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Radicalizing simulationism: Remembering as imagining the (nonpersonal) past

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ABSTRACT

On the simulation theory of memory, to remember is to imagine an event from the personal past. McCarroll has recently argued that, because it implies not only that a genuine memory need not be caused by the rememberer's experience of the remembered event but also that the rememberer need not even have experienced that event, simulationism is unable, first, to explain infantile amnesia (the inability to remember events that occurred in one's early childhood) and, second, to rule out certain "impossible" memories (namely, memories of events that occurred before one was born). Responding to McCarroll, this paper argues that simulationism is in fact able to explain infantile amnesia but concedes that it is unable to rule out pre-birth memories. It goes on to argue, however, that, rather than leading us to reject the theory, this should lead us to endorse a radicalized simulationism on which to remember is simply to imagine an event from the past, regardless of whether that event belongs to the *personal* past.

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1 The simulation theory of memory[1]

The relationship between remembering and imagining is at the heart of recent debates in the philosophy of memory. In contrast to the *causal theory of memory* (CTM; Bernecker, 2008, 2010; Martin & Deutscher, 1966), which holds that remembering requires an appropriate causal connection to a currently represented event and thus suggests that remembering and imagining are deeply discontinuous (Perrin, 2016; Robins, 2020a), the *simulation theory of memory* (STM; Michaelian, 2016c) sees remembering and imagining as fundamentally continuous (Addis, 2020; Michaelian, 2016a). Indeed, memory is, according to simulationism, a form of imagination and thus no more requires a causal connection to the represented event than does any other form of imagination.[2]

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In slogan form, STM says that to remember is to imagine the personal past. More precisely, it says that a subject, *S*, remembers an event, *e*, just in case he satisfies both a *current representation* condition (CR) and a *proper function* condition (PF):

> (STM) *S* remembers *e* if and only if
> (CR) *S* now represents *e*;
> (PF) *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.

CR is straightforward and is accepted by both causalists and simulationists.[3] PF requires some unpacking.

Inspired by empirical research on memory as a form of mental time travel (see, Addis, 2020; Perrin & Michaelian, 2017), simulationism takes episodic memory and episodic future thought (the form of imagination dedicated to future events) to be underwritten by a common neurocognitive system. The system in question – the episodic construction system – is designed to produce representations of past and future events on the basis of raw materials – stored information – deriving from the subject's experiences. In the case of future thought, it is impossible for the system to make use of stored information deriving from the subject's experience of the represented event, simply because the subject has not (yet) experienced that event; instead, it relies on information deriving from his experiences of other events. Simulationists infer that, in the case of memory, the system likewise need not make use of information deriving from the subject's experience of the represented event. In some cases, it presumably does so. In others, it does not, instead relying exclusively on information deriving from his experiences of other events.

Simulationism thus rejects the causal theory's *appropriate causation* condition. Whereas CTM takes genuine remembering to be distinguished from merely apparent remembering by the presence of an appropriate causal connection – a connection sustained by a *memory trace* laid down by the subject's experience of the remembered event, stored between the time of encoding and the time of retrieval, and providing at least some of the content[4] of the retrieved representation – STM takes genuine remembering to be distinguished from merely apparent remembering by the reliability of the simulation process that produces the "retrieved" representation: if that process is reliable, the subject remembers; if it is not, he does not remember but rather confabulates (Michaelian, 2016b, Forthcoming b; Michaelian et al., 2020).[5] The simulationist is thus committed to the following "no content" claim.

(NO-C) A genuine memory need not include any content originating in the subject's experience of the remembered event.

Simulationism takes healthy future thought to be likewise distinguished from future-oriented confabulation by its reliability and thus holds that remembering is ultimately distinguished from future thinking merely by its target: whereas future thinking aims to produce a representation of an event belonging to the personal future, remembering aims to produce a representation of an event belonging to the personal past.

Because simulationism does not require, for the occurrence of genuine remembering, that the retrieved memory include any content deriving from the subject's experience of the remembered event, there is no apparent reason for the simulation theory to include a *previous experience* condition – a condition requiring that the represented event have been experienced by the subject when it occurred – of the sort included in the causal theory. STM therefore departs from CTM in not including such a condition. The formulation of PF included in STM does, however, presuppose that the remembered event is part of the subject's *personal past*. Thus, if there are events that constitute part of a given subject's personal past despite not having been experienced by that subject – and there is reason to take the possibility that there are such events seriously (see below) – the simulationist is committed to the following "no experience" claim.

(NO-E) A genuine memory need not be of an event that the subject experienced.

Both NO-C and NO-E are counterintuitive, and both claims play important roles in McCarroll's (2020) critique of simulationism.[6]

Seeking to defend causalism's "diachronic" approach, an approach that treats remembering as a process running from the moment of experience to the moment of retrieval, against simulationism's "synchronic" approach, an approach that, in effect, reduces remembering to the retrieval process (Michaelian & Robins, 2018), McCarroll argues, first, that, because it endorses NO-C, simulationism is unable to explain *infantile amnesia* (the inability to remember events that occurred in one's early childhood) and, second, that, because it endorses NO-E, it is unable to rule out certain *"impossible" memories* (namely, memories of events that occurred before one was born). Responding to McCarroll, this paper argues that simulationism is in fact able to explain infantile amnesia (section 2) but concedes that it is unable to rule out pre-birth memories (section 3). It goes on to argue, however, that, rather than leading us to reject the theory, this should lead us to endorse a radicalized simulationism on which to remember is simply to imagine an event from the past, regardless of whether that event belongs to the *personal* past (section 4).

2 Infantile amnesia

Noting that there is "ample empirical evidence to show that adults tend to fail to recall extremely early childhood events, roughly before 2–4 years of age", as well as evidence that suggests that very young children's brains are simply unable to store information about the events that they undergo in such a way as to later enable them to remember them, McCarroll asks: "if remembering is merely imagining, why is infantile amnesia such a robust phenomenon?" "People", he writes, "may be able to imagine events in their lives at such an early age, but they typically cannot recall them" (6). The point is clear enough: simulationism is unable to explain why infantile amnesia occurs simply because any adequate explanation will necessarily invoke the inability of very young children to store traces and because such an explanation is – given simulationism's commitment to NO-C – off-limits to the simulationist.

If McCarroll's point is clear, it is likewise clear how the simulationist ought to respond. He ought to begin by acknowledging that causalism grounds, as McCarroll suggests, a straightforward explanation of infantile amnesia: very young children are – for developmental reasons the details of which need not concern us here – typically unable to store traces of the events that they undergo; older subjects are consequently typically unable to retrieve traces of and are therefore typically unable to remember events that they underwent as very young children. He ought to continue by pointing out that there is nothing inherently "causalist" about this explanation: the simulationist can endorse the causalist's explanation of infantile amnesia, just as he can endorse the causalist's explanation of ordinary forgetting.[7]

Consider, first, the natural causalist explanation of forgetting: at one point in time, the subject is able to retrieve a trace deriving from his experience of the relevant event; at a later point in time, he is no longer able to do so, either because the trace is no longer available or because it is available but, for some reason (such as the absence of a suitable cue), inaccessible. The natural simulationist explanation of forgetting shares the basic form of the causalist explanation: at one point in time, the subject is able to simulate the relevant event; at another point in time, he is no longer able to do so, either because his episodic construction system no longer has appropriate raw materials available or because it has such raw materials available but is no longer able to access them (cf., Caravà, 2021). To say that a subject's episodic construction system does not have available or is unable to access appropriate "raw materials" is just to say that it does not have available or is unable to access appropriate stored information – that is, that it does not have available or is unable to access appropriate memory traces. The simulationist explanation of forgetting thus shares not only the form but also much of the content of the causalist explanation. The difference

between the two is that the causalist asserts – while the simulationist denies – that the trace the loss of which explains the forgetting of a given event necessarily derives from the subject's experience of that particular event. It is important to note, however, that, while the simulationist denies this, he does *not* assert that there is no case in which a memory of a given event draws on a trace deriving from the subject's experience of that event. Nor does he assert that there is no case in which the only *appropriate* trace – the only trace sufficient to enable the subject to simulate the relevant event – is one deriving from the subject's experience of the event. The simulationist can thus endorse the causalist's explanation of forgetting as a special case of his own explanation.

Consider, now, the causalist explanation of infantile amnesia. Given that the simulationist can endorse the causalist's explanation of forgetting in terms of traces, there is – despite his commitment to NO-C – nothing to prevent him from endorsing the causalist's explanation of infantile amnesia in terms of traces. The difference between the causalist and the simulationist will, again, be that, for the latter, the explanation proposed by the former is merely a special case. STM allows, of course, that one might remember an event not on the basis of a trace deriving from experience of that event but rather on the basis of a trace or traces deriving from experience of another or other events; in fact, it allows, as McCarroll emphasizes, that the trace or traces in question might derive from experience of testimony about the relevant event. A full simulationist explanation of infantile amnesia will thus begin by pointing out, with the causalist, that most of the events of one's early childhood are such that one does not store traces deriving from one's experiences of those events. It will go on, however, to point out that most of the events of one's early childhood are also such that one receives no testimony about them. It will conclude that these two facts together imply that most early-childhood events are such that one is unable to generate a representation of them, simply because one is unaware that they occurred at all – one cannot generate a representation of them because one cannot even take them as targets.

Given that there are few limits on what we can imagine, it is worth emphasizing that what renders one unable to generate representations of most of the events of one's early childhood is that one is unable to take them as targets, not that one lacks raw materials of a sort that would enable one to generate representations of them.[8] It is tempting, for example, to claim that I am unable to imagine – and so, if simulationism is right, unable to remember – my first birthday party. After all, my developing brain did not store a trace of that specific event or of any other event from the relevant period, and I have been told virtually nothing about the event. It would thus be natural to suppose that my episodic construction system simply lacks raw materials of the sort that would be necessary to enable it to generate

a representation of my first birthday party. The problem with this strategy is that I can in fact imagine my first birthday party, simply by drawing on my general knowledge of how birthday parties for small children generally unfold. While I have been told virtually nothing about the event, I have been told that it occurred, and this is sufficient to enable me to take it as a target. I cannot, on penalty of probable inaccuracy, imagine the event in any detail. (Was there a cake? Were there other children present? At what time did it take place?) But, as long as my representation of the event remains sufficiently schematic, then it may well be accurate.[9]

An opponent might object that, while simulationism suggests that one will be unable to remember most events that one experienced as a very young child, the simulationist explanation of infantile amnesia has the consequence that, in some cases, subjects may remember events that they experienced as very young children. In particular, if one is aware that an event occurred, one will, given that there are few limits on what we can imagine, typically be able to generate a representation of it.

The opponent would be right to point this out, but it is not news: Michaelian (2016c) already notes that simulationism has the consequence that there are exceptions to the rule of infantile amnesia.[10] Nor does it undermine the simulationist explanation of infantile amnesia: the possibility that we remember a *small number* of events that we experienced as very young children is compatible with the fact that we do not remember the *overwhelming majority* of those events. Of course, we likewise do not remember the overwhelming majority of the events that we experience as older children and adults. The point is that simulationism explains why we remember far fewer of the events that we experienced as very young children than we remember of the events that we experience as older children and adults. The consequence that there are exceptions to the rule of infantile amnesia is, perhaps, counterintuitive, but the issue at hand concerns the ability of simulationism to explain infantile amnesia, not the intuitiveness or counterintuitiveness of the consequences of its explanation. We may therefore set aside McCarroll's argument for the claim that simulationism cannot explain why one is unable to remember events that one underwent as a very young child and turn to his argument for the claim that simulationism implies that, under certain conditions, one might remember an event that one underwent before one was born.

3 Pre-birth memories

McCarroll's argument for the latter claim turns on the role played by the notion of the *personal past* in STM. Because the simulation theory, unlike the causal theory, does not include a previous experience condition, it implies, unlike the causal theory, that the fact that a subject did or did not

experience a given event does not, strictly speaking, matter with respect to the question whether his current representation of that event amounts to a memory of it; what matters is, instead, simply whether the event in question belongs to his personal past. This implication has a surprising ring to it, but whether it is problematic – or at least potentially problematic – depends on how the notion of the personal past is understood, and, in particular, on how its relationship to the notion of the *experienced past* is understood.

Three possible relationships need to be considered. First, the personal past might be understood in such a way that not all events included in a subject's experienced past are necessarily included in his personal past. If it is so understood, then STM implies that there are some experienced events that we cannot – even if the theory's other conditions are satisfied – remember. It is not immediately clear whether this implication is potentially problematic, but the implication is not that which concerns us here, and it can therefore be disregarded. Second, the personal past might be understood in such a way that the events included in a subject's personal past necessarily coincide with those included in his experienced past. If it is so understood, then, while STM implies that the fact that a subject did or did not experience a past event that he currently represents does not matter with respect to the question whether his representation amounts to a memory of that event, this implication is unproblematic: although simulationism defines remembering in terms of the personal past rather than the experienced past, if the events of the personal past just are the events of the experienced past, then the theory does not imply that we can remember nonexperienced events. Third, the personal past might be understood in such a way that not all events included in a subject's personal past are necessarily included in his experienced past. If it is so understood, then STM implies that the fact that a subject did or not experience a past event that he currently represents does not matter with respect to the question whether his representation amounts to a memory of that event, and this implication is potentially problematic: because simulationism defines remembering in terms of the personal past rather than the experienced past, the theory implies, if the events of the personal past can include nonexperienced events, that we can remember nonexperienced events. This highly counterintuitive implication – which is just NO-E – is the focus of McCarroll's discussion of infantile amnesia.

Now, simulationism as such is not committed to a definite view of the relationship between the personal past and the experienced past. But it is plausible – whether from a simulationist point of view or from a causalist point of view – that not all events included in a subject's personal past are necessarily included in his experienced past. At sufficiently young ages, for example, subjects might be incapable, strictly speaking, of experiencing

events (Michaelian, 2016c). Let us therefore assume, with McCarroll, that not all events included in a subject's personal past are necessarily included in his experienced past.[11]

Consider, for example, what we might refer to as "lost in the mall" (LITM) memories, which occur when memory researchers implant memories of events, such as being lost in a shopping mall as a young child, in subjects.[12] In a typical case, the researchers implant a memory of an event that did not occur and that the subject therefore did not experience, resulting in a falsidical memory. But there is nothing to prevent them from implanting a memory of an event that did occur, that belongs to the subject's personal past, and that the subject did experience, resulting in a veridical memory for an experienced event. Nor – if not all events included in a subject's personal past are necessarily included in his experienced past – is there anything to prevent them from implanting a memory of an event that did occur, that belongs to the subject's personal past, but that the subject did not experience (say, because he was too young to be capable of experiencing it), resulting in a veridical memory for a nonexperienced event. STM implies that, as long as PF is met, what goes wrong in cases of falsidical LITM memory is not that the subject *fails* to remember but rather that he *misremembers*, drawing on the information available to him to generate a representation of an event that did not actually occur. Correlatively, it implies that, as long as PF is met, nothing goes wrong in cases of veridical LITM memory, including veridical LITM memory for nonexperienced events: the subject *remembers*, regardless of the fact that he did not experience the event.[13]

The counterintuitiveness of this implication does not, by itself, mean that STM is incorrect, but McCarroll maintains that the problem here goes beyond mere counterintuitiveness, arguing that, because it endorses NO-E, STM has the implication that, under certain conditions, one might remember an event that occurred not when one was *too young* to be capable of experiencing it but rather before one was *even born*. This implication would seem to be not just counterintuitive but outright absurd; indeed, McCarroll refers to supposed pre-birth memories (memories of events that one underwent before one was born) as "impossible" (6). Quoting a passage from Salvador Dalí's autobiography in which the artist claims to remember events that he underwent while in his mother's womb, McCarroll argues that

> [w]hen Dalí and others claim to remember such early events, they certainly appear to be using their imagination; these states are also about events in their personal pasts; and the people who report remembering these events do not seem, on the face of it, to be suffering from amnesia or memory-related problems, so they seem to have reliably

> functioning episodic construction systems. In this sense, these states seem to satisfy the requirements the simulation theory places on genuine remembering. But these seem to be implausible attributions of memory. (6)

The logic of McCarroll's argument is straightforward. He claims, first, that, if STM is true, then Dalí might really remember the pre-birth events that he describes himself as remembering. He claims, second, that it is not the case that Dalí might really remember those events. He concludes that STM is false. McCarroll's point is, of course, not about Dalí in particular: if his argument works, then STM is false because it implies that all of us – more precisely: all of us who are endowed with properly functioning episodic construction systems – might remember pre-birth events.

Three basic responses to this argument are available to the simulationist. He might, first, concede defeat, acknowledging that STM entails that Dalí might remember the events in question and joining McCarroll in holding that it is not the case that he might remember them. He might, second, counterattack, arguing that it is not the case STM implies that Dalí might remember the events. He might, finally, dig in his heels, acknowledging that STM entails that Dalí might remember the events but maintaining that this does not amount to a problem for the theory because Dalí might in fact remember them.

Beginning with the first response, the simulationist will, if he adopts this response, either have to abandon simulationism or modify it so that it no longer has the problematic entailment. The most natural way of modifying STM so that it no longer has that entailment is by adding CTM's previous experience condition to the theory. We saw in section 1 that, because simulationism does not require, for the occurrence of genuine remembering, that the retrieved memory include any content deriving from the subject's experience of the remembered event, there is no apparent reason for the simulation theory to include the previous experience condition. That condition is, however, consistent with CR and PF, and one might reasonably hold that the need to avoid the conclusion that Dalí's pre-birth memories are genuine provides sufficient reason for incorporating it.

There are two problems with this response. First, in order for it to be workable, it would need to be the case that Dalí did not experience the events that he underwent while in the womb – that, while those events may form part of his personal past, they do not form part of his experienced past – but it is, since neither simulationists nor causalists have said much about the relevant notion of *experience*, not clear that the events do not in fact form part of Dalí's experienced past. If they do form part of his experienced past, then McCarroll's argument still goes through.

Second, to incorporate the previous experience condition would be to *deradicalize* simulationism significantly, in the sense that the resulting theory – call it "STM_{+PE}" – would be more closely in line with our intuitions than is STM and would to that extent be more conservative. Radicality with respect to our intuitions does not, of course, constitute an argument in favor of a theory. But neither, from a naturalistic point of view, does conservativeness. The original motivation for STM was, as noted in section 1, provided by empirical research on memory as a form of mental time travel and hence was naturalistic in character: while the theory was not designed *not* to respect our intuitions about particular cases of apparent memory, it was emphatically not designed *to* respect those intuitions. The fact that our intuitions tend to favor the previous experience condition is thus neither here nor there, as far as simulationism is concerned. One might, if one were so inclined, move from STM to STM_{+PE} in an attempt to bring the theory into line with our intuitions, but to do so would be foreign to the naturalist spirit of the original empirically-based argument for simulationism. Since no good intuition-based argument for simulationism is likely to be in the offing, it is difficult to see what sort of coherent motivation one might offer for STM_{+PE}, even if the theory itself is consistent.[14]

Turning, then, to the second response, let us consider whether it might be feasible for the simulationist to argue that it is not the case that STM implies that Dalí might remember the pre-birth events that he claims to remember. STM, again, says that a subject remembers an event just in case, first, he now represents it (CR) and, second, his representation was produced by a properly functioning episodic construction system that aimed to produce a representation of an event belonging to his personal past (PF). If Dalí represents an event that he underwent while in the womb, then CR is satisfied. If Dalí's episodic construction system functioned properly when it produced the relevant representation, and if the event constitutes part of Dalí's personal past, then PF is satisfied. Let us assume that Dalí might represent an event that he underwent while in the womb. There are then two moves that the simulationist might make here. First, he might argue that the event in question does not form part of Dalí's personal past. Second, he might argue that Dalí's episodic construction system could not have functioned properly when it produced the representation.[15] Let us consider each of these moves in turn.

The first move has some initial appeal: given that the event occurred before Dalí's birth, it would not be unreasonable for the simulationist to suggest that it does not form part of his personal past. Given that the notion of the personal past is a theoretical notion that has yet to be given a satisfactory definition,[16] it would also not be particularly persuasive. However, exactly, the notion of the personal past ends up being defined, an individual's personal past certainly begins (setting aside potential worries

about vagueness) at a specific point in time. There is no particular reason to suppose that it begins precisely at birth. It might begin later, but it might well begin earlier. The individual, after all, exists well before birth, and so his personal past might begin before birth. (Indeed, it might even, in principle, begin before the individual comes into existence, in which case STM would imply that the subject might remember not just *pre-birth* events but also *pre-conception* events.)[17] And, if the personal past does begin before birth, then Dalí's apparent memory might be of an event that forms part of his personal past. The first move thus need not be considered any further.

Something like the second move is anticipated by McCarroll, who suggests that,

> [i]f the simulation theorist wants to deny that [memories such as Dalí's] are genuine, then perhaps the most convincing argument would be to suggest that these individuals do not, or more precisely did not, have a reliably functioning episodic construction system. That is, the simulation theorist could tell us that there is a developmental aspect to the episodic construction system, and that because the episodic construction system is not fully developed, then events from such a young age cannot be remembered. (6-7)

McCarroll's suggestion here is that the simulationist might maintain that genuine memory presupposes that the episodic construction system functions properly throughout the memory process – not only at the time of retrieval but also earlier, at the time of encoding – and that this would, given that Dalí's memory is of an event that occurred so early in his development that his episodic memory system was not then functional at all, enable him to classify that memory as merely apparent. McCarroll himself points out that this strategy will not work, simply because STM – as a synchronic theory – requires only that the episodic construction system function properly at the time of retrieval, not that it have functioned properly at the time of the remembered event. The viability of a diachronic version of the simulation theory designed to take both retrieval and encoding into account is certainly worth investigating, but no such version of the theory has so far been proposed. The strategy described by McCarroll thus need not be considered any further.

Rather than attempting to classify Dalí's memory as merely apparent on the ground that his episodic construction system did not function (properly) at the time of the remembered event, as McCarroll suggests the simulationist do, the second move has the simulationist arguing – in line with the synchronic character of his theory – that Dalí's episodic construction system could not have functioned properly at the time of retrieval. McCarroll does not consider this move, apparently because he assumes that, given that Dalí did not suffer from amnesia or another memory disorder, his memory was produced by a properly functioning episodic construction system. This

assumption is plausible at first glance, but it is ambiguous upon closer inspection. When one says of an apparent memory that it is produced by a properly functioning episodic construction system, one might mean to say either that *the subject had a properly functioning episodic construction system* (i.e., an episodic construction system that in general functioned properly) when memory was produced or that *the subject's episodic construction system actually functioned properly* when it produced the memory. Neither of these claims implies the other: a system that in general functions properly might malfunction on a particular occasion, and a system that functions properly on a particular occasion might in general malfunction. It is the latter claim that the simulationist means to make when he says of an apparent memory that it was produced by a properly functioning episodic construction system: what matters when assessing the status of an apparent memory as genuine or merely apparent (e.g., confabulatory) is whether the subject's episodic construction system functioned properly when it produced that particular apparent memory (Michaelian, 2020). The question, then, is whether Dalí's episodic construction system functioned properly when it produced his pre-birth memories.

Because the question concerns particular apparent memories, there is no way for us to answer it with certainty – we simply lack the necessary knowledge of the state of Dalí's episodic construction system at the relevant times. We therefore cannot say with certainty whether simulationism implies that Dalí genuinely remembered specific events that he underwent while in the womb. But McCarroll's point, again, is not about Dalí's apparent memories in particular but about the class of memories like those that Dalí claimed to have. And it is clear that, because subjects do not, in general, have information that would enable them to reliably form accurate representations of pre-birth events, it is likely that, if a given episodic construction system produces a representation of such an event, then it does not function properly when it produces that particular apparent memory (even if it in general functions properly), which implies that pre-birth memories, as a class, tend to be produced by malfunctioning episodic construction systems. Regardless, then, of whether Dalí himself genuinely remembered specific events that he underwent while in the womb, most apparent memories of events that the subject underwent while in the womb are, simulationism implies, merely apparent.[18]

In short, STM implies that genuine memories of pre-birth events will be rare at best. It does not, however, imply that such memories are – as McCarroll takes them to be – impossible. It implies, on the contrary, that they are perfectly possible: CR and PF might both be satisfied by an apparent memory of a pre-birth event, and, if they are, then the simulationist is bound to conclude that the memory in question is genuine. We have already assumed that there is no barrier to the satisfaction of CR: one can form an

accurate representation of a pre-birth event. There is likewise no barrier to the satisfaction of PF: given enough information, one's episodic construction system might in principle produce such a representation without malfunctioning. The upshot is that, though he will soften the blow by pointing to the fact that simulationism implies that genuine memories of this sort are bound to be rare, the simulationist will ultimately have to abandon the second response to McCarroll's argument in favor of the third response, digging in his heels and acknowledging that STM entails that Dalí might remember events that he underwent while in his mother's womb but maintaining that this does not amount to a problem for the theory because Dalí might in fact remember those events.

Anticipating this response, McCarroll claims that it does not "fit the science" (7). He appears to have in mind, for example, Shaw's claim – which he quotes – that "the brains of babies are not yet physiologically capable of forming and storing long-term memories" (2016: 3). "The science", however, does not and cannot directly settle the issue at hand. The science may tell us that babies are incapable of forming and storing long-term traces, but this does not by itself have the consequence that we are incapable of remembering events that we underwent while in the womb. It has that consequence only if the truth of causalism – which holds that genuine remembering presupposes the retrieval of a trace originating in experience of the remembered event – is assumed. And the science does not favor the truth of causalism.

On the contrary: it favors simulationism. Neither causalism nor simulationism is straightforwardly entailed by the available empirical evidence (Perrin & Michaelian, 2017; Schirmer Dos Santos et al., Forthcoming). The basic argument for simulationism does, however, rest on an appeal to empirical evidence (Michaelian, 2016c), whereas the basic argument for causalism rests on an appeal to intuitions about hypothetical cases (Martin & Deutscher, 1966; cf., Bernecker, 2008, 2010).[19] There have, admittedly, been several recent attempts to make an empirical case for causalism (e.g., Perrin, 2018; Werning, 2020), but these attempts have a decidedly post hoc flavor, in that they amount to efforts by causalists to identify, in the face of the empirically-based simulationist challenge, empirical evidence in favor of a theory the initial support for which is entirely intuition-based (McCarroll, Michaelian & Nanay submitted). This does not mean that causalists will not eventually be successful in identifying convincing evidence in favor of the causal theory. But it does mean that, for the time being, the evidence favors simulationism over causalism: what we know about the involvement of the neurocognitive system that underwrites episodic remembering in forms of mental time travel including episodic future thought strongly suggests that memory does not presuppose appropriate causation, and, while recent causalists have been able to describe ways

in which particular memories might involve appropriate causation, they have yet to point to convincing evidence that memory as such presupposes appropriate causation.

Thus, to the extent that the science indirectly says anything about the issue at hand, it suggests – regardless of what scientists themselves may say in their more philosophical moments – that, though memories of this sort are bound to be rare, it is in fact possible for us to remember events that we underwent while in the womb. That implication is certainly counterintuitive. But it is not – when understood along simulationist lines – absurd: if to remember is to reliably imagine an event that belongs to one's personal past, and if we occasionally reliably imagine events that belong to our personal pasts but that we underwent while in the womb, then, surprising as it might be, we occasionally remember such events. Genuine memories of events that occurred before the rememberer was born are, contra McCarroll, not impossible.[20]

4 Radicalizing the simulation theory

Overall, then, McCarroll is partly right and partly wrong about the implications of simulationism with respect to pre-birth memories. He is right in that simulationism does indeed entail that genuine memories of pre-birth events are possible. He is wrong in that the fact that it entails this should not lead the simulationist to abandon his theory – or so the previous section attempted to show. The present section will argue that the fact that it entails that genuine memories of pre-birth events are possible should, on the contrary, lead the simulationist to consider revising the theory in such a way that it implies that genuine memories of events that occurred even earlier than those on which McCarroll focusses are possible. It will argue, in other words, that, rather than *de*radicalizing their view, simulationists ought to consider further *radicalizing* it.

We saw, in section 3, that the natural way of deradicalizing STM is by adding a previous experience condition to the theory, turning it into $\text{STM}_{+\text{PE}}$. The natural way of radicalizing STM is by subtracting the personal past condition – the presupposition that a properly functioning episodic construction system aims to produce a representation of an event belonging specifically to the subject's personal past – from the theory, turning it into what we might call $\text{STM}_{-\text{PP}}$.

($\text{STM}_{-\text{PP}}$) A subject *S* remembers *e* if and only if
(CR) *S* now represents *e*;
(PF′) *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 a past event.

Whereas STM says that to remember is to reliably imagine an event from the personal past, STM_{-PP} – radical simulationism – says that *to remember is to reliably imagine an event from the past, regardless of whether that event belongs to the* personal *past*.

Radicality, again, does not, in its own right, constitute an argument in favor of a theory. But there are both empirical and conceptual reasons that favor dropping the personal past condition. This is not the place to attempt to build a detailed empirical case against the condition, but it is worth noting that approaches such as scene construction (Hassabis & Maguire, 2009) treat remembering the events of one's personal past as being of a piece not just with imagining the events of one's personal future but also, more broadly, with imagining possible scenes, including scenes that do not involve oneself. If the neurocognitive system responsible for generating representations of events that belong to one's personal past or future is likewise responsible for generating representations of events that do not belong to one's personal past or future, a view on which there is no difference in kind between memory for the events of the *personal* past and memory for the events of the *non*personal past – a view on which both are instances of the same kind of memory – becomes plausible.

Such a view would not, it should be noted, prevent us from distinguishing between memory for the events of the personal past and memory for the events of the nonpersonal past, but it would prevent us from taking that distinction to correspond to a difference between kinds of memory, just as STM allows us to distinguish between memory (i.e., imagination) for the events of the personal past and imagination for the events of the personal future but does not allow us to take that distinction to correspond to a difference between kinds of imagination. On the suggested view, the relevant natural kind is neither memory for the events of the personal past nor memory for the events of the personal past plus imagination for the events of the personal future but rather imagination for possible events, with episodic memory being simply a past-directed form of this kind of imagination.

This is likewise not the place to attempt to build a detailed conceptual case against the personal past condition, but it is worth pointing out (again) that the notion of the personal past has yet to be given a satisfactory definition. We might treat the personal past as being equivalent to the experienced past, but, as we have seen, there are reasons not to do so. We might, therefore, treat it as being distinct from the experienced past, but, given that there is no other obvious way of defining the notion of the personal past, and given that we do not have a firm intuitive grasp of the notion, it then becomes unclear just what we are, according to simulationism, capable of remembering. Because it is unclear, on the one hand, *when* the personal past begins, simulationism might or might not imply that one

might remember pre-birth events. It might or might not imply that one might remember the moment of one's conception. And it might or might not imply that one might remember even pre-conception events. (Autobiographies, after all, sometimes begin by describing the events leading to one's conception.) Because it is unclear, on the other hand, *what* the personal past includes, simulationism might or might not imply that one might remember a wide range of different events. It is fairly clear that the personal past, if it includes anything, includes events in which one was involved as a conscious agent or of which one was aware as they unfolded in one's immediate vicinity, and hence, assuming STM, that one might remember such events. It is much less clear whether it includes – and hence whether, assuming STM, one might remember – events in which one was involved as an unconscious patient (e.g., events that occurred while one was asleep) or events that may have been personally relevant to one but of which one was only indirectly aware (e.g., events that one observed via a medium such as television). Radical simulationism avoids these difficulties by broadening the concept of episodic memory dramatically: episodic memory is not memory for the episodes *of the personal past;* it is simply memory for *episodes*.[21]

Since it treats any past-oriented output of a properly-functioning episodic construction system as a genuine memory, $\text{STM}_{-\text{PP}}$ will have consequences even more counterintuitive than those of STM. Raising the possibility that STM might already imply that one might remember one's conception, McCarroll asks how, if the simulationist is willing to say that one might remember one's *own* conception, he can avoid having to say that one might remember *another's* conception:

> Attributing memory to imaginative representations of such early events, when there is no real sense that there is a subject of experience, means that the simulationist seems to have shifted from a first-personal to a third-personal notion of episodic memory: as long as there is access to the right information in the present, I can imagine the moment of another person's birth just as well as my own, and they can imagine my birth just as easily as I can imagine it. But what is it, apart from a past subject of experience, that makes one imagining but the other remembering? Without a subject of experience, we seem to have lost the personal aspect of episodic memory. (7)

$\text{STM}_{-\text{PP}}$ makes no reference to the personal past and thus unambiguously implies that one might, in principle, remember not only one's own conception but also another's conception. It thus even more emphatically "loses the personal aspect of episodic memory". But that is, it should by now be obvious, precisely the point of moving from STM to $\text{STM}_{-\text{PP}}$. If radical simulationism is right, there is no deep difference between, for example, my "remembering" my own arrival in Grenoble in 2015 and my "imagining" Napoleon's arrival in Grenoble in 1815: both are – as long as CR and PF′ are satisfied – straightforwardly instances of episodic remembering. Episodic

memory, in other words, turns out not to be equivalent to what philosophers have sometimes (e.g., Locke, 1971; Sutton, 2010) referred to as "personal memory".

An opponent of radical simulationism might object that this amounts to a *reductio* of the theory: if radical simulationism implies that I might remember Napoleon's arrival in Grenoble in 1815 (in the very sense in which I might remember my own arrival in Grenoble in 2015), then, because it is absurd to say that I might remember that event (in the relevant sense), radical simulationism is false.

The opponent of radical simulationism is not, however, entitled, at this stage in the dialectic, simply to assume that it is not the case that I might remember Napoleon's arrival in Grenoble in 1815, for the argument for radical simulationism is at the same time an argument for the claim that I might remember that event. Thus, if he wishes to base an argument against radical simulationism on the claim that it is not the case that I might remember it, he must provide an argument – an argument that does not amount to a mere appeal to intuition or to the causal theory – for the claim.

An opponent might object, along similar lines, that, given that STM_{-PP} allows that one might remember events that do not form part of one's personal past, the radical simulationist will be hard-pressed not to allow, absurdly, that one might remember *future* events, for there would seem to be, by radical simulationist lights, no important difference between an accurate representation of a future event produced by a properly-functioning episodic construction system and an accurate representation of a past event produced by a properly functioning episodic construction system.

While it would, of course, be absurd to say that one might remember future events, the radical simulationist can acknowledge this. The fact that it would be absurd to say that one might remember future events does not imply that there is an important difference between memory and future thought. Both memory and future thought are, if radical simulationism is right, forms of imagination, differentiated simply by their respective temporal orientations. The absurdity arises, the radical simulationist will argue, simply because memory, by definition, pertains to the past: it is absurd to say that one might remember the future, but it is equally absurd to say that one might "future think" the past.[22]

If the radical simulationist defends his view by means of this argument, the opponent might object that, if the argument works, then an analogous argument shows that it is a mistake to say – as the radical simulationist does – that we can remember events that do not belong to our personal pasts: it is absurd to say that we can remember events that do not belong to our personal pasts, the opponent might argue, simply because memory, by definition, pertains to the personal past.[23]

In reply, the radical simulationist will argue that this objection rests on a misunderstanding of the point of saying that memory, by definition, pertains to the past. The point is not that the concept of memory is such that the possibility of remembering the future is absurd. The point is rather that, as a practical matter, given the way the term "memory" has been and will no doubt continue to be used, saying that we might remember the future would lead to confusion. Simulationists are interested, first and foremost, not in the concept of memory but rather in memory as a natural kind (Michaelian, 2016c). They argue that there is no difference, at the level of natural kinds, between the process that produces our representations of the events of the personal past and the process that produces our representations of the events of the personal future. Radical simulationists go further, arguing that there is no difference, at the level of natural kinds, between the process that produces our representations of the events of the personal *or nonpersonal* past and the process that produces our representations of the personal *or nonpersonal* future. Radical simulationists will continue to use "memory" to refer to the instances in which this process produces representations of past events, but they will do so simply because we care about temporal orientation. Using the term "memory" to mark the fact that a given representation is of a past event and the term "future thought" to mark the fact that a given representation is of a future event does not commit the radical simulationist to recognizing a distinction, at the level of natural kinds, between memory and future thought. Of course, using the term "memory" to mark the fact that a given representation is of an event belonging to the personal past would similarly not commit the radical simulationist to recognizing a distinction, at the level of natural kinds, between memory and the form of imagination responsible for producing representations of past events that do not belong to the personal past. If the argument for radical simulationism is on the right track, however, this is not a fact that we should want to mark, whereas it may be useful, even if the argument for radical simulationism is on the right track, to mark the distinction between those outputs of the episodic construction system that target past events and those that target future events.

Pressing a different sort of objection, an opponent might argue that $\text{STM}_{-\text{PP}}$, because it implies that I might remember Napoleon's arrival in Grenoble in 1815 in the very sense in which I might remember my own arrival in Grenoble in 2015, overlooks an important difference between the phenomenology of the former memory and that of the latter. Following Tulving (1983), many (e.g., Klein, 2015; Mahr & Csibra, 2018) take *autonoesis* – defined as consciousness of the self in subjective time – to be essential to episodic memory. Presumably, a memory in which the rememberer's self does not figure cannot involve autonoesis. This might be taken to suggest

that there is an important difference between my memory of Napoleon's arrival in Grenoble in 1815 and my memory of my own arrival in Grenoble in 2015.

Those who characterize episodic memory in terms of self-related phenomenology are indeed likely to reject STM_{-PP}. For two reasons, however, this is not a particularly important strike against the theory. First, it is by no means obvious that a phenomenological difference of the relevant sort between two memories indicates that those memories belong to different kinds. Second, autonoesis, like the phenomenology of remembering in general, remains poorly understood, and there is little reason, beyond the assertions of Tulving and those who follow him, to take it to be essential to remembering.

Picking up on the thought that radical simulationism will have to make autonoesis inessential to episodic remembering, an opponent might argue that the radical simulationist is unable to recognize the distinction between episodic and *semantic* memory. Rowlands, for instance, argues that "any attempt to understand episodic memory as memory of episodes is that it threatens to collapse the distinction between episodic and semantic memory. This is for the simple reason that many semantic memories are also memories of episodes" (2018: 281). The thought behind the objection is that it is not enough, for the episodicity of a memory, that it be a memory of an episode: an additional ingredient – present in in my memory of my own arrival in Grenoble in 2015 but, if Rowlands is right, absent from my memory of Napoleon's arrival in Grenoble in 1815 – is required.

It may or may not be the case that episodicity requires such an additional ingredient, but, if it does, autonoetic phenomenology is not the only available additional ingredient. There are at least two possibilities that need to be considered here.[24] First, episodic memory may be distinguished from semantic memory by a non-phenomenological factor, such as the format of the representations that episodic remembering produces. Whereas the representations produced by semantic remembering are often taken to be propositional in character, those produced by episodic remembering are generally taken to have an imagistic format (that is, roughly speaking, to be of the same sort as those that are involved in perception). It may be overly simplistic to take semantic representations to be propositional, as some semantic representations – e.g., my memory of the layout of my office – arguably have an imagistic format. An appeal to phenomenological differences may thus turn out to be necessary to distinguish episodic from semantic memory. Second, episodic memory may be distinguished from semantic memory by a kind of phenomenology other than autonoesis. Tulving (2002a), for example, views not only autonoesis but also chronesthesia – a kind of consciousness of subjective time that does not involve the self or that involves it less centrally and that he takes to be related to but

distinct from autonoesis – to be essential to episodic memory. Chronesthesia, which, if it does not involve the self, might be present both in my memory of my own arrival in Grenoble in 2015 and in my memory of Napoleon's arrival in Grenoble in 2015, may provide a means of distinguishing between episodic and semantic memory in phenomenological terms that is consistent with radical simulationism. Thus, while there is certainly work for the radical simulationist to do here, the objection is unlikely to be fatal.

Continuing to press the thought that radical simulationism will have to make autonoesis inessential to episodic remembering, an opponent might argue that radical simulationism will have difficulty accounting for our ability to distinguish between representations of events belonging to the personal past and representations of events belonging to the nonpersonal past. The most obvious way of explaining this ability is in terms of autonoesis: if representations of the former sort come with autonoesis and representations of the latter sort do not, then there is no mystery about how the subject can tell whether or not he is thinking about his own past. But it would seem, on the face of it, that radical simulationism cannot avail itself of this explanation.

In reply, the radical simulationist can point out that the fact that autonoesis is inessential to episodic remembering does not mean that autonoesis does not exist: if radical simulationism is right, then episodic memories may be of either the personal past or the nonpersonal past, but this is compatible with the possibility that episodic memories that are of the personal past come with autonoesis, whereas episodic memories that are not of the personal past do not. He can point out, moreover, that subjects may rely, in order to distinguish between representations of events belonging to the personal past and representations of events belonging to the nonpersonal past, on the content of the representations in question, in addition to their phenomenology.[25]

Radical simulationism thus appears to be likely to survive a number of obvious objections. More will no doubt be forthcoming, but we may conclude that $\text{STM}_{-\text{PP}}$ is a view that both simulationists and their opponents ought to take seriously.

Notes

1. Section 1 of this paper overlaps significantly with section 1 of Michaelian (Forthcoming a), with which it originally formed a single paper.
2. On the continuism-discontinuism debate, see, Michaelian et al. (2020), Langland-Hassan (Forthcoming), and Schirmer Dos Santos et al. (Forthcoming). This paper will assume, as is standard, that causalism aligns with discontinuism and simulationism with continuism, but see, Langland-Hassan (2021) and Sant'Anna (2021) for alternative views. Variants of causalism have proliferated in recent years (Michaelian & Robins, 2018). This paper will take a generic causalism along the lines of that

developed by Martin and Deutscher (1966) for granted. Variants of simulationism that may be compatible with causalism have been proposed (De Brigard, 2014a; Hopkins, 2018; Shanton & Goldman, 2010). This paper will take the postcausal simulationism of Michaelian (2016c) for granted. Note that Michaelian (2021) defends a simulation theory that differs significantly from that originally proposed in Michaelian (2016c). This paper will, since the response to McCarroll developed here is available to partisans of both versions of the theory, focus on the simpler version proposed in Michaelian (2016c).

3. Relationalist alternatives to representationalism have been receiving increasing attention. While these are worth taking seriously (Aranyosi, 2020; Moran, Forthcoming; Sant'Anna, 2020), they will not be considered here.
4. The contentful character of memory traces has recently been contested (see, Hutto, Forthcoming; Hutto & Peeters, 2018; Michaelian & Sant'Anna, 2021; Werning, 2020). McCarroll's critique of simulationism assumes that traces are contentful, as does Michaelian's (2016c) formulation of simulationism, and contentless approaches will thus not be taken into account here. There is a general lack of clarity in the literature concerning the nature of memory traces (see, De Brigard, 2014b; Robins, 2017a, 2017b); given that, as argued below, both causalism and simulationism will invoke traces in explaining infantile amnesia, this lack of clarity may pose problems for both accounts.
5. See, Bernecker (2017) and Robins (2016, 2019, 2020b) for causalist treatments of confabulation.
6. References to McCarroll in what follows are to McCarroll (2020), Andonovski (2019), Perrin (2021), and Werning (2020) for critiques of other aspects of simulationism.
7. McCarroll argues that its commitment to NO-C renders simulationism unable to account not only for infantile amnesia but also for forgetting. See, Michaelian (Forthcoming a) for a full response to this aspect of McCarroll's argument.
8. Thanks to two anonymous referees for encouraging me to think more carefully about this issue.
9. The simulationist might be tempted to argue, at this point, that, while I can indeed imagine my first birthday party, I cannot do so in the relevant sense of "imagine". As Langland-Hassan (2021) has pointed out, the simulationist owes us a description of the kind of imagination of which he takes memory to be a form. Langland-Hassan himself suggests that the kind of imagination at issue is what Van Leeuwen refers to as "constructive imagination", which the latter characterizes as "the capacity to form novel representations" (Van Leeuwen, 2013, p. 224). One might, in principle, suggest that the kind of imagination at issue is, instead, the judgment-involving imagistic imagination described elsewhere by Langland-Hassan (2020) and maintain that I am unable to imagine my first birthday party because, while I can form a mental image of my first birthday party, I cannot, given that I am aware that I lack sufficient knowledge of that event to enable me reliably to form accurate mental images of it, judge that that image accurately represents my birthday party. There are several problems with this strategy. First, given the possibility of nonbelieved memories (Mazzoni et al., 2010), it is not clear that simulationism takes or ought to take memory to be a form of judgment-involving imagistic imagination. Second, there is no apparent reason to rule out the possibility that I might not be aware that I lack sufficient knowledge of my first birthday party to enable me reliably to form accurate mental images of that event. Finally, and most seriously, if my mental images of the event are sufficiently

schematic, I might correctly take myself to be able reliably to form accurate mental images of it and therefore judge that a given image accurately represents my first birthday party.

10. See 118–119 on "lost in the mall" memories (more on which below).
11. In order to enable us to assume with confidence that not all events undergone by the subject count as being experienced by him, more would have to be said about the relevant notion of experience. If what matters here is conscious experience, the assumption seems safe, but, as emphasized below, neither causalists (whose theory includes a previous experience condition) nor simulationists have said much about experience.
12. Analogous memories might and presumably do occur in non-laboratory settings.
13. It may be necessary to distinguish between *lucky* and *nonlucky* veridical LITM memory. In any case of veridical LITM memory, another agent (such as an experimenter) provides the subject with accurate information about an event from his personal past. In some cases, the agent intends to provide accurate information and does so. There is no luck at work in such cases, and it is reasonable for the simulationist to treat the representations that the subject comes, as a result, to entertain as successful memories. In other cases, however, the agent intends to provide inaccurate information but inadvertently provides accurate information. There is a form of luck at work in such cases, and the simulationist may therefore wish to treat the resulting representations as unsuccessful memories. STM's proper function condition may be sufficient to enable him to do so, or it may be necessary to add a separate anti-luck condition to the theory (Michaelian, 2021, Forthcoming b). For the sake of simplicity, we may simply assume that the veridical LITM cases at issue here are cases in which whatever conditions end up being necessary are satisfied.
14. Indeed, it is difficult to see how one might coherently move from STM to STM_{+PE} in order to bring the theory into line with our intuitions about Dalí cases and yet resist incorporating an appropriate causation condition into the theory in order to bring it into line with our intuitions about the cases of absent and deviant causation that originally motivated the causal theory (Martin & Deutscher, 1966). But "STM_{+PE+AC}" would no longer be a simulation theory – it would be a version of the causal theory, roughly in the vein of that defended by Michaelian (2011).
15. McCarroll suggests a third possible move: the simulationist might appeal to the "internality" condition on remembering introduced in Michaelian (2016b). As McCarroll argues convincingly that the move cannot succeed, and as Michaelian et al. (2020), Michaelian & Sant'Anna (2021), forthcoming b) argues that the internality condition ultimately turns out to be a poor fit for simulationism, this move will not be considered here.
16. The notion of the personal past was introduced but not defined by Tulving (e.g., Tulving, 1983). Borrowing the notion from Tulving, Michaelian (2016c) considers difficulties involved in defining it in terms of the experienced past and suggests that the personal past be defined in terms not of the events that the subject has experienced but rather of the events in which he has been involved but does not say what it is for a subject to be "involved" in an event, rendering this definition uninformative.
17. This possibility will be considered in section 4 below.
18. The version of the simulation theory developed in Michaelian (2021) requires, for successful memory, reliability not just at the level of the retrieval process but also at the level of the metacognitive monitoring process that accompanies retrieval. If Dalí was sincere when he claimed to remember pre-birth events, this may have been due in part to a failure of metacognitive monitoring of a kind that, on the version of

simulationism in question, would imply that the relevant memories are unsuccessful. There may thus be an additional reason to suppose that simulationism implies that most apparent memories of the relevant sort are merely apparent.

19. There is no need to rehearse these arguments here; see, Michaelian and Robins (2018) for an overview.
20. An opponent might object that the simulationist approach to pre-birth memories has the consequence that the frequency with which we remember such events depends in an important sense on the environment in which we happen to find ourselves: in an environment in which subjects receive suitable testimony more often than they do in the actual environment, memories of pre-birth events might be considerably more frequent than they are in the actual environment. This consequence is not obviously problematic, but it does mean that the adequacy of the simulationist approach depends on the accuracy of the assumption that we receive testimony of the relevant sort only infrequently. Research on the role of interactions with caregivers in the development of memory (e.g., Fivush & Graci, 2017) may provide a starting-point for assessing the accuracy of this assumption.
21. Aranyosi (2020) offers an additional reason in favor of rejecting the personal past condition, arguing that it amounts to a means of smuggling *factivity* – which the simulationist rejects (Michaelian, 2016c) into the simulation theory. Referring to an event in his grandfather's life, he writes:

    Suppose I can imagine this [event] so well and in so much detail that it really feels as my own past. Is this the same as remembering that [event]? It is not clear, as far as simulationism is concerned. It does appear as though I am deploying the episodic construction system, which aims at representing my past, because it really feels as *my* past. Now, if Michaelian claimed this can't be remembering because it is not really my past, then he would smuggle some form of factivity back into the analysis. (377)

    Aranyosi's thought here appears to be that, if the personal past is defined in terms of the events in which the subject was involved, then to say that a given event belongs to the personal past is to say that it is "something that happened to me", which implies that it is "something that happened" (377), i.e., that the event actually occurred. Now, it is not clear, as noted above, whether the personal past should be defined in terms of the events in which the subject was involved, but let us suppose, for the sake of argument, that, if an event belongs to the personal past, then it is an event in which the subject was involved. What STM says is that a subject remembers only if his episodic construction system aims to produce a representation of an event belonging to his personal past. What the factivity condition says is that a subject remembers only if his episodic construction system produces a representation of an event that actually occurred. The point to note is that it does not follow from the fact that a subject's episodic construction system aims to produce a representation of an event belonging to his personal past that his episodic construction system produces a representation of an event that actually occurred, even if we suppose not only that, if an event belongs to the personal past, then it is an event in which the subject was involved but also that, if a subject was involved in an event, then the event actually occurred; what follows is merely that a subject remembers only if his episodic construction system aims to produce a representation of an event that actually occurred. But it is, of course, one thing for an episodic construction system to *aim* to produce a representation of an event that actually occurred and another for it to *succeed* in producing a representation of an event that actually occurred. Aranyosi's argument thus does not go through.

22. Note that an analogous objection can be directed against STM. There would seem to be, by simulationist lights, no important difference between an accurate representation of a personal future event produced by a properly-functioning episodic construction system and an accurate representation of a personal past event produced by a properly functioning episodic construction system. STM thus suggests that one can remember the personal future. This is, on the face of it, no less absurd than STM_{-PP}'s suggestion that one can remember the (nonpersonal) future. Simulationists who are persuaded by the objection against radical simulationism thus should not be tempted to retreat from STM_{-PP} to STM.
23. Thanks to an anonymous reviewer for suggesting this objection.
24. There may be other possibilities. It is worth noting that there are candidates, in addition to phenomenology and representational format, for the ingredient that distinguishes episodic from semantic memory. Tulving's later definitions of episodic memory, e.g., characterize it in terms of its evolutionary history, its development across the lifespan of the individual, its proneness to dysfunction, and its probable human uniqueness, in addition to its phenomenology (Tulving, 2002b).
25. Cf., Michaelian (2016c) on process monitoring.

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