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## Mental Time Travel



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### Abstract

Mental time travel research has given rise to an ongoing debate between causal and simulation theories of memory, which has, in turn, triggered a debate between continuist and discontinuist views of the relationship between remembering experienced past events and imagining possible future events. Section “Introduction” of this entry describes the concept of mental time travel and reviews both debates, distinguishing between processual and attitudinal forms of continuism. Section

“Processual (Dis) Continuism” reviews empirical evidence and metaphysical and epistemological arguments for processual continuism and discontinuism. Section “Attitudinal (Dis) Continuism” reviews the emergence of attitudinal continuism and discusses its relationship to processual continuism and discontinuism and to causalism and simulationism. Section “Summary” provides a brief summary of the entry.

### Keywords

Mental time travel · Episodic memory ·  
Episodic future thought · Imagination ·  
Simulation theory of memory

## Introduction

Mental time travel research has given rise to an ongoing debate between causal and simulation theories of memory (see ► [Constructive Memory](#)), which has, in turn, triggered a debate between continuist and discontinuist views of the relationship between remembering experienced past events and imagining possible future events (see ► [Imagination](#)). This section describes the concept of mental time travel and reviews both debates, distinguishing between processual and attitudinal forms of continuism.

## Mental Time Travel

When Tulving (1972) first introduced the notion of *episodic memory* in psychology, he defined it as pertaining to the “what,” the “when,” and the “where” of experienced past events. This “WWW” definition was meant to differentiate episodic memory both from nondeclarative memory (including memory for habits and skills) and, within the category of declarative memory, from semantic memory (memory for facts). The definition was broadly compatible with existing philosophical approaches to memory, including the influential causal theory (Martin and Deutscher 1966), but it was ultimately unable to differentiate episodic memory from semantic memory, since the facts with which the latter is concerned sometimes bear on the what, the when, and the where of experienced past events.

The limitations of the WWW definition, together with accumulating evidence of an intimate relationship between remembering the past and imagining the future, led Tulving (1985) and others in psychology to redefine episodic memory as a form of *mental time travel* (MTT) in which the subject imaginatively re-experiences past events, just as, in episodic future thought, he imaginatively “pre-experiences” future events (see Prospection).<sup>1</sup> This MTT definition suggests that there is no deep difference between remembering experienced past events and imagining possible future events. The definition thus challenged the causal theory of memory, which takes the existence of such a difference for granted, and motivated a new post causal approach: the simulation theory (Michaelian 2016b).

## Causalism and Simulationism

According to the *causal theory of memory*, the basic argument for which appeals to intuitions about hypothetical cases, a subject remembers

just in case he satisfies previous experience, current representation, and appropriate causation conditions:

- A subject  $S$  now remembers an event  $e$  if and only if
  - $S$  experienced  $e$  when it occurred;
  - $S$  now represents  $e$ ;
  - $S$ 's current representation of  $e$  is appropriately causally connected to  $S$ 's previous experience of  $e$ , where an appropriate causal connection is one that is sustained by a memory trace originating in  $S$ 's experience of  $e$ .

Like causalists, simulationists accept the current representation condition, but they reject both the previous experience condition and the appropriate causation condition. While there has been some discussion of the consequences of rejecting the previous experience condition, the debate between causalists and simulationists has so far focused primarily on the appropriate causation condition and, specifically, on its necessity.

Michaelian (2016b) takes MTT research to have demonstrated that episodic remembering and episodic future thinking are processes carried out by the same episodic construction system. Episodic future thinking is a matter of imaginatively projecting oneself into the personal future. It cannot and therefore does not involve an appropriate causal connection between the imagined event and the subject's current representation of it. Episodic remembering, Michaelian argues, is similarly a matter of imaginatively projecting oneself into the personal past. It can but need not always involve an appropriate causal connection between the remembered event and the subject's representation of it. Michaelian thus takes MTT research to imply that appropriate causation is not necessary for remembering. What is necessary, according to the *simulation theory of memory*, is merely that the subject's current representation be produced by a properly functioning (and hence reliable) episodic construction system:

<sup>1</sup> In addition to episodic future thought, episodic memory is related to episodic counterfactual thought, in which the subject imaginatively experiences possible events that did not but could have occurred (De Brigard 2014). As counterfactual thought does not appear to raise any issues not raised by future thought, this entry focuses on the relationship between memory and future thought.

*S* now remembers *e* if and only if

*S* now represents *e*;

*S*'s current representation of *e* is produced by a properly functioning and hence reliable episodic construction system that aims to produce a representation of an event belonging to *S*'s personal past.

The simulation theory has been the focus of direct attacks by causalists, but the causalism-simulationism debate has also triggered a more general debate regarding the relationship between remembering past events and imagining future events (Perrin and Michaelian 2017; Michaelian et al. 2020; Langland-Hassan 2021). Whereas the causal theory, which claims that appropriate causation is necessary for memory (but not for future thought), suggests that memory and future thought are deeply discontinuous, the simulation theory, because it rejects that claim, suggests that they are fundamentally continuous. Though linked to the causalism-simulationism debate, the continuism-discontinuism debate has taken on a life of its own.

### Continuism and Discontinuism

According to *continuism* (e.g., Michaelian 2016a; Addis 2020), there is, aside from their distinct temporal orientations, no fundamental difference between episodic memory and episodic future thought. *Discontinuism* is the denial of this claim: according to discontinuism (e.g., Debus 2014; Perrin 2016), there is a fundamental difference between episodic memory and episodic future thought. The continuist-discontinuist debate has focused primarily on remembering and imagining understood as processes, but the focus has recently begun to shift to memory and imagination understood as attitudes. Distinct *processual* and *attitudinal* forms of (dis)continuism have thus emerged. According to processual continuism, there is no fundamental difference between the process of remembering the past and the process of imagining the future; processual discontinuism is the denial of this claim. According to attitudinal continuism, there is no fundamental difference between the attitude involved in remembering the past and the attitude

involved in imagining the future; attitudinal discontinuism is the denial of this claim.

The relationship of attitudinal (dis)continuism to processual (dis)continuism – and to the causalist and simulationist views with which processual discontinuism and continuism are associated – is discussed in the section “[Attitudinal \(Dis\)Continuism](#),” but note that the distinction between processual and attitudinal (dis)continuism presupposes that memory can be understood either as a process or as an attitude. Understood as a process, remembering might, if causalism is right, be broken down into the stages of encoding, consolidation, storage, and retrieval. If simulationism is right, remembering, strictly speaking, reduces to the retrieval stage responsible for the production of the subject's current representation. Understood as an attitude, memory can be described in terms of the role played by retrieved content in the subject's cognitive economy. There is room for disagreement over the nature of this role, but one might hold that a subject takes the remembering attitude towards a retrieved content when he takes that content to correspond to a past event, or when he takes it to correspond to a past event that he experienced, or perhaps when he takes it to correspond to a past event that he experienced and to be available to him now because he experienced that event.

### Processual (Dis)continuism

This section reviews empirical evidence and metaphysical and epistemological arguments for processual continuism and discontinuism.

#### Empirical Evidence

Continuists have cited a range of empirical findings in support of their view. Discontinuists have both contested the continuist interpretation of these findings and cited additional findings in support of their view.

Perhaps the most impressive evidence for continuism is provided by imaging studies that demonstrate the involvement in episodic memory and episodic future thought of strongly overlapping brain regions, suggesting that a single

episodic construction system subserves both forms of MTT (Addis 2018). Additional evidence comes from a variety of other sources. Memory and future thought are organized in a similar fashion, with both past and future events being embedded in the same narrative structures (Rathbone et al. 2011). There are important phenomenological similarities between memory and future thought, as the level of detail and intensity of experience vary with temporal distance in a similar manner remembering and future thinking (Schacter et al. 2012). The capacities to remember past events and to imagine future events emerge in development at roughly the same age (Perner et al. 2010). Moreover, these capacities not only come online together, but they also tend to go offline together. Deficits in the ability to remember the personal past are correlated with deficits in the ability to imagine the personal future (e.g., Rosenbaum et al. 2005). Similarly, patients suffering from depression display parallel tendencies to remember the past and to imagine the future in overly general ways (Williams et al. 1996).

Though imaging studies provide evidence for continuism, they also provide evidence for discontinuism, as they indicate that imagining is more cognitively demanding than remembering and draws on additional brain regions (Schacter and Addis 2007) and demonstrate that impairment of certain regions affects future thought but not memory (Berryhill et al. 2010). Indeed, some researchers have argued that two subsystems can be distinguished within the system responsible for MTT (Addis et al. 2009), while others have argued that imagining future events, in contrast to remembering past events, relies on conceptual knowledge to provide a scaffolding for the integration of episodic details (Irish et al. 2012). Moreover, there is evidence that remembering past events involves richer and more vivid detail than does imagining future or past events (De Brigard and Giovanello 2012). The emotional valence of remembered and imagined events displays a similar discrepancy, with the latter being characterized by a greater positivity bias than the former (Rasmussen and Berntsen 2013).

Overall, then, the available empirical evidence is insufficient to settle things decisively in favor of

continuism or discontinuism. Nor is it clear that empirical evidence could, in principle, by itself suffice to settle things in favor of one or the other view. Continuists grant the existence of differences between memory and future thought, just as discontinuists grant the existence of similarities. The question over which they disagree is whether the differences between these two forms of episodic thought are *fundamental*. Since empirical evidence does not determine whether or not given evidence is fundamental, philosophical arguments may have a role to play in settling the debate. The following two subsections review philosophical arguments for and against two kinds of plausibly fundamental differences – metaphysical and epistemological – between memory and future thought.

### Metaphysics

The phenomenon of *reference* in MTT might ground arguments for metaphysical continuities or discontinuities between memory and future thought. If the causal theory of memory is right, then the reference of memories – the fact that they are about particular events – might be explained, in line with the causal theory of reference, by the appropriate causal connection that links memory to the event that it is about, whereas the reference of future thoughts would have to be explained in other terms, supporting discontinuism. If the simulation theory of memory is right, then the reference of both memories and future thoughts might be explained in the same terms, perhaps in line with the description theory of reference, supporting continuism. There is little published work so far on reference in remembering (but see Michaelian et al. (2020) for an exploratory treatment).

The primary considerations that have been invoked in favor of metaphysical continuities and discontinuities between memory and future thought pertain not to reference but rather to *representation*. There are two main competing views about the role of representation in memory. According to *relationalism*, when one remembers an event, one is directly related to it – the event is a constituent of the memory. According to *representationalism* (which was taken for granted in

formulating the causal and simulation theories in section “[Introduction](#)”), when one remembers an event, one represents it – the event itself is not a constituent of the memory. The main argument in favor of relationalism pertains to the relational phenomenology of memory (Debus 2008): intuitively, when one remembers an event, it seems to one that one is aware of the event itself, not of a representation of it. The main argument in favor of representationalism pertains to memory error: one can remember not only accurately but also inaccurately (i.e., one can misremember), and one can even remember events that did not occur at all (i.e., one can confabulate); there is no apparent way of describing mismemory and confabulation without invoking (inaccurate) representations, which suggests that successful memory should likewise be described as involving (accurate) representations (Sant’Anna 2020). Relationalists typically respond to the representationalist argument by biting the bullet and endorsing *disjunctivism*, according to which, because successful memories are constituted by the events that they are about, whereas mismemories and confabulations are not, there is a fundamental difference between successful memory, on the one hand, and mismemory and confabulation, on the other (see Sant’Anna [Forthcoming](#)).

Relationalism and representationalism can be generalized to MTT as a whole, including future thought. On the one hand, given that future thoughts are about events that have not occurred and that might not occur, they are presumably not constituted by the events that they are about and will therefore be assigned by relationalists to the same disjunct as mismemories and confabulations (Sant’Anna and Michaelian 2019). Relationalism thus entails the existence of an apparently fundamental difference between memory and future thought, aligning with discontinuism. On the other hand, there is no barrier to understanding both memory and future thought as involving representations of the events that they are about. Representationalism is thus compatible with the nonexistence of any fundamental metaphysical difference between memory and future thought, aligning with continuism.

Debus (2008) argues that relationalism aligns naturally with causalism, maintaining that the constitution relation that relationalists see as obtaining between memory and the event that it is about can be understood in terms of the appropriate causation of the former by the latter. (Note that adopting relationalism would require reformulating the causal theory’s current representation condition.) Debus’s position is critiqued by Aranyosi (2020), who argues that a relationalist must, strictly speaking, treat the constitution relation as fundamental. Aranyosi’s position is itself critiqued by Moran ([forthcoming](#)), who argues that, while relationalists must treat the constitution relation as cognitively fundamental, they need not treat it as metaphysically fundamental and hence that they may, as is natural, take it to supervene on the appropriate causation relation. If Moran is right, then relationalism aligns not only with discontinuism but also with causalism.

### Epistemology

One source of arguments for epistemological continuities and discontinuities is the potential *immunity to error through misidentification* of episodic memory and/or episodic future thought. A thought is immune to error through misidentification (IEM) just in case it is impossible for it to be fully accurate but for the thinker to be mistaken about his own identity with one of the subjects involved in the event. Perrin (2016) has argued that, because the identities of the subjects involved in a remembered event are causally determined, memory is not IEM, whereas, because the identities of the subjects involved in an imagined event are stipulatively determined, future thought is IEM. Perrin’s view thus suggests that there is an apparently fundamental epistemological difference between memory and future thought, aligning with discontinuism. Fernández (2019), in contrast, has argued that, because the identities of the subjects involved in a remembered event are built into the content of the memory, memory is IEM. Presumably, if the identities of the subjects involved in a remembered event are built into the content of a memory, the identities of the subjects involved in an imagined event

may be built into the content of future thought, in which case future thought, too, would be IEM. This extension of Fernández' view is thus compatible with the possibility that there is no fundamental epistemological difference between memory and future thought, aligning with continuism.

Another source of arguments for epistemological continuities and discontinuities is the potential *directness* of our knowledge of the future and the past. It is intuitively plausible that memory provides us with knowledge of past events that is of a different kind than the knowledge of future events with which future thought provides us – that, roughly speaking, our knowledge of the past can be direct, whereas our knowledge of the future can only be inferential (Swinburne 1966). Attempting to explain this epistemic asymmetry, Kneale (1972) invokes the causal theory of memory, but the causal theory of memory does not entail the existence of the asymmetry unless it is combined with the causal theory of knowledge. The causal theory of knowledge, however, has difficulty accounting not only for our knowledge of future events but also for a variety of other forms of knowledge (e.g., our knowledge of timeless facts). It thus enjoys little popularity and has been eclipsed by the reliabilist theory of knowledge, on which knowledge does not require causal connection but only reliability. The reliabilist theory of knowledge, combined with a simulationist approach that treats both memory and future thought as potentially reliable, is compatible with the nonexistence of an epistemic asymmetry between our knowledge of past events and our knowledge of future events (Michaelian 2016a).

### Attitudinal (Dis)continuism

This section reviews the emergence of attitudinal continuism and discusses its relationship to processual continuism and discontinuism and to causalism and simulationism.

Sections “[Causalism and Simulationism](#)” and “[Continuism and Discontinuism](#)” suggest that the continuist-discontinuist debate ultimately turns on the necessity of appropriate causation for

remembering and thus that a resolution of that debate depends on a resolution of the causalist-simulationist debate: if causalists are right in claiming that appropriate causation is necessary for remembering, then discontinuism is correct; if simulationists are right in claiming that appropriate causation is not necessary for remembering, then continuism may well be correct. Section “[Mental Time Travel](#)” suggested that empirical evidence is incapable of directly resolving the continuism-discontinuism debate. Empirical evidence might nevertheless be capable of resolving the causalism-simulationism debate: as noted in section “[Introduction](#),” the basic argument for causalism is based on intuitions, whereas the basic argument for simulationism is based on empirical MTT research. Empirical evidence might thus be capable of indirectly settling the continuism-discontinuism debate, with continuism being likely to prevail over discontinuism.

This line of reasoning may, however, be too simple. Sant'Anna (2021) argues that, if representationalism, which most philosophers of memory endorse, is assumed, then a resolution of the causalism-simulationism debate would not entail a resolution of the continuism-discontinuism debate, for, if representationalism is true, then the necessity of an appropriate causal connection amounts only to a non-fundamental difference between remembering the past and imagining the future. Rather than turning on the necessity of appropriate causal connection, Sant'Anna suggests, the continuism-discontinuism debate should be understood as turning on the attitudes involved in remembering the past and imagining the future. Recent work has emphasized that, in claiming to remember an event, the subject claims epistemic authority with respect to that event (Craver 2020). It is thus plausible to take remembering to involve a certain attitude, and one might hold, as noted above, that the subject takes that attitude towards a retrieved content when he takes that content to correspond to a past event, or when he takes it to correspond to a past event that he experienced, or perhaps when he takes it to correspond to a past event that he experienced and to be



available to him now because he experienced that event.

Though some have argued that it is a mistake to understand the continuism-discontinuism debate in attitudinal terms (Langland-Hassan [forthcoming](#)), the attitudinal approach has been increasingly popular (Munro 2021; Robins 2020; Schirmer dos Santos et al. [Forthcoming](#)). The approach nevertheless faces important challenges. On the one hand, it is not clear that, in claiming to remember an event, the subject necessarily claims epistemic authority with respect to that event. One can, in particular, reject a retrieved memory, which suggests that, when one remembers, one need not take one's memory to correspond to a past event. On the other hand, it is not clear that the attitudinal approach renders continuism as unattractive as its advocates have supposed. If what it is to take the remembering attitude towards a given content is merely to take that content to correspond to a past event (and not necessarily to take it to correspond to an event that one experienced or to take it to correspond to an event that one experienced and to be available to one now because one experienced it), then remembering may be continuous with forms of future thinking in which the subject takes his representations to correspond to future events. Attitudinal continuism, then, is a view worth exploring.

## Summary

This entry has provided an overview of the causalism-simulationism and continuism-discontinuism debates to which MTT research has led. These debates have not yet been resolved. New varieties of both causalism and simulationism continue to be developed, as do new arguments for continuism and discontinuism. Efforts to clarify the prospects of attitudinal continuism and discontinuism, in particular, are ongoing, and, though considerable attention has been devoted to attitudinal discontinuism, the merits of attitudinal continuism remain largely unexplored.

## Cross-References

- ▶ [Constructive memory](#)
- ▶ [Imagination](#)
- ▶ [Prospection](#)

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