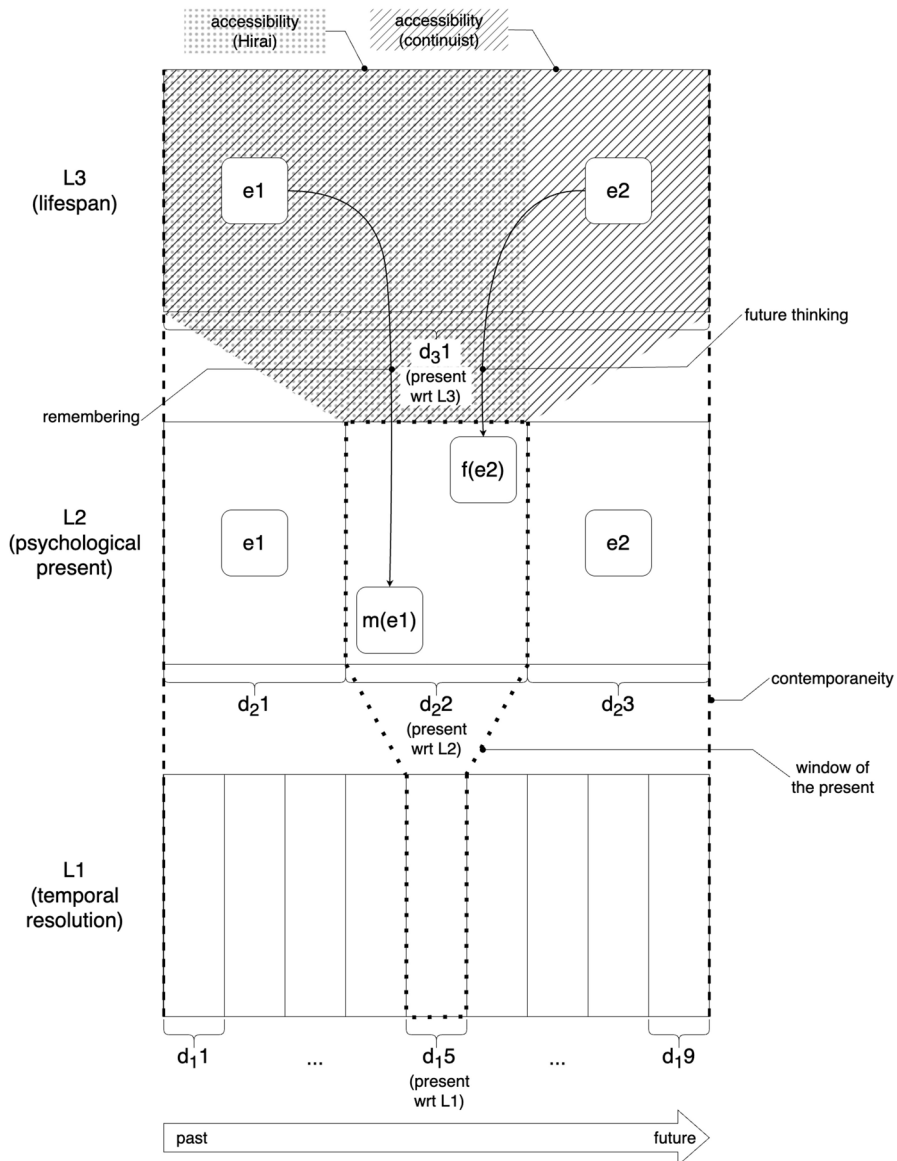


Fig. 3 The continuist multitimescale interpretation of BTM. Experience $e2$ is located in the future with respect to L2 and in the present with respect to L3. In future thinking, the subject accesses $e2$ at L3 and takes it as a target for the construction of a future thought of $e2$ ($f(e2)$) in the present with respect to L2

by pointing out, first, that, while Bergson nowhere discusses future thought in any detail, the fact that he does not explicitly endorse the view does not imply that he is not implicitly committed to it and, second, that (as noted in Sect. 1), the focus here

is on Hirai's interpretation of BTM rather than on Bergson himself—the aim is not to assess Hirai's fidelity to Bergson but rather to examine the coherence of BTM with continuism if Hirai's interpretation is taken for granted.¹⁰

It might be objected, third, that the view that one can access one's future experiences is so implausible as not to be worth taking seriously. This objection can be met by noting several points. First, given that access is a technical notion, it is not obvious that we should take the view in question to be particularly implausible. (Admittedly, it is likewise not obvious that we should take it to be particularly plausible, given that access is a technical notion.) Second, even we should take the view to be implausible, it is not obvious that it is appreciably less plausible than is the view that one can access one's past experiences. In particular, it is not obvious that holding that the future as well as the past is accessible introduces any additional metaphysical cost. (Again, none of this is obvious, given that access is a technical notion.) Third, the focus of this paper is on the compatibility of BTM with continuism. It is one thing to claim that BTM can be rendered compatible with continuism and quite another to claim that it should be. The paper does not argue for the latter claim. The paper is, in other words, concerned exclusively with the question whether BTM can, in principle, coherently be combined with continuism, not with the question whether we ought to make the modifications that we would need to make to the theory in order coherently to combine it with continuism.

It might be objected, finally, that, whereas it makes sense to adopt the forward access assumption only if we assume that what one thinks about, when one thinks about the future, is the *actual* future, what one thinks about, when one thinks about the future is, at least typically, one or more *possible* futures. This final objection is significantly more powerful than the previous three. The multitime-scale framework, as it stands, does not take the possibility that the future is epistemically (if not metaphysically) open into account. Modifying the framework so that it does take that possibility into account will require rendering it even more exotic—and potentially more costly—than it is already. But it will turn out, as the remainder of this section will show, that the relevant modification is anyway required in order to render multitime-scale BTM compatible with continuism about the relationship of episodic memory to episodic counterfactual thought.

4.3 Continuist multitime-scale BTM II: counterfactual thinking

If we take continuism to hold that there is no fundamental difference not only between episodic remembering and episodic future thinking but also between episodic remembering and episodic counterfactual thinking, then, if we want to render BTM compatible with continuism, it will be necessary to modify the multitime-scale framework by modalizing it, multiplying timescales not only “vertically”, as Hirai does, but also “horizontally”. The framework that results is one on which

¹⁰ Along the same general lines, it might be objected that the continuist view presupposes a kind of determinism that is foreign to Bergson. Again, the focus here is on Hirai's interpretation of BTM rather than on Bergson himself.

the human transtimescale system includes not only the hierarchy composed of layers 0–3 that Hirai describes, which corresponds to *actuality*, but also—spreading out, so to speak, on either side of this hierarchy—a series of analogous hierarchies, corresponding to *counterfactual* possibilities more or less distant from actuality. The framework thus, in effect, posits multiple pure memories: in addition to a pure memory containing everything that the subject experienced in the past and will experience in the future, there are pure memories containing everything that the subject could have but did not experience in the past and everything that he could but will not experience in the future, one pure memory per life that the subject might have lived.

If this modalized multitimescale framework is to ground a form of continuism that holds that there is no fundamental difference not only between episodic remembering and episodic future thinking but also between episodic remembering and episodic counterfactual thinking, then we must adopt, in addition to the forward access assumption described above, a “sideways access” assumption according to which not only experiences located in the actual layer 3 that are past or future relative to the present of the actual layer 2 are accessible and thus able to be taken as targets for the construction of memories or future thoughts at the actual layer 2 but also experiences located in the counterfactual layers 3 are accessible and thus able to be taken as targets for the construction of counterfactual thoughts at the actual layer 2. Once the sideways access assumption is adopted, the requisite form of continuism follows.

Consider, for example, one’s tenth birthday party. Suppose that the party did not involve but could have involved one’s receiving a bicycle as a gift. From the perspective of the actual layer 2, the experience of receiving a bicycle as a gift during one’s tenth birthday party is not only past but also nonactual, and, were the subject confined to the actual layer 2 or to the actual layer 2 and the actual layer 3, it would be out of reach. But it is available in a counterfactual layer 3 to which the subject has access. The subject is thus able to take it as a target and construct, at the actual layer 2, an episodic counterfactual thought of receiving a bicycle as a gift during his tenth birthday party.

Because the objection, which arose above, that what one thinks about, when one thinks about the future is, at least typically, a possible future rather than the actual future amounts to the claim that future thought is a form of counterfactual thought, multiplying timescales horizontally enables a straightforward response to the objection. We thus arrive at the conclusion that *a continuist multitimescale BTM is coherent not only if we take continuism to hold that there is no fundamental difference between episodic remembering and episodic future thinking but also if we take it to hold that there is no fundamental difference between episodic remembering and episodic counterfactual thinking.*

Figure 4 depicts the modalized continuist multitimescale interpretation of BTM in schematic form.

Two objections arise at this point. It might be objected, first, that the modalized multitimescale interpretation of BTM is unnecessarily extravagant: the availability of image materials is sufficient to explain our ability to think about counterfactual possibilities, rendering the accessibility of counterfactual experiences unnecessary; there is thus no need to multiply timescales horizontally. This objection can be met

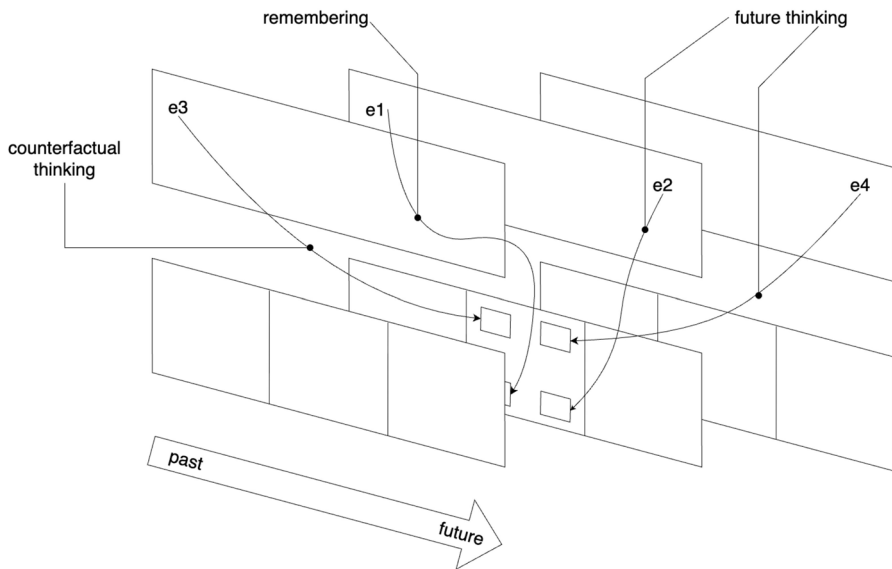


Fig. 4 The modalized continuist multimescale interpretation of BTM

by noting that if the availability of image materials were sufficient in the case of counterfactual thinking, then it would presumably be sufficient also both in the case of future thinking and in the case of remembering. Given that the partisan of BTM holds that it is not sufficient in the case of remembering, he cannot consistently hold that it is sufficient in the case of counterfactual thinking.

It might be objected, second, that the sideways access assumption is even less plausible than is the forward access assumption. This objection can be met by pointing out that, given that access is a technical notion, it is not obvious that we should take the assumption to be particularly implausible. It must be conceded, however, that the modalized multimescale interpretation does come at a significant additional metaphysical cost. No attempt to determine whether that price is worth paying will be made here—the focus of the paper is, again, entirely on the compatibility of multimescale BTM with continuism, not on the overall viability of continuist multimescale BTM.

5 Conclusion and open questions

This paper has argued that the question with which it began—whether Hirai's multimescale interpretation of BTM can be rendered compatible with continuism—is to be answered in the affirmative. Once that question has been answered in the affirmative, two further questions naturally arise.

The first concerns the plausibility of continuist multimescale BTM. The question can be approached from two perspectives. From a Bergsonian perspective, the key issue pertains to the notion of accessibility. Depending on how that notion

is understood, it will be more or less plausible to hold that forward and sideways access, in addition to backwards access, are possible. It is not obvious, at this stage, whether Bergsonians should be prepared to reject Hirai's presupposition that only backwards access is possible. From an analytic perspective, the key issue pertains to the multitimescale framework, which is radically unlike those employed in analytic philosophy of time. It is not obvious, at this stage, whether analytic philosophers should be prepared to treat it as a serious alternative to the latter.

The second question concerns the relationship between BTM and simulationism, as opposed to the continuism to which simulationism subscribes. Michaelian (2025) argues that Hirai's attempt to provide a simulationist interpretation of BTM fails because BTM is incompatible with continuism. If the argument of this talk is on the right track, then Michaelian's argument does not go through. But there is another difficulty that any attempt to provide a simulationist interpretation of BTM will need to overcome. Michaelian's (2016b) original formulation of simulationism holds that one can only remember the events of the personal past but also holds that the personal past includes both *experienced* and *nonexperienced* events. (Consider, for example, the possibility of remembering something that happened to one while one was unconscious and that one thus did not experience.) Given the role played by pure memory in BTM, it is difficult to see how BTM might be reconciled with this aspect of simulationism. There is a potential solution to this difficulty: Hirai, as noted above, treats the entities located at levels 2 and 3 as being the subject's experiences. Other Bergsonians treat them as being events. If we depart from Hirai by taking pure memory to be composed of events rather than experiences, it might be possible to reformulate BTM so that it allows that one can remember nonexperienced events. Michaelian's (2024) more recent radicalized formulation of simulationism, however, holds that one can remember not only the events of the *personal* past but also events of the *nonpersonal* past—that is, events that belong to the personal pasts of others. (Consider, for example, the possibility of remembering something that happened to one's parent before one was born.) Given the role played by pure memory in BTM, it is difficult to see how BTM might be reconciled with radical simulationism, regardless of whether we take pure memory to be composed of events rather than experiences.

Both of these questions will be left open here. It is to be hoped that they will be addressed both by continuists and simulationists and by Bergsonians in future work.

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Declarations

Ethical approval No ethical approval required.

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