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Episodic memory without autonoetic consciousness

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Abstract

Ever since Tulving's influential 1985 article "Memory and Consciousness" it has become traditional to think of autonoetic consciousness as necessary for episodic memory. This paper questions this claim. Specifically, it argues that the construct of autonoetic consciousness lacks validity and that, even if it was valid, it would still not be necessary for episodic memory. The paper ends with a proposal to go back to a functional/computational characterization of episodic memory in which its characteristic phenomenology is a contingent feature of the retrieval process and, as a result, open to empirical scrutiny. The proposal also dovetails with recent taxonomies of memory that are independent of conscious awareness and suggests strategies to evaluate within- and between-individual variability in the conscious experience of episodic memories in human and non-human agents.

Keywords: Episodic memory; Autonoetic Consciousness; Semantic Memory; Construct Validity; Recollection.

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1. Introduction

Written around 397 AD, Augustine's *Confessions* intriguingly foreshadowed many contemporary debates in theoretical cognitive science. Armed only with the power of introspection and a keen aptitude for conceptual distinctions, Augustine intuited that when it comes to the contents of our memory, one ought to distinguish between memories of things previously experienced or sensed, and memories of what he called *knowledge*. Unlike the former, which involves the retention of images, the latter refers to certain kind of memories that are "kept apart from the rest" as they don't involve the mere retention of images "but of the facts themselves" (Augustin, 1997: X, 9). Many others since have echoed the need for distinguishing memories of particular events experienced in one's own past from memories of known facts, such as remembering that the molecular composition of water is H_2O. Yet, of the many attempts to distinguish these two kinds of memory (for reviews, see Herrmann, 1982; Renoult and Rugg, 2020), no other has been as influential to contemporary science and philosophy as the distinction, suggested by Endel Tulving, between *episodic* and *semantic* memory.

The distinction was first introduced in 1972, in a chapter included the *Organization of Memory,* a pivotal volume Tulving himself edited with Wayne Donaldson. In the following decade, the popularity of Tulving's distinction grew fantastically, and by the time he published *Elements of Episodic Memory*, in 1983, his initial paper had been cited more than 500 times (according to the Social Science Citation Index). And yet, as if it needed another boost, Tulving once again revamped the distinction, in 1985, in another widely cited paper that introduced a further approach to separating episodic and semantic memory, this time grounded neither in

conceptual distinctions nor in empirical results but in the apparently inerrant evidence of our phenomenology. There, Tulving argued that different kinds of memory correspond to different kinds of conscious experiences, and he claimed that episodic memory is correlated with what he called *autonoetic consciousness*. Indeed, he went as far as claiming that autonoetic consciousness is a *necessary* component of episodic memory, perhaps an even more essential element than those listed, just two years earlier, in his book.

Here, I offer a critical evaluation of Tulving's notion of autonoetic consciousness and argue, first, that the construct it supposedly refers to lacks validity; and second, that even if it was a valid construct, autonoetic consciousness still would not be necessary for episodic memory. To that end, in section 2, I begin by reconstructing the logic behind Tulving's distinction between episodic and semantic memory prior to 1985, and then discuss how fundamentally different was his proposal to employ autonoetic consciousness as a phenomenological marker of episodic—as opposed to semantic—memory. Then, in section 3, I offer conceptual, methodological, and empirical reasons to doubt the validity of the construct of autonoetic consciousness as well as the claim that it is necessary for episodic memory. Finally, in section 4, I explore several positive consequences for research on memory that may follow if we abandon the alleged necessary connection between episodic memory and autonoetic consciousness.

2. A brief history of Tulving's episodic-semantic distinction.

Tulving initially motivated the distinction by noting that memory types are typically contrastive: 'For instance', he said, 'we understand that short-term memory is not long-term memory, auditory memory is not visual memory, and acoustic memory is not articulatory memory' (Tulving, 1972: 384). But there was a "new kind of memory", recently introduced by Quillian

(1966), and about which that very same volume had dedicated three chapters. In a sense, the goal of those three chapters was to try to unify the kind of memory that underlies a variety of memory tasks, including the memorization of facts, concepts, and language comprehension. But if there is such a thing as semantic memory, Tulving wondered, what kind of memory should it be contrasted with? His suggestion is that *episodic* memory is the right contrast category, and that in fact this kind of memory constitutes the sort of recollective phenomena psychologists have been interested in at least since Ebbinghaus (1885). Importantly, the contrast he had in mind was couched in functional or computational terms. Specifically, although he acknowledged that there were several processes common between episodic and semantic memory —e.g., both selectively receive and retain information from perceptual systems and can transmit information to other systems— he stressed that there were enough computational differences to think of these kinds of memory as distinct systems.

Back then (and this is perhaps true of today as well) there was little clarity as to what constitutes a cognitive system (De Brigard, 2017a), let alone how to distinguish them. At the very least, there were two minimal requirements to postulate a distinction between cognitive systems: 1) a difference in the nature of the information and/or representational format the system supposedly operates on, and 2) a difference in the computational processing upon said representations. For instance, one of the main arguments to distinguish short- from long-term memory was based on the fact that there was a difference in the format of the representation each of the them operated with —e.g., short-term memory supposedly operated with modality specific information whereas the information in long-term memory was thought to be amodal— as well as at least one difference in their computational processes —i.e., short-term memory was capacity-limited whereas long-term memory was not (Atkinson and Shiffrin, 1968). A similar minimal

strategy was employed by Baddeley and Hitch (1974) to argue for a difference in two subsystems in working memory: one operating solely with phono-articulatory information (representational format) and susceptible to auditory interference (computational process) and another one operating solely with visuospatial information (representational format) and susceptible to visual interference (computational process).

The same logic underlies Tulving's original argument for a difference between episodic and semantic memory. According to him, there was an essential difference between the nature of the information stored in each kind of memory: whereas episodic memories were allegedly stored via spatiotemporal relations, information in semantic memory was stored via semantic associations. The provenance of the information was also different. While episodic memory required "direct recording" –i.e., a direct connection with the encoded mnemonic content— semantic memory involved "indirect recording", whereby the content that is encoded is not the same as the experience that brought it about (e.g., one may learn that the capital of Venezuela is Caracas while having a cup of coffee in a café in Caracas, but only the memory of being in the café in Caracas is direct; the mnemonic content that Caracas is the capital of Venezuela is not identical to the experience in virtue of which it was acquired and, thus, was indirectly recorded). As a result, there was also a difference in what he calls the "reference" of the stored information: whereas episodic memories referred to autobiographical events, semantic memory had "cognitive" referents. Moreover, Tulving also discusses two putative differences in processing. First, he argued that retrieval made episodic memories susceptible to modification, while the same is not the case for semantic memory; and second, that processes like forgetting and retroactive interference affect episodic memory to a much greater extent than semantic memory (Tulving, 1972).

Tulving then revised and enlarged this list of differences in his 1983 book, but the reasoning behind the distinction remained the same. In fact, he included a useful table summarizing the "differences between episodic and semantic memory" comprising three subcategories—information, operations, and applications—with the first two directly corresponding to differences in informational/representational format and differences in computational processes (Table 1). By then, the representational/computational strategy to postulate putatively different cognitive systems was well accepted. Notice, too, that during that decade, Tulving had been consistent with his characterization of episodic memory in purely computational terms, that is, in the terms with which he described it in his initial postulation in 1972, and then revised and expanded upon in 1983. Take, for instance, his well-known review-paper on encoding specificity, in which he defined episodic memory as being "concerned with storage and retrieval of temporally dated, spatially located, and personally experienced events or episodes, and temporal-spatial relations among such events" (Tulving and Thomson, 1973).

Diagnostic Feature	Episodic	Semantic
Information		
Source	Sensation	Comprehension
Units	Events, episodes	Facts, ideas, concepts
Organization	Temporal	Conceptual
Reference	Self	Universe
Veridicality	Personal belief	Social agreement
Operations		
Registration	Experiential	Symbolic
Temporal Coding	Present, direct	Absent, indirect
Affect	More important	Less important
Inferential capability	Limited	Rich
Context dependency	More pronounced	Less pronounced
Vulnerability	Great	Small
Access	Deliberate	Automatic
Retrieval queries	Time? Place?	What?
Retrieval consequences	Change system	System unchanged
Retrieval mechanisms	Synergy	Unfolding
Recollective experience	Remembered past	Actualized knowledge
Retrieval report	Remember	Know
Developmental sequence	Late	Early
Childhood amnesia	Affected	Unaffected

Applications		
Education	Irrelevant	Relevant
General utility	Less useful	More useful
Artificial intelligence	Questionable	Excellent
Human intelligence	Unrelated	Related
Empirical evidence	Forgetting	Analysis of language
Laboratory tasks	Particular episodes	General knowledge
Legal testimony	Admissible, eyewitness	Inadmissible, expert
Amnesia	Involved	Not involved
Bicameral men	No	Yes

Table 1. Summary of differences between episodic and semantic memory (Tulving, 1983: 35)

But then, in 1985, he introduced a different way of distinguishing episodic and semantic memory, this time grounded neither in conceptual distinctions nor in empirical results but in the apparently inerrant evidence of our phenomenology. Now episodic memory was characterized as involving *autonoetic* (self-knowing) consciousness, a different kind of consciousness from *noetic* (knowing) consciousness, which supposedly characterizes semantic memory, and *anoetic* (not-knowing) consciousness, which allegedly characterizes procedural memory. This new approach to distinguishing episodic, semantic, and procedural memory had the additional advantage of dovetailing nicely with Squire's proposed taxonomy of memory (1986), in which the declarative versus procedural distinction was proposed. By the time Squires' "tentative taxonomy" evolved into the so-called *Standard Model of Memory* (Squire, 1992), the idea of separating episodic, semantic, and procedural memory in terms of consciousness became widespread and, as a result, the initial computational approach to differentiate them was less emphasized.

Now, what exactly is autonoetic consciousness? When the term is introduced, we are told first "that autonoetic consciousness is correlated with episodic memory" and, second, that it is "necessary for the remembering of personally experienced events" Next, we are told that autonoetic consciousness is responsible for making the individual aware of the fact that the remembered event "is a veridical part of his own past existence". Finally, Tulving tells us that "it

is autonoetic consciousness that confers the special phenomenal flavor to the remembering of past events, the flavor that distinguishes remembering from other kinds of awareness, such as those characterizing perceiving, thinking, imagining, or dreaming" (Tulving, 1985: 3). To buttress this proposal, he moves on to interpreting the case of N.N., an individual with severe deficits in episodic memory, as showing absence of autonoetic consciousness with apparent preserved noetic and anoetic awareness. The alleged tight correlation between episodic memory and autonoetic consciousness motivates Tulving to then describe autonoetic consciousness in terms of six characteristics: 1) it encompasses personal time: past and future; 2) it is a necessary characteristic of episodic remembering; 3) it appears late in development; 4) it is selectively impaired or lost in brain damage; 5) it varies across individuals and situations; and 6) it can be measured.

Tulving's attempt at linking episodic memory to a distinct phenomenological marker—i.e., autonoetic consciousness—is continuous with the long philosophical tradition of finding internalist criteria (i.e., features of the recollective experience itself) that allows us to distinguish memory from other cognitive faculties. For Spinoza and Locke, for instance, memories were different from imagination because they were accompanied by the thought that what is brought to mind happened in the past. By contrast, Hume suggested that we manage to distinguish memories from imaginings by the greater vividness of the former, whereas for Russell, memories, unlike imaginings, were "accompanied by a feeling of belief which may be expressed in the words 'this happened'" (Russell, 1921: 14). Unfortunately, it is also well-known that, ultimately, all these proposed memory-markers fail, for all sorts of different reasons (De Brigard, 2014; De Brigard, 2017b). Might it be that Tulving's memory marker succeeds where the others have failed? Now, 40 years after its initial formulation, it is worth evaluating whether his characterization of

autonoetic consciousness withstands the test of time and whether it can then be used as a reliable marker of episodic memory.

3. A critical evaluation of autonoetic consciousness

A first difficulty we find with the notion of autonoetic consciousness pertains to the somewhat unsystematic—and sometimes contradictory—use of the term. Consider the fact that, in 1985, Tulving initially defined autonoetic consciousness as the capacity to become aware of the remembered event as a "veridical part of our own past existence" and said that it should be distinguished from the kind of consciousness associated with other mental states, including imagining. But then, just a few lines later, he tells us that autonoetic consciousness is also necessary to imagine yourself in the future—what is now called "episodic future thinking" (Szpunar, 2010). This suggests, therefore, that autonoetic consciousness is *not* a memory marker after all, for it is present *both* when we entertain episodic memories in remembering as well as when we imagine possible future events. A potential interpretation that does not render these two statements as contradictory, is to say that Tulving did not want to include episodic future thoughts in the category of imagination. This interpretation seems consistent with the way in which he defined autonoetic consciousness in subsequent writings. For instance, in 1997, Tulving stated that: "Autonoetic consciousness is the capacity that allows adult humans to mentally represent and to become aware of their protracted existence across subjective time" (Wheeler, Stuss and Tulving, 1997). Now memory is not even mentioned, and the past has just become one of the two directions through which autonoetic consciousness allow us to "mentally travel in time". But then, in 2002, he tells us that autonoetic consciousness "allows us to be aware of subjective time in which events

happened. Autonoetic awareness is required for remembering. No autonoesis, no mental time travel" (Tulving, 2002). Now mental time travel seems to only go backwards.

A conciliatory interpretation of these apparently inconsistent definitions is to think of episodic memory and episodic future thinking as two operations of a larger cognitive system—call it the "mental time travel system"—and then to think of autonoetic consciousness as its necessary correlate. This, in fact, seems to be the way many researchers interpret the empirical evidence showing remarkable overlap in the brain structures engaged during episodic memory and episodic future thinking—evidence that comes not only from neuroimaging studies (Okuda et al, 2003; Szpunar et al, 2007; Addis, Wong and Schacter, 2007), but also from developmental (Atance and O'Neill, 2001), neuropsychological (Klein et al, 2002;), and behavioral findings with clinical (Dickson and Bates, 2005) and neurotypical populations (Szpunar and McDermott, 2008; for a review, see Schacter et al, 2012; for a critical assessment, see Trakas, 2022). However, more recent findings suggest that autonoetic consciousness may also be associated with other kinds of imaginings that don't fall under the alleged operations of a mental time travel system. For instance, neuroimaging studies show commonalities in neural activity associated not only with mental time travel but also with our capacity to imagine alternative ways in which past personal events could have occurred but did not—a cognitive capacity known as "episodic counterfactual thinking" (De Brigard et al., 2013; Ayala et al, 2022). When one mentally simulates episodic counterfactual events, such thoughts are neither about the future nor the past, for they do not seek to depict the past as it was—that is what remembering does—but rather as it could have been. And, critically, these studies show that, despite some differences in the way people experience episodic counterfactual relative to future thoughts (De Brigard and Parikh, 2019), the phenomenological features associated with episodic future thinking are equally present during episodic counterfactual

simulations (De Brigard and Giovanello, 2012; De Brigard et al., 2016; Özbek et al., 2017; Özbek et al, 2018).

A further complication with this conciliatory interpretation comes from a landmark study by Hassabis and colleagues (2007), in which five patients with hippocampal amnesia showed profoundly impoverished mental simulations when it came to imagining new experiences. Critically, this effect was independent of whether they were asked to imagine these new experiences in a possible future, contemporaneously, or in no particular time at all (see also Hassabis, Kumaran, and Maguire, 2007). Thus, it looks like a healthy hippocampus is required to mentally simulate episodes that need not involve projecting oneself backward or forward in time. A more likely explanation is that the common engagement of these core brain regions and the similarities in their recollective experiences does not depend on whether the content of the relevant thoughts falls under the umbrella of a mental time travel from one's personal past to one's personal future. Instead of their content (i.e., what the thought is about) I've argued that these similarities have to do with the structure of the simulation itself—specifically, with the fact that these kinds of mental contents involve a complex spatiotemporal structure whose mental simulation takes time to unfold (De Brigard and Gessell, 2016; De Brigard, in press). As such, it looks like the first alleged characteristic of autonoetic consciousness—that is encompasses personal time (past and future)—is likely false.

What about the second characteristic—namely, that autonoetic consciousness is necessary for episodic remembering? Given that "necessary" is a modal term, it is useful to ask first what its modal scope is. That is, when Tulving claimed "there is no such a thing as episodic memory without autonoetic awareness" (Tulving, 1985), did he mean the latter to be an essential property of episodic memory in a logical or metaphysical sense? Probably not. I don't think he meant to say

that it was inconceivable or logically contradictory to think of an organism for whom episodic memories do not feel like anything at all—a kind of philosophical memory zombie (Chalmers, 1996). So, the claim is likely to be interpreted as stating a psychological, or perhaps a biological, necessity. But, if so, then it shouldn't be possible to find real-life cases of episodic memory without autonoetic consciousness. Unfortunately, there are a few documented cases that strongly suggest that you can have episodic memories without autonoetic consciousness. Stuss and Guzman (1988), for instance, report the case of J.V, a 50-year-old man with apparent Cluver-Bucy syndrome, who developed retrograde amnesia for personal experiences from his past. After treatment, he appears to recover—or re-learn (it is unclear)—information about past personal events, although he reports that those contents do not come associated with the feeling of intimacy characteristic of other episodic autobiographical memories. Similarly, Levine and colleagues (1998) report the case of M.L., a 36-year-old man who suffered a severe traumatic brain injury resulting in damage to his right uncinate fasciculus, essentially disconnecting the prefrontal and medial temporal cortices in that hemisphere. In addition to several cognitive and affective impairments, his injury resulted in M.L. reporting "a feeling of subjective distance from recall of events occurring after his recovery" (Levine et al., 1998: 1956). And more recently, Klein (2013) mentions the case of R.B., a 43-year-old man who was struck by a car while riding his bicycle and had to spend time in the hospital.[1] After discharge, R.B. was apparently able to remember particular incidents from his life but without the "feel that the content experienced belonged to him" (Klein, 2013: 5).

Not only can we find cases of episodic memory with reduced sense of relieving, ownership, warmth and intimacy, which are supposed to be essential to autonoetic consciousness, but also

[1] It is important to note that the details of this case are murky, for there is no systematic and careful neuropsychological report of the case. The first report of R.B. was included in Klein and Nichols (2012), which is an article in a philosophy rather than a clinical or neuropsychological journal. To my knowledge, no clear clinical and/or neuropsychological assessment of this case has been published, so it should be taken with a grain of salt.

reduced vivacity and sense of relieving. Zeman et al (2010), for instance, reported the case of M.X., a 56-year-old man who abruptly lost his capacity to "mentally visualize". Relevant to the current argument is the fact that M.X. was tested with a delayed visual memory task, and while his accuracy was no different from that of controls, his reported vividness at retrieval was significantly lower. More recently, Dawes and colleagues (2022) used phenomenological questionaries and structured interviews to probe aphantasics' experience during episodic past and future thinking, finding that their scores for features associated with autonoetic consciousness (e.g., vividness, emotion, coherence) were, if not at floor, significantly lower than controls. However, other evidence reveals that individuals with aphantasia show little to no impairment in memory accuracy and recognition (Bainbridge et al. 2021; Keogh et al., 2021; Dance et al., 2023). Contrary to Tulving, Dawes and colleagues interpret these results as suggesting that the characteristic phenomenological aspect of remembering—its autonoetic consciousness—and the successful recall of information about a particular past event—the episodic memory—are "dissociable components of autobiographical memory" (Dawes et al., 2022, see also Aydin, 2017; Blomkvist, 2023). Of course, if this is the case, then it is false that there cannot be episodic memory without autonoetic consciousness.

One could be tempted to explain these cases as reflecting semantic rather than episodic memory, but this tack backfires. Recall that Tulving's original motivation to postulate an episodic memory was to capture the capacity to recall the single, spatiotemporally isolable instance in which an item is encountered—be it a token presentation of the word "pillow" in a list or a token experience of a stop sign while on the road—as opposed to the general type of which such instances are tokens of, which is supposed to be handled by semantic memory. The problem is that the individuals in all these cases have no difficulty performing tasks that require them to retrieve

episodic (i.e., token) information. So, we face a dilemma: either to accept that semantic memory can handle token information and give up on the motivation to draw the distinction to begin with, or to accept that sometimes episodic memory is not accompanied by autonoetic consciousness, thereby accepting that it is not a necessary correlate. Neither option seems desirable.[2]

A careful examination of the third characteristic—that autonoetic consciousness appears late in development—raises a similar concern. While in his 1985 paper Tulving wasn't terribly clear as to how late in development episodic memory is supposed to emerge, he is a bit clearer in 2002: "Although it is difficult to put a specific figure on the age when children acquire a more-or-less fully functioning episodic memory system, a rough rule of thumb is that children younger than 4 years of age do not yet have such a system" (Tulving, 2002:7). The problem, however, is that accumulating evidence from the past few decades clearly shows that preverbal children, as early as 6-months-old, can remember all sorts of information that unmistakably fall under the scope of what episodic memory was supposed to operate with. Researchers have shown, for instance, that preverbal children can remember unique action sequences they learned during a prior demonstration, and that such information can be retained up to one month by the age of 9 months and up to a year by the time children reach 20 months (Bauer, 2006). More recently, Nakano and Kitazawa (2017) used eye-tracking to demonstrate that 18-month infants preferentially look at regions of a computer screen in which the day before the saw a mean-looking character appear, suggesting memory-driven anticipation. Once again, one could argue that these kinds of tasks are driven by semantic rather than episodic memory, but then the same issue mentioned above occurs, namely that in so doing, we would be overextending the reach of the semantic memory system by applying it to information it was not supposed to be able to operate with. A more parsimonious

[2] There is likely a third option: to postulate two kinds of episodic memory, one with autonoetic consciousness and one without. I explore this possibility below.

explanation is perhaps to say that episodic memories that are accompanied by autonoetic consciousness don't develop until much later.[3] But this is equivalent to say that episodic memory and autonoetic consciousness exhibit two separate developmental trajectories which, once again, speaks against the claim that without autonoetic consciousness there cannot be episodic memory.

The fourth characteristic—i.e., that autonoetic consciousness is selectively impaired or lost in brain damage—is also likely false. "Selective impairment", though, is an interesting choice of words, for it could be understood in at least two ways. One way is as stating that there is a one-to-one correlation between a brain region and autonoetic consciousness. If so, when Tulving says that "the case of N.N. shows that certain kinds of brain damage may result in its impairment, or loss, without comparable impairment in other forms of consciousness" (Tulving, 1985: 6), he is saying that the part of the brain damaged in N.N. should be thought of as being dedicated to autonoetic consciousness. Although consistent with the spirit of the day—modular approaches to understanding neuropsychological dissociations were all the rave, and serious concerns with these kinds of inferences won't start emerging until a bit later (e.g., Caramazza, 1986; Shallice, 1988; Farah, 1994)—this reading is likely too restrictive. I doubt that even Tulving himself thought that the parts of the brain that N.N. precisely injured were uniquely dedicated to autonoetic awareness. In fact, in the more thorough neuropsychological evaluation of this patient—where it is revealed that N.N is in fact Kent Cochrane, better known by his initials K.C.—Tulving and colleagues (1988) report not only several other neurological sequela of his accident, including anosmia,

[3] Although, as a father of two, I find it difficult to believe that the many instances in which my kids recognized a daycare friend at the local playground, for instance, or were able to directly approach the spot in the backyard where the day before they had buried a toy, were devoid of any sense of intimacy and warmth.

apathy, and hemianopia, but also massive hemorrhagic and infarct atrophies in several regions of his brain, as revealed by a rather grainy CAT scan.[4]

A second, perhaps more amicable interpretation, is to read this characteristic as suggesting that the brain regions engaged in autonoetic consciousness can be associated with other cognitive processes but *not* with those that involve anoetic or noetic consciousness. As such, one should not expect to see that the brain regions affected in N.N./K.C. are engaged during semantic or procedural memory tasks. Unfortunately, we also have ample evidence showing that brain regions that are critical for episodic memory are also needed to perform tasks that fall under the category of semantic and even procedural memory. Consider the hippocampus. Psychology textbooks tell us that H.M., whose hippocampi were surgically removed, was unable to encode new episodic information but that he was still able to learn new skills, which are paradigmatic cases of procedural memory and, thus, anoetic consciousness. The problem is that a careful look at the evidence shows that this is simply not true. H.M. failed at numerous tasks for which he should have had no problem, had his procedural memory being preserved. Moreover, in many of the few tasks that have been presented as evidence for his preserved skill-learning, H.M.'s performance was never on a par with controls, which Corkin astutely attributes to the fact that the deficit was "cumulative, not independent", as you likely need to remember past experiences to help you to perform well at skill-based tasks (Corkin, 1968: 264; Corkin, 2013; for more on why H.M. didn't have intact procedural memory, see De Brigard, 2019). Further evidence of hippocampal involvement in procedural memory comes from several neuroimaging studies showing that the

[4] A post-mortem evaluation of K.C.'s brain showed multiple lesions in both hemispheres, including the 50mm lesion in the superior frontal gyrus, a 30mm lesion in the left superomedial occipital lobe that extended to the parietal lobe, and a hugely enlarged left lateral ventricle, among many others. His medial temporal lobes were also compromised, particularly his hippocampi, as well as portions of the entorhinal, perirhinal and parahippocampal cortices (Gao et al, 2020). Tulving likely didn't have much information about the extent and nature of K.C.'s neural damage, but I doubt he would have thought that these disaggregated portions of the cortex happened to be functionally responsible for, and only for, autonoetic consciousness.

hippocampus, and surrounding medial temporal lobe regions, are actually involved in the consolidation of motor skills (Schendan, Searl, Melrose, and Stern, 2003; Albuouy et al. 2008). Moreover, there is also plenty of neuropsychological and neuroimaging evidence showing substantial neural overlap between episodic and semantic memory (for a recent review, see Renoult et al, 2019). In sum, even the weaker interpretation of the claim that autonoetic consciousness is selectively associated with particular brain regions, is incorrect.[5]

The fifth characteristic—that autonoetic consciousness varies across individuals—is trickier to evaluate. On the one hand, it seems trivially true. Likely every cognitive capacity varies across individuals: the range of information people can hold in visual working memory varies (Brady, Konkle and Alvarez, 2011), for instance, as well as individuals auditory (Kidd et al., 2007) and visual (Mollon et al., 2017) discrimination abilities. So, perhaps Tulving meant that there is some dimension along which autonoetic consciousness varies among people. This, in fact, may be the way in which we should interpret his remarks on said variability: "Autonoetic consciousness can be expected to vary *systematically* with the conditions under which it is observed" (Tulving, 1985: 6. My emphasis). The question, of course, is what makes it systematic. Presumably, this systematicity in variability responds to some kind of quantitative increment or decrease that should in principle be captured by a measurement instrument. In recent years, there has been work suggesting that the phenomenology of episodic memory varies widely across individuals, and all sorts of metrics have been developed to capture such variation (Palombo et al, 2018; Madore and

[5] An anonymous reviewer suggested that, perhaps, there may be a brain region uniquely associated with autonoetic consciousness, is just that we haven't found a single case of selective damage. This is a possibility, of course, but I find it highly unlikely that there would be a neural correlate for just autonoetic consciousness, as opposed to a neural correlate for consciousness in general (I return to this issue at the end of this paper). Note, too, that the evidence discussed in the preceding paragraphs involves neural commonalities between episodic, semantic and procedural memory, not between neural correlates of autonoetic, noetic and anoetic consciousness. However, according to Tulving, since the latter are necessarily correlated with the former, then the neural structures associated with each kind of memory would a fortiori be associated with each kind of consciousness.

Wagner, 2022). But Tulving isn't talking about episodic memory: he is talking about autonoetic consciousness. Is there a measure along which we can observe the systematicity with which autonoetic consciousness varies among people?

According to Tulving, there is, as the final characteristic of autonoetic consciousness is precisely that it can be measured. To show that it can, Tulving reports two very similar experiments in which participants are presented with a long list of word-pairs featuring a category (e.g., musical instrument) and an instance of said category (e.g., violin). Next, they are asked to recall as many instances as they could in three consecutive tests, each one with increasing degrees of retrieval support: 1) free-recall, 2) recall by cuing the category, and 3) recall by cuing the category and the first letter of the instance. The idea is that instances that were retrieved with the least amount of support depended on episodic memory, whereas those that were retrieved with the most amount of support depended on semantic memory. Critically, when participants recalled an instance, they were asked whether they "actually 'remembered' its occurrence in the list or whether they simply 'knew' on some other basis that the item was a member of the study list" (Tulving, 1985: 8). As expected, the proportion of 'remember' answers was significantly higher for instances recalled during the free-recall test whereas the proportion of 'know' answers was significantly higher for those recalled in the condition with the most retrieval support.

This "remember/know" paradigm, as it has been known since, was introduced as a methodological strategy to measure whether a certain recollective experience involved autonoetic consciousness, corresponding thus to an episodic memory, or rather noetic consciousness, in which case it would correspond to a semantic memory.[6] Unfortunately, this experimental approach to

[6] This paradigm has also been employed to distinguish "recollection" from "familiarity" as two different retrieval processes that need not reflect the presence of two different kinds of consciousness (Yonelinas, 2002). Although some of my remarks could be leveraged against the use of the remember/know paradigm to measure recollection and

measuring autonoetic consciousness is extremely problematic. For one, it has been pointed out that this measure is consistent with a continuous interpretation of memory strength rather than a dichotomous one between episodic/autonoetic versus semantic/noetic. In a series of papers, John Wixted has demonstrated that data produced using the remember/know paradigm is better accounted for by a single parameter, which he calls "memory strength", rather than by the two variables postulated by Tulving (Wixted, 2007; Wixted and Mickes, 2010). More recently, Umanath and Coane (2020) provided convincing evidence to the effect that, contrary to Tulving's assumption, lay people do not use the term "remember" to preferentially refer to recollective experiences associated with episodic memory, just as they don't employ the term "know" to primarily refer to memories about concepts or facts. (see also Williams and Lindsay, 2019) Moreover, this lack of systematicity is also evident among psychologists that aren't experts on memory. The only group in which they found that the use of "remember" and "know" mirror—albeit not perfectly—the linguistic distinction proposed by Tulving were (you guessed it!) memory experts, motivating the ineluctable conclusion that what drives their choice of words is Tulving's theory, rather than the other way around. As a result, Umanath and Coane (2020) strongly caution against the use of the remember/know paradigm as presented by Tulving to measure the phenomenology of episodic and semantic memory for, as they put it, "the terms do not intuitively mean to participants what researchers want them to mean" (p. 19). It is hard not to question, therefore, the face validity of this instrument to measure the construct of autonoetic consciousness.

Consistent with their results, and perhaps more worryingly, recent work by Zaman and colleagues (2024) offers further reasons to think that the construct lacks criterion validity as well. They report two experiments in which participants are asked to recall a remote and a recent

familiarity, my main target is the claim that the "remember" and "know" responses measure autonoetic and noetic consciousness, respectively.

autobiographical event from their personal past (Experiment 1) or from a video presented in a computer (Experiment 2). They then used a battery of instruments that have been employed to assess the phenomenological characteristics of episodic memories in the past 30 years, including the remember/know questionnaire. Next, they submitted the resultant data to an exploratory factor analysis with a principal axis factoring approach centered on the responses to the autonoetic questions. If the remember/know questions were truly tapping at two different kinds of conscious awareness—one autonoetic and one noetic—in order to differentiate between episodic and semantic memory, we should not only expect to see them loading onto different factors but, more critically, we should expect to see the "remember" responses loading onto the same factor as responses to questions pertaining to the alleged characteristics of autonoetic consciousness (e.g., familiarity, sense of re-experiencing, sense of traveling back in time, etc.). However, this is not at all what their data show. Not only does remember/know responses load onto the same factor, but they also don't share a factor with any other phenomenological characteristic for either remote or recent autobiographical memories. This is exactly what lack of construct validity looks like.

Before concluding this section, let me address two possible objections. First, someone may argue that episodic memories that exhibit autonoetic consciousness are different from episodic memories that do not. In fact, Zaman et al's (2024) data reveals another intriguing phenomenon: that the factorial structure of real-life episodic memories does not coincide with that of video-based episodic memories (although in neither case do remember/know responses load onto different factors). This result is becoming more and more common, as researchers are showing not only behavioral but also neural differences between real-life episodic autobiographical memories and episodic memories of events encoded in online or laboratory settings (Cabeza et al., 2004; McDermott et al, 2009). The problem with this objection is that it risks throwing the baby out with

the bathwater, as it were, for then autonoetic consciousness will not constitute the introspective marker it was supposed to be. Remember that autonoetic consciousness was postulated to help us tell apart whether a particular memory was being processed by the episodic—as opposed to the semantic—system, so the suggestion that only some episodic memories are correlated with autonoetic consciousness renders it useless as a demarcating criterion.[7]

A second possible objection is to argue that, while Tulving's characterization of "autonoetic consciousness" may be wrong, researchers can still use the term as long as they clearly define it at the beginning of their papers. I've noticed a worrying tendency in research papers to equate the locution "in this paper, I am going to refer to the term 'X' as such-and-such" with the notion of "operationalization". But this is not what the latter term means. The notion of "operationalization" comes from early 20th century physics, where theoretical terms that putatively referred to unobservable entities abounded. Concerned about the proliferation of idiosyncratic definitions for theoretical terms, operationalists argued that every such term needed to be definitionally associated with a determinate way of measuring its putative referent; otherwise, it shouldn't be employed meaningfully in scientific practice (Bridgman, 1927). But they didn't mean that for every term there could be a different, and perhaps unique, way to measure its putative referent, but rather that every term needed to be associated with a single, determinate way of measuring it. The notion of operationalization was supposed to be the solution and not the cause

[7] A related objection was raised by an anonymous reviewer, who suggested that maybe the inclusion of autonoetic consciousness to the definition of episodic memory constituted an update, as it were, of the original functional characterization. As a result, Tulving could agree that some of the memories he would have thought were episodic under the functional characterization (e.g., the retrieval of a token presentation of a word that the participant judged only as "known"), turned out not to be so under the new, updated characterization. The problem is that we would still need an account for those memories that under the functional characterization would count as episodic—as opposed to semantic—but that under the updated characterization would not. One possibility is to postulate a different kind of memory that can handle retrieval of token information that is not accompanied by autonoetic consciousness but that is still distinct from semantic memory. Another possibility is to also update the notion of semantic memory to now cover the retrieval of both type and certain kinds of token information. Perhaps one of these revisionist strategies may work, but I just don't know how they could remain faithful to Tulving's original program.

of the toothbrush problem in psychology (Mischel, 2008). Of course, terms in psychology are often trickier because their putative referents are not always unobservable due to their size or speed, but because they may not refer to the same kind of physical stuff you just need a more powerful machine to detect. That is why we call their referents "constructs", to remain ontologically neutral. And a lesson we all should have learned from Meehl (e.g., MacCorquodale and Meehl, 1948; Cronbach and Meehl, 1955), is that not every measure can be associated with a construct—they need to be thoroughly validated first. As such, a real operationalization of a term like "autonoetic consciousness" is more than an idiosyncratic definition, even if momentarily related to a measure developed for a single experiment. For it to be meaningfully employed in scientific practice by a community of researchers, it needs to be tied to a single validated measure. And, unfortunately, this is not something we can say of the term "autonoetic consciousness".

4. Studying episodic memory without autonoetic consciousness

In the previous section I argued that Tulving's characterization of autonoetic consciousness is not only unsystematic and often contradictory but also that it comprises six characteristics that are likely inaccurate or false. The purpose of that analysis was to draw at least two lessons: 1) that autonoetic consciousness is not a valid scientific construct, and 2) that even if it was, it wouldn't be necessary for episodic memory. This does not mean, in any way, that I am denying the incontrovertible fact that most people experience many of their episodic memories vividly, with what James (1980) described as a sense of warmth and intimacy, and with what others have described as a certain feeling or belief that the content of their recollective experience corresponds to an episode of their personal past (e.g. Russell, 1921). What I deny is, first, that experiencing this phenomenology is a necessary condition for a memory to be episodic, and second, that such

phenomenology is constitutive of a particular conscious process that is categorically distinct from other kinds of conscious processes that operate with semantic or procedural memories. In this sense, my view is partially consistent with Klein's (2013) recent proposal that the phenomenology typically associated with episodic memory—and often captured by the notion of autonoetic consciousness—is not a necessary but a contingent property of episodic memory (see also, Klein 2014; 2015). Surprisingly, Klein's proposal agrees with the way in which Tulving himself functionally characterized the nature of recollective experience in 1983 and before: as a particular operation of the episodic system on its information (see Table 1). Episodic memories do not need to feel the way they do; this is a contingent effect of our cognitive architecture. Understanding why is it that episodic memories are experienced the way we do, therefore, is an open empirical question that should not be closed by stipulating that their relationship is a matter of necessity.

However, my view diverges from Klein's (2013) in that I *do* think that the reason why we experience certain mental episodes vividly and as a kind of reliving, whereas others come to our mind devoid of such phenomenology, may actually have to do with a difference in their content. For instance, in discussing patient J.V. mentioned above (Stuss and Guzman, 1988), Klein characterizes him as being able to remember semantically the exact same content he would have remembered episodically, if he hadn't had the accident. He contends that because the "core constituents of an episodic memory as initially proposed (i.e., temporal, spatial, and self-referential) can also be on display in a semantic memory experience, [then] there appears no principled reason why the content of these two systems should differ" (Klein, 2013: 2). This inference, however, is unwarranted, because from the fact that both a semantic and an episodic memory may refer to the exact same past experience, and even be reported with the exact same

words, it does not follow that their mental contents are identical or that they are representing their referents in the same way.

Philosophers' draw two distinctions that are helpful here. The first is the distinction between intentional *objects* and intentional *contents*. Mental states exhibit intentionality: they are about something. What a mental state is about is its intentional object. However, as Brentano (1974) showed, intentional objects need not exist. I can think about the Tooth Fairy even though the Tooth Fairy does not exist. Critically, intentional objects can present to the mind in different ways. Lois Lane can have thoughts about Clark Kent that differ from how she thinks about Superman. She can think, for instance, that 'Clark Kent is a coward' and that 'Superman is brave', and she won't be contradicting herself, even though both 'Clark Kent' and 'Superman' refer to the same individual: Kal-El. This is because the intentional object of her thoughts—Kal-El—can present to Lois either as Clark Kent or as Superman, and each mode of presentation conveys a different intentional *content*.

The second distinction is between *conceptual* and *non-conceptual* contents. To illustrate, consider an example inspired by Cussins's (1992). He tells us that, when he was young, he used to ride his motorcycle around London, often exceeding the speed limit. One time, a policeman stopped him as asked him: "do you know how fast you were going?" There is a sense in which of course he did. He was making the right movements and micro-adjustments to respond to the road conditions, and such motor decisions were epistemically sensitive and deliberate rather than mere reflexes. But, of course, that it not the sense in which the policeman's question was intended. What the policeman wanted was an answer in terms of a number of miles per hour. The knowledge the policeman was asking for was *conceptual*, whereas the kind of knowledge the motorcyclist had was *non-conceptual*. Now, imagine a variation on the story in which our protagonist is such an

expert motorcyclist that they can easily move from the non-conceptual information given by how it feels to ride a motorcycle, to the conceptual information captured by the speedometer. Such an individual would have no problem articulating confidently and with the same string of words: "I was driving 70 miles per hour". But from the fact that the same core information is reflected in their report (i.e., speed) does not follow that the two ways of knowing his speed have the exact same mental content.

My contention is that memories that feel more paradigmatically episodic not only involve mental contents that present to their subjects in a different mode than those that are experienced more semantically, but also that the former are more likely to involve non-conceptual contents whereas the latter are more likely to involve only conceptual ones. Thus, J.V. can report to the experimenter that he remembers being at a particular place at a particular time without any sense of reliving or ownership because his memories are retrieved with fewer sensory, proprioceptive, and non-conceptual contents than they would have, had he not had the brain accident. Likewise, an individual with aphantasia (Blomkvist, 2023) or with SDAM (i.e., severely deficient autobiographical memory; Palombo et al., 2018) can evoke memories of past episodes that differ in mode of presentation and/or richness and quantity of non-conceptual, proprioceptive, and sensory information relative to an individual with HSAM (i.e., highly superior autobiographical memory). Critically, they may use the same words to report their memories, but that does not mean that the contents of their recollective experiences are the same. The content of a memory is not exhausted by the words used to articulate it.[8]

[8] Small caveat: I am not denying that certain instruments, such as the autobiographical interview (Levine et al., 2002), could show important differences in the narratives of individuals whose memories feel more episodic versus more semantic. But these instruments are very structured, long interviews precisely designed to reveal such differences.

To understand why is it that certain recollective experiences are vivid and convey a sense of intimacy and warmth that others do not, we need to investigate not only why is it that some contents differ in terms of mode of presentation and degree of conceptual or non-conceptual richness, but also why is it that some surpass a certain threshold of subjectivity whereas others do not. Here's a possible way of construing this proposal (Figure 1). Think of each memory as having its own topology, which is determined by varying distributions over all the sensory, proprioceptive, conceptual, and non-conceptual information that constitute their contents (x- and y-axes). In turn, each of these distributions would vary along some measure of strength (z-axis, Morales, 2023). Thus, some values would be very high, such as spatial information (A) and conceptual associations (B), whereas others would be less strong, such as temporal/sequential (C), visual (D), affective (E), proprioceptive (F) and olfactory (G). Now, those contents not only vary in strength: they are also not equally likely to reach conscious awareness. In some cases—that is, for some individuals and for some memories—only contents with a certain degree of strength would surpass their threshold of subjectivity. If the threshold is high (hyperplane 2), an individual would only be aware of the spatial (A) and conceptual associations (B) related to the experienced event, with perhaps a faint recollection of its temporal/sequential details (C). By contrast, if the threshold is lower (hyperplane 1), they will be consciously aware of a much richer recollective content, which would include not only more sensory data, such a visual details (D), but also affective (E) and proprioceptive (F) information, which would likely be sufficient to present the content as having the sense of warmth and intimacy in virtue of which is felt as their own.[9]

[9] An anonymous reviewer pertinently asks: why would there be different thresholds? I draw inspiration here from work on conscious perception, whereby different theories of consciousness offer promising explanations as to why perceptual contents may or may not reach conscious awareness. One possibility, for instance, is that only mnemonic contents with certain strength manage to be broadcasted onto the global neuronal workspace (Dehaene et al., 2006), or perhaps be successfully discriminated by a higher-order reality monitoring mechanism (Lau, 2022). The point is that these are excellent *empirical* questions that future research should investigate, rather than leave unexplored because of an alleged necessary connection between episodic memory and autonoetic consciousness.

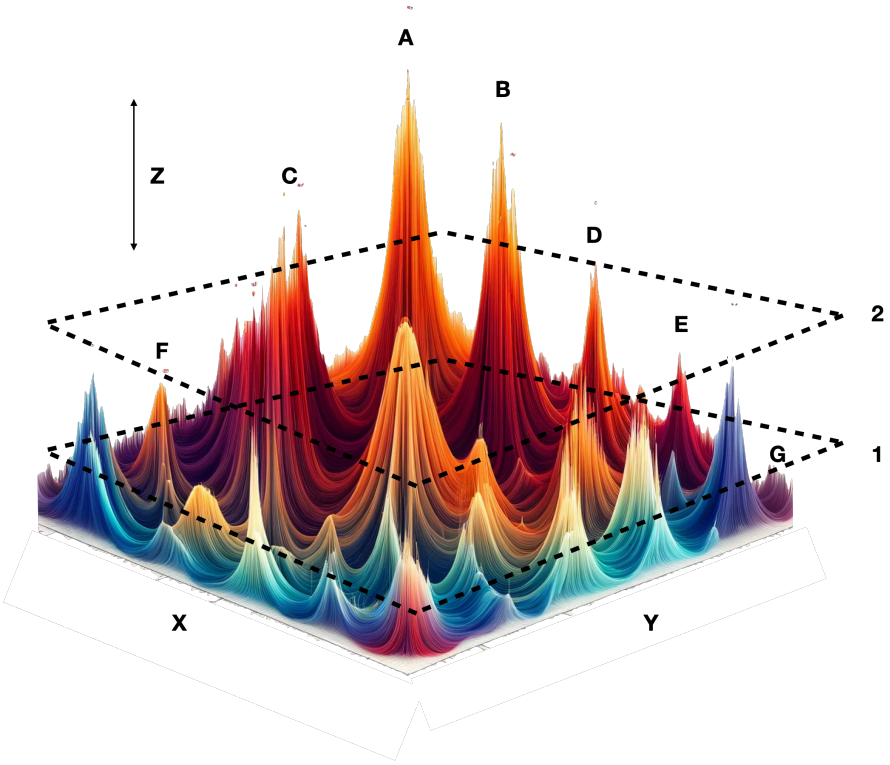

Figure 1. ***The topology of a memory.*** Each Gaussian distribution samples over different components of a mnemonic content, including sensory, proprioceptive, affective, non-conceptual and conceptual (x- and y-axes). The high of these distributions is determined by a measure of strength (z-axis). The hyperplanes (1 and 2) represent two different thresholds of subjective awareness. See text above for further information.

Of course, every aspect of this model is both verifiable and falsifiable. At the end, the correct version of this model may contain additional and even entirely different parameters. My goal is simply to offer a possible strategy to empirically approach the question as to why certain mnemonic contents feel the way many people experience rich episodic autobiographical memories and why others are devoid of such phenomenal qualities. From this perspective, the relationship between memory retrieval and its corresponding subjective experience is not necessary, but contingent, and as a result it is open to empirical scrutiny (Klein, 2013). In a sense, this proposal is not that different from the way in which Tulving himself seemed to have thought about the

nature of recollective experience in his work prior to 1985—that is, in terms of the nature of the information represented and the nature of the computations/operations over said representations. My suggestion is simply that we need to update that functional characterization as well as to explore the ways in which mnemonic representations and computational processes that give rise to conscious experience interact (e.g., De Brigard, 2011).

Re-thinking episodic memory in mere computational terms, and detaching it from autonoetic consciousness, has a number of advantages. First, I think it makes developmental and comparative work with non-human animals more straightforward. From this perspective, there is no need to talk about "episodic-like" memories, as many animal researchers do (Clayton and Dickinson, 1998), because one cannot be sure that the retrieved content has autonoetic consciousness. Instead, the question as to whether young children, non-human animals and even artificial agents have episodic memory becomes one of functional equivalence (Allen and Fortin, 2013). It is a further question whether the retrieval of a particular episodic memory by a non-human animal, say, is accompanied by the same kind of phenomenology a human would experience. For the answer to that second question requires an additional investigation into the precise topology of the relevant memory as well as the mechanisms that render such contents conscious. Thus, with a precise functional characterization of episodic memory in which autonoetic consciousness is not necessary, the question as to whether young children, non-human animals and even artificial agents can remember past events becomes independent from the now open, empirical question as to why such memories are experienced the way they do.

Second, the proposed view also offers strategies to compare intra- and inter-individual differences in the recollective experience of episodic retrieval. For instance, in trying to understand why two people may experience the same scene differently, we may find out that different visual

perspectives at encoding and/or retrieval could influence the strength of the spatial (A), visual (D) and proprioceptive (F) components of the mnemonic content, which in turn may determine the degree to which the memory feels more or less vivid and familiar (Zaman and Russell, 2022). Likewise, we may want to explore the conditions under which the same content would be differently experienced by the same individual as a function of manipulating the threshold of conscious awareness, perhaps via cognitive load, effort, or distractibility at retrieval (De Brigard, 2011). Comparing the topologies of diverse memories across conditions between- and within-subjects becomes an open possibility to explore differences in the phenomenological experience of episodic memories.

Finally, a merely functional view of episodic memory is consistent with recent proposals to replace the standard model of memory with taxonomies that do not use consciousness as a wedger (e.g., Redder et al., 2009; Henke, 2010; Murray, Wise and Graham, 2016). In fact, by acknowledging that the relationship between memory retrieval and recollective experience isn't necessary but contingent, researchers can also explore how extant scientific theories of conscious experience can intersect with theories of memory retrieval. Despite promising developments in the cognitive neuroscience of consciousness, most of the research in the mechanisms underlying our conscious awareness of mental contents has been confined to perception (Seth and Bayne, 2022). The perspective suggested here may help to motivate researchers to explore how extant neurocognitive theories of consciousness can explain how mnemonic contents—as opposed to perceptual contents—can become available for conscious awareness (De Brigard, 2011; Lau et al, 2022).[10]

[10] A personal note: I was supposed to finish this manuscript on January 31st, 2024. I had it all planned to work on it during the whole month of January, starting in New Year's Day. Unfortunately, on January 4th, my sister was diagnosed with terminal cancer and on January 15th, she died. The days that have followed have been full of grief and

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sadness, and everything has been difficult. Thinking about this paper, hard as it was to muster the energy to write it, was a beacon of light. I want, thus, to dedicate this paper to my sister, Ana Maria De Brigard, whom I miss so much.

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