

Robins, S.K. (2022). Episodic memory is not for the future. In A. Sant’Anna, C. McCarroll, and K. Michaelian (eds.), *Current Controversies in the Philosophy of Memory*, (pp. 166–184), Routledge.

## **Episodic Memory is Not for the Future**

Sarah Robins

### **1. Introduction**

*Memory is for the future.* This claim has become increasingly common amongst memory scientists and philosophers of memory in recent years. It is striking. Memory involves retention of information and experience from the past, so it has traditionally been assumed that the function of memory should match this orientation. The motivations researchers have for turning memory toward the future are varied. Collectively they have served to reignite interest in what once seemed a well-settled question: what is the function of episodic memory?

Here I focus on the Constructive Episodic Simulation Hypothesis (CESH), one of the most prominent accounts of episodic memory’s prospective function (Schacter & Addis, 2007; Addis, Wong, & Schacter, 2007). CESH theorists claim they have “redefined the function of episodic memory as primarily future-focused” (Addis 2018: p. 65). Despite the popularity of the view, I argue that CESH has not established that episodic memory’s function is for the future.

The argument proceeds in two steps. First, I illustrate how the CESH claim that episodic memory’s function is future-focused depends on episodic remembering and episodic imagining being the same cognitive activity. Second, I argue that this claim does not hold: episodic remembering and episodic imagining are *not* the same cognitive activity. Even if they are both constructive, as CESH theorists maintain, they involve importantly distinct forms of construction.

Before beginning, I note some points of contact with Mahr’s paired chapter on this controversy over the function of episodic memory. While our approaches differ, there are some key claims on which we agree. We both advocate for more careful consideration of functions in this literature, and we agree that progress on the question of episodic memory’s function requires more attention to the nature of remembering and its distinction from imagination. What’s more, our accounts of remembering appear to be, at least largely, complementary. We part ways on the question of which approach to functions is more pressing and fundamental, and we differ in how we relate the account of remembering to the search for episodic memory’s function. Mahr begins with an account of remembering, and then uses this account to advocate for a particular view of episodic memory’s etiological function. I focus first on its causal-role function, and then use that focus to highlight what is distinct about episodic remembering.

### **2. The Constructive Episodic Simulation Hypothesis**

In 2007, *Science* declared the discovery of similar brain areas supporting memory and imagination one of its 10 breakthroughs of the year (*Science* 318: 1848-1849). The discovery was—and remains—exciting because it challenges the standard conception of episodic memory as a distinct capacity for faithfully resurrecting past events. There is now extensive research on the neural overlap between memory, imagination, and other forms of self-projective thinking,

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which recruit the same ‘core network,’ including the medial temporal lobes, hippocampus, retrosplenial cortex, medial prefrontal cortex, and the inferior parietal lobule/intraparietal lobule (Addis, Wong, & Schacter 2007; Szpunar, Watson, & McDermott 2007; Schacter et al. 2015).

These findings serve as the motivation for the *Constructive Episodic Simulation Hypothesis* (CESH), which has quickly become one of the most influential accounts of episodic memory. The account is novel because it breaks with the traditional focus on episodic memory as a distinct neurocognitive capacity focused on representing the past.

The CESH has three central claims.

1. *What it is.* Humans possess a single neurocognitive system for the purposes of constructive episodic simulation (CES). The system includes information acquired from past events that is stored in the memory system, and various simulation processes that act on this stored information. Information storage in the CES system is organized so as to facilitate this constructive process—i.e., information from particular past events is stored in a distributed manner that allows, and even encourages, flexible recombination of event details across simulations.
2. *How it works.* In simulations, the CES constructs representations by flexibly retrieving and recombining the event information in its memory system. The types of simulations involve remembering, imagining, counterfactual reasoning, and future planning. The constructed representations are episodically-framed events (i.e., from a first-person, auto-noetic perspective). These representations can be directed toward the past or the future, as well as to counterfactual and hypothetical scenarios.
3. *What it’s good for.* The flexible nature of information storage in the CES system is beneficial for imagining, and for combining event details in novel ways so as to think about the future or counterfactual and hypothetical scenarios. The flexible storage is detrimental for one of the constructive activities—remembering the past—and so can result in errors in these cases. Overall, however, the CES system is adaptive.

These features of how the CES is organized and operated are meant to provide the warrant for thinking of episodic memory as having a prospective function. To see how this is meant to work, we must first explore the sense of function at issue and then how this function becomes future-focused. The next two subsections take up these inquiries.

## 2.1 How do CESH theorists understand function?

When CESH proponents talk about the function of episodic memory and other forms of simulation, what sense of function do they have in mind? CESH theorists themselves do not provide an answer. More generally, philosophers of memory have not engaged much with the

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extensive literature on functions in the philosophy of biology and philosophy of science.<sup>1</sup> Discussion of biological functions has generated two broad classes of functions: etiological and causal-role functions (Garson 2016). Most philosophers of biology are *pluralists* about these functions—i.e., they think each has a role to play in the biological sciences. Since there are multiple, viable accounts of biological function available, it is important to determine which the CESH is committed to, as each has distinct requirements and implications. My aim here is not to pair CESH with a particular account of function—that would require more space than is available in the present chapter. Instead, my aim is to situate the CESH with respect to the general divide between two broad categories of biological function.

Accounts of function focus on a specific trait, property, or characteristic. Etiological functions seek to explain the existence of the trait; *why* does it exist? Etiological accounts thus appeal to teleology, selected effects, or fitness in order to answer the question. Causal-role accounts, in contrast, seek to explain the trait’s role in the overall system in which it is currently embedded. *How* does the trait work? These accounts identify the trait’s functional role and, depending on the particular account, may also include particular mechanistic (neural or biological) details. Which account of function one uses will depend on the trait in question and the methods and resources available and of interest to the researcher. In principle, however, both functional accounts could be given for any trait. Take, for example, the topographic organization of the visual cortex—the part of the brain responsible for processing visual information that is structured so that adjacent parts of the cortex represent adjacent parts of the visual field (e.g., Wandell, Dumoulin, & Brewer, 2007). We could ask about its etiological function—why does this organizational structure exist? An answer here would be given in terms of selective advantages of this trait, or its emergence as a byproduct of some other trait, etc. We can also ask about its causal-role function—that is, how this organization of the visual cortex influences the nature of processing in the visual system and cognition more broadly.

Given the choice between etiological and causal-role approaches to function, at first glance it appears that CESH is best understood as an etiological account of episodic memory’s function. One of the central claims of CESH, as outlined above, involves consideration of the overall adaptiveness of this system, suggesting attention to questions of *why* this trait exists. Closer inspection, however, reveals that the sense of “adaptive” at use in CESH is distinct from use of the term in evolutionary contexts. For CESH theorists, “adaptive” is meant to characterize “beneficial characteristics of an organism” (Schacter 2012: 604). CESH theorists connect use and enhancement of CES to decision-making, emotional regulation, and spatial navigation (Schacter, Benoit, & Szpunar, 2017). Increasing the amount of constructive episodic simulation a person engages in is thought to help with a range of cognitive processes. Discovering that some of these roles confer benefits on the individual is interesting, but it is not an account of etiological function, where benefits are more narrowly construed in terms of selective and reproductive advantage.

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<sup>1</sup> Schwartz (2020) is a notable exception.

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Instead of considering the selective advantages of episodic simulation, CESH theorists are investigating the scope of this system, how it works, and what role it plays in our cognitive processing more generally. They are, in short, offering an account of the causal-role function of the CES system. Explorations of how the system is adaptive are part of this broader investigation of how CES works. In pursuing these possible benefits, however, CESH theorists should proceed with caution. Whether a cognitive process confers benefits on the individual is a separate question from what the cognitive process *is*. Identifying benefits of episodic simulation can provide an indication of the other cognitive processes to which CES is connected, but there is no general adaptive constraint on causal-role functions as there is for etiological ones. Going forward, all references to the function of episodic memory and the CES should be read as causal-role functions.

## 2.2 How does CESH make episodic memory future-focused?

CESH theorists characterize episodic memory, and its function, in terms of the broader CES system in which it is embedded. The function of episodic memory just is the function of the CES system—or at the very least, the function of episodic memory is parasitic on the function of the CES system. There are two key steps in the argument via which CESH theorists establish the prospective function of episodic memory and the CES.

First, CESH theorists defend the claim that all forms of episodic simulation are the same—they are particular expressions of one general ability (to construct episodically-framed event representations). As Addis (2018) puts the point, “memories are not special or different than imaginings; both are complex, multimodal event representations constructed via the integration of schema and informational elements stored in content-specific areas of the cortex” (p. 66). Forms of episodic simulation may differ in the tense assigned to the constructive representation that is generated: it may be represented as from the past, about the future, or as hypothetical or counterfactual. Aside from this tense assignment, the underlying process is the same. Episodic remembering is essentially the same activity as episodic imagining. All forms of episodic simulation can be understood in terms of a single function.

Second, in order for this primary function of the CES to be *for the future*, the CESH theorist needs episodic imagination/future thinking, rather than episodic remembering, to be the primary or central activity of the episodic memory system. CESH theorists are not particularly explicit about how they defend this claim. The defense comes, presumably, from a survey of the various forms of episodic simulation and an assessment of which forms are most reliable – i.e., generate the fewest errors. Here, episodic remembering and its tendency toward false memory fares poorly. Episodic imagination is comparatively stronger, and the benefits of simulating future events for other cognitive activities (Schacter, Benoit, & Szpunar, 2017) offer reason for thinking of this as the primary activity of CES.

For the purposes of this chapter, my focus is on the first move in this argument: collapsing episodic imagining and episodic remembering into two instantiations of the same general cognitive operation. This equivalence grounds the claim that CES has a particular

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function, which is then articulated as a *prospective* one. CESH theorists have long defended the similarity of episodic remembering and episodic imagining. In a recent set of papers, Addis (2018; 2020) strengthens the claim, arguing for their equivalence. In the next section, I ask whether Addis’ account can support the claim that episodic remembering and episodic imagining are the same cognitive activity.

### 3. Addis’ (2020) Criteria for Episodic Remembering and Imagining

In this section, I ask whether episodic remembering and episodic imagining should be considered the same cognitive process, as CESH proponents propose in an effort to establish the claim that episodic memory’s function is prospective. In a series of recent papers, Addis (2018; 2020) advocates for a strong reading of the CESH, according to which episodic memory and episodic imagination are the same neurocognitive process. Specifically, she claims that episodic remembering and episodic imagining are:

1. Subserved by the same brain system,
2. Act on the same information, and
3. Are governed by the same rules of operation (2020: p. 1).

I discuss each criterion in a distinct section below, evaluating their relevance for determining the causal-role function of episodic memory. I argue that our focus should be on the third—being governed by the same rules of operation.

#### 3.1 Same Brain System

The first criterion is the one that initiated interest in the CESH: the finding that episodic remembering and episodic imagining rely on the same brain system. Neuroimaging evidence accumulated over the past decade and a half makes clear that there is significant overlap in the brain regions that are recruited when participants are asked to remember past events and when they are asked to imagine future ones. It’s worth noting that the vast majority of these studies show *overlap* in the brain regions involved in these two activities, but for the purposes of this paper, I am happy to accept the stronger claim that episodic remembering and episodic imagining are subserved by the same brain system. What I want to question is whether this is enough to ground a claim of shared function. As I argue below, there are a number reasons to be skeptical of that claim.

To start, a general point: sharing a brain system is not sufficient for sharing a function. There are myriad instances of biological and cognitive functions sharing an underlying mechanism, even a brain region, when such inference is not warranted. Our sensory capacities of smell and taste, for example, are both based in chemoreception, but that does not establish a shared function between the gustatory and olfactory systems. Language processing and musical appreciation also rely on the same brain regions, but are recognizably distinct functions (Peretz et al. 2015; for an extended argument on this point, see Robins & Schulz, under review). Moreover, many philosophers and neuroscientists now advocate for an understanding of neural systems as *multifunctional* (Anderson 2010; McCaffrey 2016). If a shared function is to be found

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across brain systems, many neuroscientists now think that figuring out what it is will require a massive overhaul of our cognitive ontology (e.g., Price & Friston 2005; Poldrack et al. 2009).

CESH theorists are not claiming that sharing a brain system is sufficient for uniting the various forms of episodic simulation as a single function. The view does have its origins, however, in the discovery of their neural overlap (as discussed in Schacter 2019). How far can this identified brain system take us in understanding the function of episodic simulation? The brain system by which episodic remembering and episodic imagining are both subserved is the *Default Mode Network*, or DMN. As a recognized brain system, the DMN is a relative newcomer. The first paper suggesting its existence was in 1997 (Schulman et al., 1997). The DMN has, however, quickly become one of the most extensively investigated brain systems. As of 2015, there had been more than 3000 papers published about the DMN (Raichle, 2015). This is in part because the DMN is large and somewhat diffuse. It has distinct subsystems, each of which has a somewhat distinct functional characterization. As Raichle expresses: “data from humans suggest that the default mode network instantiates processes that support emotional processing (VMPC), self-referential mental activity (DMPC), and the recollection of prior experiences (posterior elements of the default mode network). These functional elements of the default mode network can be differentially affected during task performance by the nature of the task” (2015: 440). Each of these subsystems has a broad functional characterization, subsuming several cognitive abilities and activities. Even the posterior subsystem associated with episodic remembering and episodic imagining is also associated with story comprehension and mind-wandering (Buckner et al. 2008). To arrive at a functional characterization that encompasses all of these activities, even of a DMN subsystem, is quite difficult. The shared structure may indicate similarities in function, but they fall far short of establishing that this range of cognitive activities as sharing a single, well-defined function.

### 3.2 Same Information Base

Addis’ second criterion for treating episodic remembering and episodic imagining as fundamentally the same is that they act on the same information. As she elaborates, both activities “draw on elements of experience from fine-grained perceptual details to coarser-grained conceptual information and schemas about the world” (Addis 2020).

As with the previous criterion, I do not wish to dispute the claim that episodic remembering and episodic imagining may be the same in this regard. What I want to question instead is whether this sameness is enough to warrant considering these two activities as having a shared function, or being the same neurocognitive process. It seems relatively straightforward to assume that remembering the personal past and imagining a possible personal future make use of the same information. If I want to think about what I might be doing at this time of the year a few years in the future, my thoughts about that possible future will likely be derived from my detailed knowledge of how events in my life (particularly during this time of year) have gone before, updated so as to reflect how they might be combined and reconfigured in the future. In fact, it is unclear what the alternative hypothesis would be. Where would the components of our thoughts about future events come from, if not from past event information?

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The use of the same informational base in both episodic remembering and episodic imagining is especially unsurprising in the experimental contexts where CESH is investigated. In these studies, researchers are comparing the brain areas active during remembering and imagining. To do so effectively, experiments are designed to hold as many other features of the two tasks constant as possible. Participants are generally instructed to generate mental representations with a particular structure, differing only in whether they are directed at the past or the future. Take, for example, one of the original studies exploring the CESH: Addis, Wong, and Schacter (2007). In this study, participants were given a set of cue words (e.g., *dress, yellow, star*), which they would use to generate event representations. They were instructed to make the representations temporally and contextually specific (i.e., occurring in a particular place at a particular time). In response to the presentation of a cue, participants were instructed to either “recall a past event” or “envisage a future event.” They were also given a timeframe: either recent (within a year) or remote (5-20 years in the past or in the future). In response to *yellow*, for example, a participant engaged in recent remembering might generate a representation of visiting a sunflower field last fall. A participant who received the same cue, but was instructed to imagine a remote future, might imagine buying a yellow house a decade from now.

The point can be put more broadly: there are many cases where two cognitive activities make use of the same information and yet remain importantly distinct functions. Balancing one’s checkbook and estimating the number of people attending a rally both involve numerical representations and addition. Writing a poem and transcribing a city council meeting involve linguistic representations and spelling. Sharing an information base does not interestingly contribute to making two cognitive activities the same.

### 3.3 Same Cognitive Operation

I have argued that the first two of Addis’ proposed criteria are not particularly useful for establishing that episodic remembering and episodic imagining are the same cognitive process. There is one criterion remaining: that these two activities are governed by the same rules of operation. According to Addis, “both are complex, multi-modal event representations constructed via the integration of schema and informational elements stored in content-specific areas of the cortex” (2020).

Unlike the previous two criteria, this one seems particularly well suited to considerations of function, as it is focused on the operative processes of both episodic remembering and episodic imagining. These processes are, or at least directly inform, the causal-role function. Determining whether they are in fact the same process is critical for determining whether episodic remembering and episodic imagination have the same function.

What is the shared operation? CESH claims that both of these activities are constructive: they involve the retrieval of event details from episodic memory, which are then built into representations of episodically-framed events.<sup>2</sup> These event representations may be directed

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<sup>2</sup> Thinking of episodic remembering and episodic imagining as two forms of constructive imagination finds support beyond CESH (see Michaelian, Perrin, & Sant’Anna (2020) for a

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toward the past or the future, but the addition of tense is a mere add-on to what is, essentially, the same constructive operation. If this can be established, then episodic remembering and episodic imagination will have been shown to have the same causal-role function.

#### 4. Episodic Remembering and Episodic Imagining as Associative Networks

In the previous section, a shared constructive operation was identified as the feature that must be shared by episodic remembering and episodic imagining if they are to be considered to share a function. Addis (2020) defends the sameness of episodic remembering and imagining on these grounds, proposing that their shared cognitive operation is spreading activation across associationist networks. Here I evaluate that proposal, illustrating how associationism fails to capture the operation of either episodic remembering or episodic imagination.

Associationist networks are representations of connected elements of semantic information (e.g., Plaut 1995; Bechtel & Abrahamsen, 2002). In such networks, each node is semantically evaluable (i.e., meaningful) and the connections between nodes indicate connections between semantic elements.<sup>3</sup> The stronger the connection, the stronger the semantic relation. Information acquired as the result of a particular event is distributed throughout the network, as a particular pattern of associations between the nodes corresponding to its semantic elements. A person’s network might thus have nodes for items like beach, sand, water, bathing suit, and sunglasses, as well as nodes for individual friends and family members, etc. In such networks, the nodes are connected in ways that reflect the associations between the information designated by each node. The nodes for beach and sand, for example, are likely to be well connected (or at least, better connected than the nodes for sand and library). Each node then has an activation level, or strength, reflecting how often and how recently the subject has encountered the corresponding idea.

When a node in the network is activated – for example, as a result of the presentation of a cue – the activity spreads from this node to other nodes with which it is connected. The amount and direction of spread will depend on the underlying activation level of that node, the number of other nodes to which its connected, and the strength of those connections. As with the activation level of any individual node, the strength of the connections between nodes is a combined function of recency and frequency. Nodes that have activated together often and/or recently will be more strongly connected than those that have not. If a node has a strong activation level and a series of weak connections to many other nodes, its activation will likely be sufficient to activate all of them. In contrast, a node with a weaker activation level, and connections to a few other

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summary). Recently, Peter Langland-Hassan (2020) has argued that the sense of imagination that could best serve to unite episodic remembering and episodic imagining is constructive imagination. Ultimately, Langland-Hassan is skeptical that such an account will be successful, but the claim does find resonance with a broader class of theorists who wish to defend *continuism* between remembering and imagining.

<sup>3</sup> For a discussion of semantically evaluable distributed networks in memory, see Robins (2016a).

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nodes, where one is more strongly connected than the others, will likely, upon activation, only spread activation to the well-connected node. The set of nodes that become activated in response to a cue provide the elements that can be combined in the constructive act of forming a mental representation.

Addis (2018; 2020) views these associative networks as active in episodic simulation at multiple levels. These networks govern the operations “between elements, within and between schemas, and between schemas and the emergent simulation” (p. 11). That is, all simulations involve combining event elements and schemas to produce an episodically-framed event representation. This occurs in both episodic remembering and episodic imagining. Consider how this would work in the Addis and colleagues (2007) experiment discussed earlier. Participants are given a cue like *star* or *dress*, as well as instructions on the type of simulation to produce (remembering or imagining, recent or remote). This cue activates the corresponding node in their semantic network, and then participants search between the other nodes that are activated by its spread to construct a representation that meets the requested specifications.

Addis’s account picks up on an important element of cognitive processing: associative strength is an important feature of many activities, including remembering and imagining. However, associative strength fails to capture the full and distinctive operations of either cognitive activity under consideration here and so fails to provide the basis for their united function. In the case of episodic remembering, associative strength is too weak to account for how representations are generated. In the case of episodic imagination, episodic simulation is too strong.

Associative strength has a clear influence on remembering. When trying to recall past events, details that are associatively linked are easier to recall than those that are not. Similarly, when errors occur in this process, as in cases of misremembering, the errors often reflect substitutions that favor associative connections (Gallo 2006). That is, when I remember a past event and some detail of that event is wrong, in many cases the error involves incorporating a similar and more familiar feature instead. Given their role in remembering, CESH theorists have long been suggesting that the entirety of remembering be accounted for in terms of associative processes. I have argued at length against this approach in previous work (Robins 2016b), which I will summarize here. Associations explain remembering (and its errors) in cases where the representation generated includes details that cohere with the two basic principles of spreading activation: what was encountered most recently and what is encountered most frequently. Many memories fit with these principles, but not all. At least some times, we remember events from the remote past, even when features of those events have been more recently and more frequently associated with other events. Put another way, associationist accounts predict that anomalous event features would wash out of network connections over time, as the connections between more frequently co-occurring details are strengthened. This makes clear predictions about the kinds of events we should remember, and not. Unfortunately, the evidence about how and what we remember does not fit with this prediction. Associationist networks are too weak to account for the operation of episodic remembering.

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In the case of episodic imagining, associationist networks face the opposite problem: they explain too much. What appeared an advantage above—namely, the ability of associationist networks to predict how spreading activation will occur within a cognitive system and so which representations will be generated—constrains imagination in ways that fail to reflect our understanding of this cognitive faculty. Patterns of spreading activation predetermine and regularize which representations and schemas will be activated and when. Imagination, particularly when considering hypotheticals, counterfactuals, and the future, needs to release or suppress many of these associations. Again, this is not to say that there is no role for associations in imagination. Associations may play a key role in activating elements and schemas for consideration. But the activity of combining them into a plausible and interesting representation that suits one’s purposes is what makes the activity imagination—and to do this requires going far beyond what is most recent or most frequent via spreading activation. In short, associative networks seek to explain too much about imagination. Using them to account for the cognitive operation underlying episodic imagination would run afoul not only of how we standardly think about imagination, but also the steady stream of results supported and often touted by CESH theorists that point to the connections between episodic imagining, creativity, and divergent thinking (e.g., Addis, Pan, Musicaro, & Schacter, 2014).

There are ways of developing associationist models to allow for more sophisticated relations beyond brute frequency and recency.<sup>4</sup> It is thus possible that a revised version of associationism could address these issues in capturing the nature of episodic remembering and imagining. The burden for showing this can be done is on Addis and other proponents of the CESH. And, given that the explanatory demands for remembering and imagining pull in opposite directions, there is reason to be skeptical that a single unifying revision could be found.

## 5. Episodic Remembering and Episodic Imagining are Distinct Forms of Construction

Even if Addis’s (2020) proposal for the cognitive operation underlying episodic remembering and imagining fails, as I argued in the previous section, CESH theorists may continue to claim that they are the same and go looking for an alternative way of characterizing their shared cognitive activity. CESH theorists are committed to the claim that episodic remembering and episodic imagining must be the same cognitive activity because they are both constructive processes. In what follows, I allow that both remembering and imagining are constructive, while denying that they are constructive in the same way (and so deny that they are the same process). There are important, fundamental differences in the kind of constructive processes involved in episodic remembering and episodic imagining.

In a recent paper (Robins 2020), I proposed that remembering and imagining should be treated as distinct psychological attitudes.<sup>5</sup> My intention was to draw a parallel with the more

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<sup>4</sup> I’m grateful to an anonymous reviewer for raising this point.

<sup>5</sup> Technically, Robins (2020) focused on the state of *seeming to remember* – a state meant to be broad enough to catch both successful and unsuccessful cases. CESH theorists are not operating with a factive view of remembering. Their account of episodic remembering involves both

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familiar propositional attitudes. Belief and desire are both mental attitudes toward propositional contents, and also understood as distinct. So too for remembering and imagining, although the contents of remembering and imagining are unlikely to be propositional. As orientations toward mental content, there are differences in the feel and function of each attitude. The activities of remembering and imagining feel different to people when they’re engaged in them. Here I do not intend a strong claim about the phenomenology of either, only that people can easily recognize which attitude they are engaged in (remembering or imagining) and tell the difference between them. This can happen even if the content is the same—a person can remember eating lunch last Tuesday or imagine eating lunch last Tuesday.

In that paper (Robins 2020), I argued further that CESH theorists agree with me on this difference between episodic remembering and episodic imagining, at least implicitly. The experiments used to test CESH, like the Addis, Wong, and Schacter (2007) paper described above, instruct participants to engage in remembering in some conditions and imagining in others. These are treated as distinct experimental conditions and are analyzed as independent variables in the subsequent statistical analyses. CESH theorists find, as they did in the Addis et al (2007) paper, that the neural regions activated by these activities are the same (or highly overlapping, at least), but the activities themselves are treated as distinct.

My aim here is to build on this basic distinction between episodic remembering and episodic imagining, offering further grounds for differentiating between them in terms of the kinds of construction that they involve. Characterizations of construction, amongst CESH theorists but also memory theorists more broadly, are underspecified. Most theorists have devoted their energy to the contrast between construction and other, more preservative accounts of remembering. Memory is not simply retrieving well-preserved items from the mind’s storage, most theorists insist, remembering is *constructive*. What constructive means, beyond the assembly of event details at the time of retrieval, is left unsaid.

In what follows, I am happy to accept this basic characterization of construction, and further, to accept that both episodic remembering and episodic imagining are constructive in this sense. Even if so, there is room to differentiate between them and identify them as distinct forms of construction. As a significant step in this direction, I identify three features of the constructive process that differ across episodic remembering and episodic imagining: 1) awareness, 2) control, and 3) response to error.

When comparing these forms of construction, it is helpful to have clear examples in mind. To this end, it is incredibly helpful that one of the CESH papers, from Addis and colleagues’ article (2007), provides participant examples in the appendix:<sup>6</sup>

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successful and unsuccessful attempts. My use of ‘seeming to remember’ in that paper and the use of ‘episodic remembering’ by CESH theorists are similar enough for present purposes, so I’m framing my account in terms of CESH views here.

<sup>6</sup> Later papers in the CESH framework follow a similar experimental design, but do not often include an appendix of participant reports.

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**Past Event (5 years ago; cue = star)**

It was my birthday and I was about to leave for a trip with my family ... And so my friend, he has just gotten his license, and he said, okay, you know, I'll take you out for your birthday before you leave ... so we went to this place in Berkeley ... famous for its deep dish pizzas. He had just gotten his license, I'm kind of oblivious [of this] ... so when I got in the car I immediately started talking to him, and he's, um, okay I can't talk right now ... We had the pizza and he took me to this place called Indian Rock in Berkeley and it was a very interesting place, and I had always heard of it but you need a car to get there, so perfect timing, so we walked up with the pizzas and it's this big rock on the top of this kind of hill at Berkeley. And when you're up at the top you can see the whole bay and you can see San Francisco ... the view was gorgeous, and the sun was setting.

**Future Event (in 5 years; cue = dress)**

My sister will be finishing ... her undergraduate education, I imagine some neat place, Ivy league private school ... it would be a very nice spring day and my mom and my dad will be there, my dad with the camcorder as usual, and my mom with the camera as usual. My sister will be in the crowd and they'd be calling everyone's name ... I can see her having a different hair style by then, maybe instead of straight, very curly with lots of volume. She would be wearing contacts by then and heels of course. And I can see myself sitting in some kind of sundress, like yellow, and under some trees ... the reception either before or after and it would be really nice summer food, like salads and fruits, and maybe some sweets, and cold drinks that are chilled but have no ice. And my sister would be sitting off with her friends, you know, talking with them about graduating, and they'd probably get emotional.

*1) Awareness of Construction*

Episodic remembering and episodic imagining may both be constructive, but episodic imagining is transparently so while episodic remembering is not. The everyday person is aware of the constructive aspects of imagining; they are not similarly aware of the constructive aspects of remembering. That is, while engaged in the activity of episodically imagining, I may often experience the activity as mental assembly, building a representation from disparate event details. It seems like this may be what's going on in the future event case reported from the Addis et al. (2007) study, where the participant visualizes what their sister will look like at her graduation ceremony. The participant updates various aspects of their image of the sister bit by bit—first her hair, then her glasses, and then her shoes and clothes. The combination of these representational features is transparent to the participant; they seem to be cognizant of the way in which each is added to the imagined scene.

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The reported memory event is importantly different in this regard. The representation in this case may be equally as constructive, cobbled together at the time of retrieval. This construction does not appear to be apparent to the participant; at the very least, there is nothing constructive in the event description as given. This fits with the experience of remembering more broadly. It would likely take a person by surprise to learn that the act of remembering, which feels like retrieval, actually comes about in a very different way. The disconnect between how remembering feels versus what the process is actually like is part of why the findings from the psychology of memory have been so startling to many and so extensively discussed.<sup>7</sup> For those of us who do research in this area, it is easy to take these features of remembering as obvious and apparent, forgetting that in the act of remembering they are not.

## 2) *Control over Construction*

A second feature over which episodic remembering and episodic imagining differ concerns whether and how the person has control over each constructive process. Episodic imagination is under a form of direct cognitive control. A person who is episodically imagining a future event may not have full control over which event details or possibilities come to mind, but they do have control over which are selected and then incorporated into the event representation.<sup>8</sup> The participant in the Addis et al. (2007) study may have considered multiple ways that their sister's appearance would change in 5 years. They may have considered the sister's hair being both longer and shorter before deciding upon a representation of it as curly.

Episodic remembering, in contrast, is not similarly controlled. The person who is remembering a past event does not consider multiple ways the past event might have gone and then select amongst them to establish what happened. At least, this is not what happens at the level of awareness. It is possible that, subpersonally, this kind of activity is taking place. Without awareness of it, there is no opportunity for intervening in and controlling such a process. In this way, this feature of episodic construction is importantly connected to the previous.

Remembering does allow some opportunities for indirect control. If I am having difficulty calling an event to mind, I can engage in additional cue elaboration, or use peripheral details and semantic knowledge to help bring the desired information to mind. What's important for my purposes here is that the activity of doing this feels like promoting one's search for a particular event representation. It does not feel like the process of generating a range of options,

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<sup>7</sup> Episodic remembering can be piecemeal. A person may assemble event details slowly as they're recalled. This may count, in a loose sense, as awareness of construction. But the sense of construction here is still quite different than that of episodic imagining. The distinction is akin to two ways one might build a house out of LEGO: by following the instructions in a kit and by using a non-curated pile of pieces to build one from scratch. Remembering is like the first, imagining like the second. Thanks to an anonymous reviewer for suggesting this kind of case.

<sup>8</sup> Exactly how much control an individual has over their imagination is an open and interesting empirical question. However much it turns out to be, however, it seems safe to maintain that it's more control than exists in remembering.

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between which one can select to form a memory. To put the point another way, in the case of episodic imagining it would make sense to ask the participant *why did you include detail X?* In the case of episodic remembering, such a question makes far less sense.

### 3) *Response to Error Discovery*

The third difference I want to highlight between episodic construction in the case of remembering and imagining concerns how the constructive process is viewed by the person who generated it after learning that the representation contained an error—i.e., involved a component that did not correspond to how the event actually occurred. Both episodic remembering and episodic imagining could contain such errors, although in the case of imagining it’s more difficult to characterize them as erroneous, since they were generated prior to the event. Still, both forms of construction could be involved in cases where a person is required to confront a discrepancy between their representation and the represented event.

In episodic imagining, this could happen in a few distinct ways. First, the event could happen, and happen differently than how it was envisioned. Suppose the little sister, in the example above, decided upon an art institute rather than an Ivy League university. The person may note and reflect on the difference between what they expected would happen and what actually occurred, and they may even go so far as to identify flaws in the assumptions that they used to construct the representation of the event (e.g., attending too much to how their parents characterized the sister’s ambitions, not attending enough to her love of drawing and painting). Second, a person could recognize an error in their construction of the future event even before it happens. The person could, for example, spend more time with their sister and come to recognize that the sister is far more attached to her glasses than they’d previously realized, or far too squeamish about touching her eyes to ever transition to contacts. In either case, it seems possible for the person to maintain the initial event representation as an imagined account of the event. The status and assessment of that representation are not threatened by their disconnect with the event itself.<sup>9</sup> In short, discovery of an error in the process of episodic imagining does not diminish or alter the status of the event representation that was generated.

Conditions are quite different in the case of episodic remembering. Episodic remembering also contains errors. Researchers debate how often and how significant such errors are, but even without empirical studies of the phenomenon, we are all aware of at least occasional discrepancies between our memories of particular past events and what actually transpired. Suppose there was an error in the memory representation reported in the Addis et al. (2007) study, copied above. Maybe the participant who reported getting pizza with a friend on their birthday was mistaken about some of the event’s details—maybe they had sushi, not pizza, or sat on the opposite side of the bay, or maybe it was the friend’s birthday, not theirs. Any such discovery (provided by conflicting testimony, photo or video evidence, etc.) would diminish the status of the representation *as an episodic memory*. The person would no longer endorse their

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<sup>9</sup> As an anonymous reviewer has rightly noted, the plausibility of this claim depends on what the nature of imagining turns out to be, and whether there is a distinct form of imagination that is actuality-oriented along the lines suggested by Munro (2021).

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report as a representation of the event. The person could hang on to the representation, and the feeling of remembering it generates, while denying the representation has the status that was previously presumed. In so doing, they might say something like, “Wow, I really felt like I remembered us eating pizza. But I guess it was sushi.” Alternatively, the person might edit the representation to fit the details they now know were actually a part of the event. Doing so would be an instance of actively controlled, consciously aware construction. But, importantly, doing so would also mean that the person no longer treats the representation as a memory.

This is only a sketch; far more attention to the nature and details of these constructive processes is needed before we can determine whether the differences between these forms of episodic construction are as strong as I have suggested. My aim has been to describe and elaborate on three features on which the constructive processes of episodic remembering and episodic imagining differ from one another, even if both processes involve assembling event details to form episodically-framed representations. In doing so, I am inspired in part by a similar distinction that has been drawn between forms of non-episodic imagination—i.e., the constructive formation of mental images, but without the episodic perspective. This form of constructive imagining can happen voluntarily. I can, for example, imagine a polar bear that has webbed feet and pointed ears. This form of imagining also occurs in non-voluntary contexts; most notably, while one is dreaming. Both of these activities are properly described as constructive imagining.<sup>10</sup> Both involve building a mental image from various object details. Researchers have recently noted, however, that these are importantly distinct forms of constructive imagining. This is best documented by the observation that damage to particular brain areas impedes the ability to engage in voluntary constructive imagining, but leaves constructive imagining during dreaming intact (Vyshedsky 2019). The two are both constructive processes, but importantly distinct ones.

## 6. Conclusion: What is the Function of Episodic Memory?

CESH theorists are engaged in a research program that claims to have “redefined the function of episodic memory as primarily future-focused” (Addis 2018: p. 65). This revision to our understanding of episodic memory, casting its function as prospective rather than retrospective, relies on treating all forms of episodic construction as essentially the same. That is, CESH theorists are committed to the existence of a single cognitive process—episodic simulation—by which event details are selected and assembled into episodically-framed event representations.

In this paper, I challenged the claim that all forms of episodic construction are effectively equivalent. Episodic remembering and episodic imagining differ not only in the tense assigned to the constructed representation, a difference CESH theorists acknowledge, but in three further, substantial ways. This is true, I suggest, even if we allow that they are both supported by the same brain system and draw upon the same mental reserve of information. Going further, I

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<sup>10</sup> Amongst philosophers, there is an active debate over whether dreaming involves imagination or perception (see Ichikawa (2009) for a defense of dreaming as imagination). In empirical work on the visual system, however, the term *constructive imagining* is often used to refer to the activity of both (e.g., Vyshedsky 2019).

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argued that episodic remembering and episodic imagining are importantly different *even if* they are both constructive processes.

The failure to unite these forms of episodic simulation as a single cognitive activity undercuts the claim that episodic memory's function has been redefined. The lack of an argument in favor of episodic memory's prospective function is not yet a defense of the traditional, retrospective account (see Boyle 2019 on this point). It is, instead, an incentive to continue exploring the full range of possible ways episodic memory's causal-role function could be understood.

CESH theorists may wish to revisit the distinction between accounts of function in Section 2, and renew their interest in the etiological function of episodic memory. Many of the concerns raised by CESH theorists suggest an interest in this, as researchers often ask *why does episodic memory have the organizational structure that it does?* This is an interesting and important question, and one on which CESH theorists and others can make more substantial progress once the standards for each form of function are better understood. Questions about evolutionary function are difficult, because they cannot always be answered as posed. That is, there might not be a reason that episodic memory has the structure that it does. Episodic memory could be a byproduct of some other adaptive process—or an exaptation, or a spandrel. Pursuit of the full range of options will require transcending concerns about and features of our current human psychology and neural organization, turning instead to consideration of what previous form these features may have taken and how prior environments may have differed from our present circumstances. Such work could yield a prospective account of episodic memory function, but episodic memory's role in the here and now remains an open question.

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