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On Unifying Declarative Memory

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Abstract

The distinction between episodic and semantic declarative memory systems, as introduced by Tulving (1972, updated in 1984, 1991), was a revolutionary approach to human memory. While the distinction is now widely endorsed in the study of memory, there are debates about what constitutes each system's domain, how each system is used, how each system functions, and the phenomenal experiences associated with the functioning of each system. On the basis of clinical studies and insights from conditions affecting memory, this paper argues that the episodic/semantic distinction can be reframed as a result of a unified declarative memory system. In this view, experiences are encoded into memory traces, and retrieval of memories is dependent on the cues specific to each particular instance of remembering. The upshot of this proposal, called *unified memory functionalism*, is that the phenomenal differences of remembering can be understood in terms of the differential salience of cues without defaulting to the view that there exist multiple declarative memory systems.

0. Introduction

Differences in the ways we remember events and facts seem obvious. Memories concerning where you set your car keys, what you did on your birthday, or that you need to mow the lawn this weekend are clearly spatiotemporally-oriented. What a frog is, how to multiply, or how to pronounce the name of your country aren't. The distinction between the spatiotemporally-oriented and not appears clear in most cases, and so it seems reasonable that human memory systems are individuated in this way, as well: we have an episodic system that cues event-related memories, while the semantic memory system cues facts and concepts. This is the dominant view of declarative, long-term memory.

There's good reason this has become the dominant view on declarative memory. Even discarding the seemingly common sense differences between episodic and semantic memory systems, the separation appears especially prominent when looking at amnesic persons. In cases of retrograde and anterograde episodic amnesia semantic memory and knowledge persists while the ability to retrieve past events or imagine future events are impaired. Famous clinical case studies such as those of patients H. M., K. C., and E. P.

illustrate well such a differentiation. Patient H. M. could not recall any event that happened after the date of a medical procedure (Klein, 2018), patient K. C. could not recollect any personally experienced events throughout his lifetime (Rosenbaum et al., 2005), and patient E. P. had “severe and extensive retrograde amnesia for facts and events but [was] capable of retrieving memories from his early life” (Stefanacci et al., 2000, p. 7028). In each of these cases some separation between episodic and semantic memory is clear: the patients typically retain semantic memory and knowledge and cannot retain, at least at some level or through some time period, any episodic events. The presence of episodic and semantic amnesia motivates the distinction promoted by Tulving.

There are reasons to believe this isn’t the full story, however, or even an accurate one. Where the domain and function(s) of semantic memory appears less debated, the domain and function(s) of episodic memory is far less well-defined. For a memory to be event-oriented isn’t enough for it to be considered part of episodic memory. Even temporally recent events can fall to this same category. If you are asked to remember what you had for breakfast, you may simply recall the foods without imagining yourself eating them, listing them less like an event that was experienced and more as we might a semantic fact. Conversely, we might imagine an amnesic patient who no longer remembers his wife’s name, or even that he has a wife, despite this no longer being event-oriented in context or content.

These cases question not only whether the distinction between episodic and semantic are useful, but their very ontologies. On the basis of attention to these examples and others, this paper advances an account of declarative memory according to which memories for facts and memories of events are functionally encoded and retrieved by a single system, and retrieval experiences are associated with two different sorts of phenomenal experiences. Memory systems thus are not memory *proper*, but instead is a unified cognitive function of encoding and retrieval whose traces present as specific phenomenal experiences. Call this *unified memory functionalism*.

To elucidate the unified view, section 1 reviews Tulving’s view of episodic and semantic memory systems, and currently received views concerning their functions and interactions. Section 2 will provide meta-analyses of clinical case studies, memory conditions, and counterexamples that call into question the validity of the received view.

Section 3 will outline the unified view by advancing the thesis that episodic and semantic memories are supported by the same system. Section 4 will walk through the motivations for the unified proposal, including applications to memory conditions, false memories, and a positive account of the enhanced memory experienced by synesthetes due to an expanded understanding of cues and retrieval. Section 5 will conclude the paper with a survey of the unified framework.

1. Tulving's Distinction between Episodic and Semantic Memory Systems

In 1972 Tulving suggested the view that would become widely endorsed in memory studies: that human long-term, declarative memory is systematically dualistic, with the episodic system encoding and retrieving memories related to events and the semantic memory system encoding and retrieving memories of concepts and facts. Typically these systems work in tandem, providing us with the full capacity of recollection. When we remember going out to a restaurant with friends, we're not only recalling that we left early, traveled to the restaurant, met the friends, ordered food, and ate, but in recollecting these memories we are also making use of concepts and facts like that of what a restaurant is, the familiarity that friendship evokes, and the words it takes to retell the story. Episodic and semantic memory systems together buy us the capacity of recollection of memories, including facts and concepts that allow us to reflect upon and retell them.

In this section we will step through the received account and its view of the episodic and semantic memory systems and their cross-functions and interactions, which will set up the further discussion of problems with this view.

1.1 Episodic Memory

According to Tulving, the episodic system specifically encodes and retrieves memories that are spatiotemporal in nature, and that it is the "highest human ontogenetic achievement and as probably being uniquely human" (Markowitsch & Staniloiu, 2011, p. 16) though more recent studies show that other species may share anatomical and functional homologs (Allen & Fortin, 2013; Dickerson & Eichenbaum, 2010). Relying on temporally-dated events (Tulving, 1984), the subsequent memory retrieves "details of the event and of the place in which it occurred" (Moscovitch et al., 2016, p. 2). That I

remember putting on my shoes, going to the store, and picking up a jar of pickles are all encoded using episodic memory. The episodic system isn't constrained in any specific temporal way, however, as you can remember temporally-dated events that are in the future. For example, that you need to attend a meeting next Tuesday. While the event hasn't yet occurred, it is recorded as a future-oriented event within episodic memory. For the present, remembering what you're doing currently would appear to be in the domain of short-term memory, though it isn't far-fetched to say, "I am going to the grocery store right now, as I do every Wednesday, and as I will continue to do," implicating a long-term memory that can be oriented in all three temporal phases: the past, present, and future.

An event can be determined in several ways. Brushing your teeth, buying a car, and attending your wedding are all events. Doing all of these on a single day, albeit atypical, would also be an event, or an event that is a set of other events. Subsequently, most significant events that are encoded to episodic memory are also full of smaller, largely inconsequential events that are recorded alongside or within the memory of the significant one. What determines which events are encoded and which are forgotten are at best correlated to the significance of the event to the person, such as the birth of one's sibling or child, or at worst due to happenstance, as in the case of remembering that last week you slept with the windows open since the weather was nice. Forgetting is largely along these same lines, with many significant events, like a set of all the birthdays that have occurred in your life, being largely forgotten, and of course so too do many insignificant events in our lives also go by the wayside.

Episodic memory is also said to evoke a feeling of familiarity with the event that is recollected. As James famously wrote, "Memory requires more than mere dating of a fact in the past. It must be dated in *my* past. In other words, I must think that I directly experienced its occurrence. It must have that 'warmth and intimacy' ... as characterizing all experiences 'appropriated' by the thinker as his own" (James, 1890, p. 426).

There are several views of how episodic memory is realized within the received view. For some psychologists and philosophers, episodic memory is analogous to mental time travel (Michaelian, Klein, & Szpunar, 2016). In this way, when we remember an event, we do so in a way that appears to us how we experienced it in the past. We then use it as

a source of knowledge and may perceive the experience as imagining or simulating the event we remember (Hopkins, 2014, 2018; Michaelian, 2018). When we think back to our first day of school, it's likely that you mentally time travel back to when the event occurred, imagining your experience, what you saw, heard, smelled, and how you felt. The nervousness, the smell of used schoolbooks and freshly sharpened pencils, and the moment you first saw your soon-to-be best friend-and-classmate all vividly reappear within your mind.

Connected to the presentation of episodic memory is auto-noetic consciousness, or the ability to place ourselves temporally within the memory, be it in the past or future. The relationship between these two “gives rise to remembering in the sense of self-recollection in the mental re-enactment of previous events at which one was present” (Gardiner, 2001, p. 1351). Thus it's often argued that for episodic memory to truly be such, it must be accompanied by auto-noetic consciousness (Tulving, 1985; Metcalfe & Son, 2012; Michaelian, 2015).

1.2 Semantic Memory

Tulving's view of declarative memory systems doesn't stop at temporally-dated episodic memory; rather, working in tandem is the semantic memory system. Where episodic memory retrieves details about events, semantic memory provides the facts and concepts that inform our conscious experience and allow for reflecting upon and the retelling of our memories. Suggested to be at least in part its own neurocognitive system by Warrington (1975), the semantic system retrieves the words we use and their meanings, the facts and concepts we believe about the world, the formulas and algorithms that govern our mathematical capabilities, our knowledge of historical events, and understanding of causes and their effects, among other general and categorical knowledge structures (Tulving & Donaldson, 1972; Binder & Desai, 2011). Retrieval of semantic memory happens via simulation, “appearing as a kind of semantic imagining” and “a matter of imagining a proposition that was the object of a past belief” (Michaelian, 2018, pp. 101-102). They form what most people would consider general knowledge by way of beliefs formed through “the organization of sensory, motor and higher-order features in the brain built up of years of experience with the world” (Kutas & Federmeier, 2000, p.

466). It is specifically those experiences encoded by episodic memory that, for these types of general knowledge, are used to form the semantic knowledge retrieved by the semantic system.

To clarify the distinction between episodic and semantic memory within Tulving's framework, we can look at both typical and atypical cases. In the typical realm, while it might be episodic memory that allows us to recall having once taken a biology test, it's our semantic memory system that allows us to recall what a test is and to recall facts about the purposes of tests. In an atypical example we might imagine an amnesic patient who, after some accident, loses the ability to process and retain episodic memories, and yet can still use words to communicate, know what country in which they reside, and be able to recall major national holidays. The typical case shows the contribution of these memory systems to everyday phenomenal experience, while the atypical case demonstrates the separation between the two systems as supposed by Tulving.

Akin to episodic memory's reliance on auto-noetic consciousness, semantic memory has a similar reliance on noetic consciousness, according to Tulving. As described by Metcalfe and Son (2012), noetic consciousness "allows an organism to be aware of, and to cognitively operate on, objects and events, as well as relations among objects and events, in the absence of the physical presence of those objects and events" (p. 292). In stark contrast with auto-noetic consciousness, however, noetic consciousness "does not necessarily involve the self or anything self-referential" (Metcalfe & Son, 2012, p. 292). Noetic consciousness is simply the presentation of objects, concepts, facts, and other semantic information, likely without any reference to the self or imagining that the self has any placement or involvement with the object or information.

1.3 Interaction toward Phenomenal Experience

Though Tulving's distinction emphasizes two individuated memory systems whose domains are largely distinct, this isn't to say that these systems don't interact. Rather, in typical circumstances, Tulving says these two systems work in tandem to generate the phenomenology associated with remembering.

To elucidate the phenomenal experience of recollection in a typical circumstance we only need to look at the way we remember things in normal everyday life. Using an

example previously discussed, remember again back to a time when you took a test in school. You likely imagine the memory from your own first-person perspective, with the feeling of an intimate familiarity, an event that is a set of subevents: that of taking a test being the event proper, but full of smaller events like that of walking into the classroom or test facility, receiving your packet from the proctor, marking on the paper, and the feeling of nervousness or confidence depending on how confident you were in your studying abilities, alongside many other memories of visuals, smells, feelings, and so forth about the event. The experience alone, however, is not the entire story. Informing this experience, and likely also contributing to the reflection on the memory itself, is semantic memory, at play essentially behind the scene. It might be the episodic system that brings about the memory of the event, but according to Tulving it's the semantic memory system that informs you what a test is, where they typically take place, the process for taking one, and the significance of it for your grade (and, hopefully, that it's a demonstration of knowledge). In this way, for Tulving, both systems of memory work in tandem to provide the full experience of recollecting taking a test.

2. Problems with Tulving's Distinction

Tulving's proposal has provided a persuasive account of long-term, declarative memory for nearly 50 years, but its validity isn't without controversy. Ambiguities in current research into memory condition and the ways in which we experience both forms of memory show a fair amount of ways to put pressure on and undermine the received view. Such alternative accounts include Addis' view that episodic memory and imagination share the same constructive episodic simulation hypothesis (Addis, 2018; Schacter and Addis, 2007) and Roediger's transfer-appropriate procedures approach, which suggests the dissociations between retrieval processes is simply a reflection of the kinds of memory tests being used (Roediger, 1990). In this section we will survey several ways to question the received account, setting up the unified view as an alternative that satisfies these concerns.

2.1 Sketchy Definitions

What has essentially traditionally differentiated episodic and semantic memories is the

subject of the content of each type, but in recent literature these definitions have been called into question. Specifically, clinical cases have shown that “the core constituents of episodic memory as initially proposed (i.e., temporal, spatial, and self-referential) also can be on display in semantic memory experience,” and, therefore, according to Klein “...there appears no principled reason why the content of these two systems should differ” (Klein, 2013, p. 2).

We can see how these boundaries break down using examples from both everyday retrieval and clinical case studies. On the former, we can imagine retrieving such semantic facts as “I know that the American Declaration of Independence was signed on July 4th, 1776,” “I know that I was born on a Thursday,” and “I know that prior to 1949 seatbelts weren’t an option in American cars,” even if I can’t recollect any of these through my own first-person experience. Nonetheless, each statement here is a case of semantic memory that retrieves self-referential, spatial, and temporal content.

Some clinical case studies show a similar ambiguation. A patient presented by Stuss and Guzman (1988) told of an [retrograde] amnesic patient who was able to “successfully re-learn specific temporal and spatial details of his personal past” (Klein, 2013, p. 2). One caveat, however, was that he could only retrieve such details as semantic facts, omitting the first-person narrative that would otherwise enable one to imagine the past in the perspective it was experienced.

As Klein notes, from these examples it would appear that “there is no logical or empirical evidence supporting the assertion that only episodic memory makes reference to the ‘where and when’ of past personal experience” (Klein, 2013, p. 2). Content alone, this shows, cannot be the differentiator for these two types of declarative memory. While he explicitly says this sharing of content between the two types doesn’t necessarily damn such a taxonomy, it does give us good reason to rethink such a distinction and consider alternatives that may better suit the evidence.

A second concern stemming from cases of episodic amnesia is that of narrative construction and affected neuroanatomical structures. The study by Race et al. (2011) shows that despite deficits in episodic memory and future thinking caused by medial temporal lobe (MTL) damage, it does not correspond to defects in narrative construction. This is supported by follow-up research by Craver (2012), which found

evidence that even for patients with severe episodic memory deficits, such as amnesic patient H. C., whose ability to construct scenes was still within normal range, “a kind of temporal and spatial narrative construction [is] preserved” (p. 462). Another study by Race et al. (2013) showed that patients with MTL damage who experience episodic amnesia can still describe the present despite deficits in describing past and future thought. As shown by Craver et al. (2014), patient K. C., who we previously discussed, despite a severe case of episodic amnesia, still held intact a “concept of time, knows that it passes, and can orient himself with respect to his personal past and future,” calling into question the belief that the hippocampus “plays an essential role in temporal consciousness” (p. 191). It’s evident, then, that semantic memory can provide some level of spatiotemporally-oriented narrative construction aside from the cues that would otherwise be present with typical MTL function.

Examples like these show that such content isn’t simply the domain of episodic memory as traditionally envisioned in Tulving’s framework, but is shared by semantic memory in some capacity, as well. If that’s the case – if the very domain of episodic memory is shown to lack the definition needed to qualify its existence apart from semantic memory – this is problematic for the dominant view.

2.2 Phenomenology

The images conjured up to our consciousness during episodic retrieval appear vastly different than the ways in which we retrieve facts, concepts, or words. When we vividly imagine the last holiday party that we attended, with extreme detail, the experience of recollection seems far different from the way in which we recall, say, a hammer, and certainly not what comes to mind when we think of $E = mc^2$. However, this isn’t to say that these phenomenal experiences require separate systems, and this delineation quickly becomes ambiguous when considering several cases of recollection.

Along these same lines we too can look at the phenomenology of memory errors as evidence for such ambiguity. Whether it’s a simple misremembering, which is successfully retained but retrieved inaccurately (Robins, 2016), or confabulation, whereby people recall events and/or details that never happened, the result of each at least appears to be approximately the same for the subject: that they believe what has

been retrieved is accurate to reality.

For example, we can look at the Deese-Roediger-McDermott (DRM) Paradigm, which uncovered misremembering as a memory error through memorizing lists of words (Robins, 2014, 2016). In this experiment, participants are given a list of words which, after some delay, they are asked to recall or recognize, all while being presented some new but categorically similar semantic words (Pardilla-Delgado & Payne, 2017). Results of DRM Paradigm experiments have routinely shown that “participants exhibit false memories robustly” and “they experience these memories in a vivid and detailed manner” (Nabeta & Kusumi, 2009, p. 545.).

Meanwhile, the “lost in a shopping mall” experiment by Loftus and Pickrell (1995) uses episodic retrieval of a false event to illustrate confabulation of an event’s details. In this experiment participants were led to believe that, as a child, they had been lost in a shopping mall, even though the entire story was made up. Participants were given several true stories from their childhood along with the fake story, and then these were constructed or supplied by family members. Of the 24 participants, 29% initially reported remembering the confabulated event, and for some participants the confidence in the false memory increased with each subsequent interview. The results of the study showed that “people can be led to believe that entire events happened to them after suggestions to the effect” (Loftus & Pickrell, 1995, p. 723).

It’s no surprise here that each of these cases, where there’s a phenomenal experience of confidence in a false memory, implicate memory cues of various kinds, as both types of memory errors are likewise ambiguous in nature. We’ve all experienced a simple misremembering of an event and we too have all experienced some level of confabulation. Such vivid examples and prominent experimentation aren’t necessary to prove these cases exist, though. It isn’t difficult to imagine misremembering that we wore a blue shirt last Friday when it was really a red shirt, and it also isn’t difficult to imagine confabulating the features of a popular brand’s logo, as is common with anecdotal Mandela Effect appearances. The Mandela Effect is a popular internet phenomenon that documents common false memories for many people, the most popular example being the false memory of the presence of a cornucopia in the Fruit of the Loom logo despite it never featuring one. This type of collective confabulation tends to be of semantic

information, generally of concepts or facts that have seemingly been confabulated. For these kinds of memory errors, however, the phenomenology offers no distinction from the truth: despite the error, the subject believes the memory to be true and feels the familiarity common to such memories.

While it at first appeared that the phenomenal experiences of recollecting episodic and semantic memories were differentiated, further consideration shows this divergence is ill-defined. Blurring the lines between each memory system, what is retrieved, and what it provides in terms of phenomenal experience, we should then ask what it is that Tulving's view buys us. For phenomenal experience, it doesn't buy us anything more than a generalized phenomenal experience for each kind of memory, but, as we've seen, even that generalization is suspect.

2.3 Kinds

It's obvious then that Tulving's framework promotes declarative memory as two separate kinds: that of episodic memory and semantic memory. But, as we have seen, the defining features of each kind supposed by Tulving fall apart under scrutiny, undermined by the very phenomenal experiences it used to establish each. Where the received view sees episodic and semantic properties as being realized separately, establishing each kind of declarative memory system, without such distinctions these realizers are far less obviously dissociable and, instead, turn out to be mere cues without the required kind-splitting into separate systems as traditionally assumed.

A brief account of such *dissociable realizers*, as termed by Craver (2004), would offer some benefit here to elucidate this point. According to Craver, traditional arguments for kind-splitting of declarative and procedural memory systems walk along these lines:

- M1. Declarative memory and procedural memory can be independently disrupted.
- M2. If phenomena X and Y can be independently disrupted, then they have distinct realizers.
- M3. Procedural and declarative memory have distinct realizers.
- M4. No Dissociable Realization (NDR). Instances of a natural kind have one and only one realizer. If there are two distinct realizers for a putative instance of a kind,

there are really two kinds, one for each realizer.

M5. So procedural and declarative memory are distinct kinds of memory. (p. 962)

If taking the received view of declarative memory, it is easy to simply replace mentions of declarative and procedural memory with that of episodic and semantic memory systems. The problem for the dominant view, of course, is that these realizers aren't as defined as supposed, and so the support for kind-splitting dissolves. Craver allows for this possibility. In his discussion of NDR, he states, "NDR also leaves it an open question whether the unification of two or more realizers that were previously presumed to be disparate would mandate unifying the realized kinds (as in, perhaps, the case of rusting, burning, and breathing)" (p. 962). Though it may be true that in such cases unification is not required, we will make such a case for declarative memory in section 3.

3. Unified Memory Functionalism

The unified account advances the view that episodic and semantic distinctions are merely functions and cues that are used to promote a unified phenomenal experience. Functionalism is the widely endorsed theory of the relation between mental states to brain and behavior (Dennett, 1991), a view that the mind is functional in nature; that is, "the mind is (an aspect of) the functional organization of the organ of cognition" and that its "functional organization is the plurality of components, functions, and organizational relations that make up a mechanism and explain its capacities" (Piccinini, 2010). According to functionalism, the mind is just the software on which the brain runs.

There are two main kinds of functionalism: "functionalism about mental states and functionalism about mental contents" (Piccinini, 2004, p. 375). That is, either it's the mental state or the mental contents which are defined by their functional relations with mental inputs, outputs, and other states or content, respectively. For declarative memory we can interpret it with respect to mental state functionalism by virtue of a mental state of recollection or retrieval. Consequently, with mental states inferring mental content essentially, we will see how the distinction between episodic and semantic memory systems proposed by Tulving dissolve, and instead work as cues that present as a unified phenomenal experience, even if some of these cues are missing or impaired. Thus we can now reimagine declarative memory in a radical functionalist perspective.

In a typical functioning declarative memory system, experiences are processed into traces, or engrams. The retrieval of memories, however, is dependent on the salience of the cues specific to the memory. Harkening back to the examples containing a ball, we see memories retrieving cues of each type. “A ball” retrieves on cues such as quantity and shape, and likely also cues such as material, feel, color, what sport or application it’s used for, and may even have spatiotemporal cues such as bounciness, or if the ball is of vintage construction or ancient application. “The ball I played with as a youngster” shows other cues: all the aforementioned cues plus additional cues such as self-reference, familiarity, events in which I used the ball, and the time in my life in which I used it. “The ball the baseball player is holding” retrieves on cues of other sorts: the concepts and facts of what is likely a baseball, as well as the self-reference and familiarity of present experience of being in front of the baseball player holding the ball. “The ball I will buy for my child” similarly retrieves on such cues, constituting factive cues and adding in others of future-oriented memory and likely also an imagination or simulation of what kind of ball I plan to buy, where, and when.

We should take a moment to differentiate this account from that of Tulving’s. The standard model suggested two separate declarative memory systems, episodic and semantic, which traditionally has claimed an inherent separation in types of content, with episodic memory retrieving event-related content and semantic memory retrieving general knowledge and facts. We’ve made the case, however, that these types aren’t as differentiated as Tulving claims. By detaching memories from this binary organization, we can instead look at memories more generally and see that the phenomenal experience of recollection is dependent upon sensitivities to specific cues and how they are retrieved. Cues, in this sense, are without Tulving’s kind-splitting into semantic and episodic categories. The memory of what a ball is requires no cue of self-reference, familiarity, or spatiotemporal context; likewise a memory of my last birthday party doesn’t immediately require any cue to inform what a birthday party is; our memory of the concept or event is simply just that, without reflection of any corresponding or informing cues. The usefulness of these rigid categorical distinctions has worn out its utility, and instead can be understood in functional terms.

We have thus far established that these declarative memories retrieve on cues that

qualify different types of information. Here we come to another divergence with the dominant view. Where the standard view sees memory conditions such as amnesia as a result of a deficit of memory retrieval by a specific neuroanatomical region, the unified view suggests the deficit isn't with retrieval but in the salience of memory cues and content. Memories are retrieved, but not all of its cues and content are not salient. This is why we sometimes see traditionally episodic or semantic information still presenting despite adverse impairment: the memory and its cues are still being retrieved, but the processing and interpretation of the specific datum loses typical context. That amnesiacs don't necessarily lose all episodic or semantic information despite an impairment of the corresponding neuroanatomical region is telling: it's evidence that the traditional view of impaired faculties has been too broad.

We can again look to the study by Klein (2013) as evidence for this reimagining of retrieval within the unified framework. The patient, despite retrograde amnesia, was able to relearn spatiotemporal details about his past. The only caveat was that he was unable to place himself within these facts, and instead he retrieved them as semantic facts. Here the memories themselves are intact and so are some of the appended cues, and he too is still able to retrieve them, but there is a problem with processing at least some of the cues, resulting in the loss of self-reference.

The same happens in some typical cases. Recalling the example of listing what you had for breakfast, while it's possible that you did so through a phenomenal experience of imagining sitting down for breakfast with your family and remembering what you ate, it's also possible you simply remembered, akin to a semantic list, what you ate without any imagining at all. Cues in this case take form of a combination of self-reference and object-oriented characteristics: "I had pancakes, bacon, and eggs." Despite the possibility of spatiotemporal cues also affixed, such as "I had breakfast at 7 a.m.," "I had breakfast on the couch in my house," and "I had breakfast with my sister," these aren't lost or necessary; their retrieval, simply, didn't require those specific cues. That they were absent says nothing about the content; they're still there, with the memory, but the cues and content presented were only those salient to the person, and ones required to complete the task of answering the question.

The dominant view doesn't explicitly say so, but if we were to take a strict

interpretation of it, we might be required to bring along entire memories and its details when answering these types of questions. If we are to adhere to the narrow view that episodic retrieval occurs only through imagining or simulation or even merely mental time travel, it's reasonable to think that answering the breakfast question brings along a phenomenal experience of recollecting the entire event of having breakfast. Yet this isn't the case, and we can easily answer episodic questions via mere semantic facts, as I've already shown.

The presence of a differentiated auto-noetic and noetic consciousness in the unified framework thus looks less like a requirement as Tulving suggests and more as a shared presentation of a singular consciousness utilizing these same memories and their cues. Since self-reference can appear without auto-noetic consciousness, and semantic information of events can present within auto-noetic consciousness, any distinction, much like that of episodic and semantic memory, is also ambiguous and unnecessary. Where Tulving's view might prescribe these types of consciousness as a way to describe the traditional view of phenomenal experiences, the unified view requires no such prescription.

Retrieval in the unified view, then, is simply the retrieval of memories utilizing salient cues by a person sensitive to such cues, and as required for the chosen task. This broad view removes the constraints of Tulving's framework and instead allows for the presentation of memories, even in the least typical circumstances, in a unified phenomenal experience.

4. Motivating the Unified View

Memory conditions and deficits highlight how the unified view advances our understanding of declarative memory. In the following brief accounts each condition is reimagined within the unified framework, highlighting the differences in understanding the ontology and etiology of each, as well as what it buys us in comparison to the standard account.

4.1 Amnesia

H. M., after a surgical resection of his MTL, could not remember any events that

happened to him post-procedure (Scoville & Milner, 1957). Despite his condition, he was still able to learn new things. According to Klein (2018),

the dissociation between H. M.'s absence of memorial experience and his intact learning ability could be accounted for by the idea that (a) memory exists in a variety of types, (b) the availability of different types of memory can explain performance on different types of tasks (e.g., semantic memory explains how he learns new facts; procedural memory explains how he learns new skills; implicit memory explains how he learns to solve priming tasks); and (c) only the type of memory accompanied by a feeling of reliving (i.e., episodic) was impacted by his surgical procedure. (p. 127)¹

Klein describes H. M.'s case in the view of the standard model of pluralistic memory types. Reimagining it within the unified framework, however, shows a slightly different story. Instead of memory existing in a variety of types, memories are retrieved using the specific cues that connect to the traces. For patient H. M., his faculties' abilities to append and interpret these cues to memories was impaired by his anterograde amnesia. Sensitivity to these cues and the efficacy of faculties that interpret them explain the specific performance on different types of tasks. Lastly, the absence of memories pertaining to self-reference is affected by impaired cues on specific memories that pertain to first-person reliving and the accompanying feeling of familiarity. That he was still able to learn some things, however, including things that were self-referential, shows that some cues and the interpretation of them were still intact. Where the dominant view chalks H. M.'s abilities up to a matter of separate memory systems which strictly constrains what may be learned, the unified view allows H. M. and other amnesic patients to achieve memory retention specific to the unimpaired cues and interpretation. The unified account readily allows for H. M. to create new memories despite his impairment, aligning with the actual presentation.

Similarly, the case of patient K. C. and his severe anterograde amnesia demonstrates the benefits afforded by the unified view. Patient K. C., while "incapable of recollecting any personally experienced events (Rosenbaum et al., 2005, p. 989)," still "understands the concept of time, knows that it passes, and can orient himself with respect to his personal past and future" (Craver, 2014, p. 191). Similar patients have likewise

¹ Edited to remove in-line references.

demonstrated the ability to “know they have personal futures and care about them” (Craver, 2016, p. 978). Even without any ability to imagine the future, spatiotemporal orientation and self-reference persist.

The unified view affords a flexibility that accurately aligns with aspects of amnesia that Tulving’s account would otherwise find counterintuitive due to its rigid definitions. But these qualities are only counterintuitive due to these imposed constraints; once removed by the unified proposal, amnesia, its effects, and these types of presentations are accounted for by way of retrieval failure associated with self-referential cues.

4.2 Category-specific Agnosia

While there are many types of agnosia, category-specific agnosia and its reliance on a traditional conception of semantic memory is particularly interesting within the unified framework. Category-specific agnosia, a syndrome of impaired object identification and perception, results in an inability to accurately recognize objects that share categorical content or description.

Take, for example, a lemon. A semantic representation of a lemon would include facts about lemons such as that they are yellow, sour, a fruit, are grown on trees, and that their juice and zest are used in making lemon meringue pie. A person with category-specific agnosia may have difficulty recognizing that it is in fact a lemon and not an apple or grape or watermelon, despite obvious differences between these objects to those not afflicted with the syndrome.

There are several theories of how this type of agnosia presents the way it does, though of particular interest is the view that it involves organizing memory based on the categorization of semantic details. Such a view, however, quickly devolves in a near-endless amount of categorization that our memory would need to index. As Humphreys and Forde (2001) suggest,

Given the diversity of the information considered to be “semantic,” and the fact that there are fundamental differences in the nature of the knowledge involved (i.e., some pertains to the sensory properties associated with an object [e.g., it is brown and has floppy ears] and some reflects how two or more objects relate to each other [e.g., dogs chase cats], etc.), it is perhaps surprising that all of this information is considered

to be represented in one homogenous “store.” (p. 455)

It’s no surprise, then, that they come to the same conclusion as the one that motivates the unified view. They go on to argue that

the concept of a “semantic system,” in any unitary sense, may be one of the victims of an attempt to define the nature of our stored knowledge in more detail. If the “semantic system” retracts to no more than the form of knowledge recruited to perform a particular task - with this knowledge differing across tasks, then the “system” becomes a fiction. (Humphreys & Forde, 2001, p. 455)

This is the benefit of the unified view: there’s no longer a constraint to semantic information, information types, or categories on which the information must be grouped. Instead, the unified view relies on sensitivity to cues of specific memories, better accommodating category-specific agnosia. Instead of endless categories of information that should be connected between objects and their memories, it’s merely an impairment of a sensitivity to specific cues and their differential salience that are affected by the agnosia. An inability to recognize lemons and similar fruits are based on a differential salience toward that specific cue, with no required slippery slope into other similar categories or features. This specific kind of agnosia thus constrains one’s ability to retrieve memories on that cue, with no expected impairment of related or corresponding descriptor.

This view also serves as a way to explain some mysteries of category-specific agnosia. Outlined by Bub and Bukach (2001), some patients with this syndrome experience trouble identifying man-made objects in comparison to biological ones. In their description of the problem, however, they state, perhaps ironically, that in trying to find an etiology for such trouble there are no “shared perceptual features or structural dimensions for most of these objects” (Bub & Bukach, 2001, p. 479). What Bub and Bukach are missing, however, is the obvious cue that is retrieved on: that the object is, in fact, man-made, or not. By invoking the salience of cues within the unified framework, we can account for even the most general presentations of category-specific agnosia, as such cues can be as broad or specific as the object permits.

4.3 Memory Errors and False Memories

As Robins (2019) notes, “Accounting for confabulation is . . . an important desideratum for any candidate theory of memory” (p. 2135). While we previously used memory errors as a way to detail several problems with Tulving’s distinction, now we will account for false memories within the unified view. Where we have previously looked at memory conditions that included impairments and advantages, in this section we will briefly look at ordinary cases of false memory: misremembering and confabulation.

Misremembering is defined by Robins (2016) as

a memory error that relies on successful retention of the targeted event. When a person misremembers, her report is inaccurate, yet this inaccuracy is explicable only on the assumption that she has retained information from the event her representation mischaracterizes. (p. 432)

We often and ordinarily misremember past experiences (Brainerd & Reyna, 2005). For example, perhaps after asked what you had for breakfast, you answer “eggs,” but really you had waffles today, and it was in fact yesterday when you had eggs. Or when asked how old you are, you misremember your age as the one prior to your recent birthday. Sometimes misremembering is accompanied by a near-immediate feeling that the information you just recalled is wrong, and we actively work to search our internal memory for the accurate, or what we feel is a more accurate, answer.

There are several accounts for how misremembering comes about. One such account is briefly visited here. The causalist view implicates intact memory retention but inaccurate memory retrieval (Michaelian, 2016). We needn’t get into the specifics of the causalist account, but instead we can elucidate the unified view’s contribution to the account on the grounds that both issue views based on a function, or process, and not on the content itself. That is, the content of the misremembered memory is not at stake here; rather, causalist account implicates the process of recollection as the etiologic reason for misremembering. This is supported by experiments by Wang et al. (2018) on the effect of self- and other-referencing in the DRM Paradigm, finding that “false memories are not malfunctions of cognitive processes, but that true and false memories may originate from similar memory mechanisms” (p. 83). There’s good reason for this: all we have to do is remember the often-accompanying correction to our misremembering. What this correction shows is that the content of the memory is intact,

but for some reason, in the moment of retrieval, we did so incorrectly. Therefore, it's the cue retrieval that is in error.

The unified view supports this suggestion. The memories and their cues are intact, as is shown by the accurate correction of misremembering, but the process by which these cues are retrieved and interpreted is temporarily incorrect. It may be that the required faculty is monopolized by other processes, such as the default mode network (DMN), which is implicated in spatiotemporally-oriented memories (Addis, 2018; Gerrans, 2014; Hutto, 2017; McCormick et al., 2014).

In contrast to misremembering is confabulation, or “remembering” events that “draw on information from many sources; their explanation does not require appeal to a particular past event that has been distorted” (Robins, 2016, p. 434). A famous case of confabulation outlined by De Brigard (2014) uses the example of the El Al cargo plane crash which left 43 people dead in Amsterdam, an event that was spoken about on news shows for weeks. Utilizing a questionnaire that was handed out to hundreds of Amsterdam residents, H. F. M. Crombag and a team of psychologists collected answers on their recollection of the event, of which 55% of residents remembered having seen footage of the actual crash. The problem, as you might guess, is that no such footage exists. Here we see how confabulation works: there may be some event(s) which provide information toward a constructed, though not real, event that the person remembers. Thus a confabulation is not true memory, but instead is akin to the act of *seeming to remember*, as outlined by Bernecker and others (Bernecker, 2017; Teroni, 2018).²

The unified account suggests that confabulation comes about in near-opposite the way of misremembering. As opposed to an intact memory content and temporarily impaired retrieval process implicated in misremembering, confabulation is impaired in both ways: first, by the absence of a true memory and, second, an impaired retrieval process. Confabulation unjustifiably retrieves and interprets cues of true memories and, from these, constructs a cogent narrative, which presents as the phenomenal experience of recollection, or something resembling such. This would account for why

² Confabulation, in this view, isn't evidence of any effort, conscious or otherwise, on part of the person to “have fulfilled a rational obligation to knowledgeably explain our attitudes by reference to motivating reasons” (Keeling 2018, p. 1215). The unified view infers no reference to attitudes or motivating reasons at all.

confabulations tend to utilize portions of actual memories that retrieve on cues relevant to that which prompts the confabulation. In the case above, the confabulation's etiology is based on the actual event of the plane crash as it was experienced by the residents, but the confabulation presents as a result of cues that are interpreted in ways that facilitated scrambled retrieval attempts.

4.4 Synesthesia

While we've seen accounts of memory conditions and errors as compelling motivations for the unified view, a thorough application should similarly offer compelling results. Where this unified account has filled in negative gaps otherwise exposed by memory conditions and errors, we too can look at positive cases, where this proposal contributes an understanding of neurological conditions where memory isn't incumbered but instead is advantaged. Synesthesia presents a such a case.

Synesthesia is a neurological condition whereby "an otherwise normal person experiences sensations in one modality when a second modality is stimulated" (Ramachandran & Hubbard, 2001, p. 4). A synesthete may, for example, see letters or numbers as inherently colored, shapes or colors when hearing sounds, taste textures otherwise reserved for the touch, experience time non-linearly, among other meshing of the senses. While synesthesia is sensory in nature and specifically doesn't infer memory as an explanatory process for its etiology (Ramachandran & Hubbard, 2001), it has also shown to accompany significant advantages for memory (Rothen et al., 2012; Luria, 1968). As we will see, these advantages are at least in part owing to the ways in which cues within the unified model work.

In one study of six time-space synesthetes by Simner et al. (2009), it was shown that the synesthetes were more accurate at dating events (and didn't slow their typical recollection in doing so), were able to generate more autobiographical events in the given year, and learn more while retaining memories for longer (Mills et al., 2006; Rothen & Meier, 2010). Rothen et al. (2012) describes this finding as evidence of these synesthetes' advantage of being able to use the spatial form generated for the memory as "internal 'place holders' to anchor events in time" (p. 1959). It also found that the advantage to synesthetes is more apparent in long-term memory than short-term (Rothen et al., 2012).

This characterization conforms nicely to the concept of cues within the unified framework of long-term, declarative memory. For synesthetes, as they perceive stimulus or objects with an atypical accompanying description, this description is then appended as an additional cue that non-synesthetes lack. These *extra* cues, or which Meier and Rothen (2013) describe as *additional retrieval cues*, give an advantage to synesthetes.

5. Conclusion and Final Thoughts

Tulving's distinction for episodic and semantic memory systems says that the episodic system deals with event-related memories, while the semantic memory system deals with general and world knowledge. I have motivated an alternative framework, unified memory functionalism, to better explain problems for the dominant view rooted in cases of misremembering, confabulation, amnesia, category-specific agnosia, and synesthesia. Within a unified memory functionalist framework, experiences are encoded into memory traces, and retrieval of memories is dependent on the cues specific to each particular instance of remembering. This view accommodates more accurately the intricacies seen in the phenomenal experiences seen in various memory conditions, errors, and advantages.

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