



The article below is the first in what we hope will be a series—which we will call CrossWires. In this series, articles will be published that ‘invite’ response or commentary. We will be happy to receive such replies and, subject to review, publish them as articles in *WIREs* Cognitive Science. We will, on a case-by-case basis, solicit replies, but in all cases, we will be open to submitted replies from any interested reader. The point of this feature is to start a conversation—a somewhat open-ended one.

Stan Klein’s article raises fundamental questions about how we use the term memory, and what we take it to mean, or should take it to mean. If you are interested in addressing these issues in our pages, get in touch with me via e-mail: [nadel@u.arizona.edu](mailto:nadel@u.arizona.edu). We hope you enjoy this new feature.

# What memory is

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I argue that our current practice of ascribing the term ‘memory’ to mental states and processes lacks epistemic warrant. Memory, according to the ‘received view’, is any state or process that results from the sequential stages of encoding, storage, and retrieval. By these criteria, memory, or its footprint, can be seen in virtually every mental state we are capable of having. This, I argue, stretches the term to the breaking point. I draw on phenomenological, historical, and conceptual considerations to make the case that an act of memory entails a direct, non-inferential feeling of reacquaintance with one’s past. It does so by linking content retrieved from storage with auto-noetic awareness during retrieval. On this view, memory is not the content of experience, but the manner in which that content is experienced. I discuss some theoretical and practical implications and advantages of adopting this more circumscribed view of memory. © 2014 John Wiley & Sons, Ltd.

#### How to cite this article:

*WIREs Cogn Sci* 2014. doi: 10.1002/wcs.1333

## INTRODUCTION

In this article, I present two separate, but closely intertwined theses. One offers an analysis of the mechanisms underlying the experience of memory, as well as the criteria we use to decide whether a mental state is an act of memory as opposed to, say, a perception, belief, dream, thought, or act of imagination. Contra current practice in much of the behavioral sciences, I argue that memory is not isomorphic with, identifiable from or reducible to analysis of the physically specifiable and quantifiable properties of content present in awareness. Rather, memory is the manner in which content is presented to awareness

during an act of retrieval. Borrowing a phrase from Nagel,<sup>1</sup> ‘there is something it is like’ for a mental state to be experienced as an act of remembering. To determine if a mental state is a memory, one needs to consider both the content in awareness and the way that content is made available to awareness.

My second thesis concerns what I see as the overly liberal criteria used by both philosophers and behavioral scientists to classify a mental state as an act of memory. Although the practice of viewing various psychological faculties (e.g., knowledge, navigation, recognition, categorization, skills) as manifestations of memory has been in evidence for more than 1000 years,<sup>2–4</sup> this inclusive proclivity has increased dramatically in the past century (e.g., Section *The Rise of Multiple Systems View of Memory and the Gradual Repositioning of the Past*).

Recent proliferation in types of memory stems, in large part, from a failure to differentiate between

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Conflict of interest: The authors have declared no conflicts of interest for this article.

the origin of an outcome and the outcome itself. All mental events have an origin. Many result from, or connect to, sensory and/or introspective experience. The underlying assumption, typically unstated, is that a mental state merits the label ‘memory’ if it can be shown to be causally linked to an initial act of sensory or introspective registration.

However, the fact that a current mental state is the outcome of past learning does not license the conclusion that learning necessarily eventuates in memory. When an initial act of registration produces a mental state, that state may be a memory: But it also may be knowledge, skill, belief, dream, plan, imagination, decision, judgment, feeling of familiarity, act of categorization, an idea, a hope, a fear, and so on. To label this diversity of outcomes expressions of memory is to broaden the construct’s domain of applicability to encompass a sizable portion of neural activity that is not strictly vegetative or homeostatic. In effect, we reduce the term ‘memory’ to a meaningless designator.

In this paper, I take the position that the fact that events in one’s past determine our success in engaging in current thought or behavior is a necessary, but not sufficient, condition to sanction the conclusion that a thought or behavior is an act of memory.<sup>a</sup> To qualify as memory, the product of learning needs to be a mental state of the ‘right sort’. What makes it the ‘right sort’ is that it includes the feeling that one is reliving a past experience—that is, it provides a directly-given, non-inferential sense that one’s current mental state reflects a happening from one’s past. On this view, the range of phenomena toward which the term ‘memory’ currently applies is in serious need of pruning.

These two threads are conceptually interwoven. However, interconnectedness should not be taken for inseparability. It is possible to endorse the idea that much of what we now label ‘memory’ oversteps our epistemic and ontological warrant, while rejecting some, or much, of the theoretical considerations offered in support. Conversely, one can accept some, or much, of what I have to say about the mechanisms underlying memorial experience without having to agree that the concept of memory needs to be reined in (one can, of course, reject or accept both threads in full). The point is that the two theses—i.e., that memory entails a very particular type of experience (a temporal orientation toward one’s past; see Sections *Subjective Temporality* and *The Core Thesis: What Memory Is*), and that memory cannot be fully appreciated unless these experiential properties are taken fully into account—are functionally independent.<sup>b</sup>

Finally, I attempt to show that the proposed selectivity regarding the use of the term ‘memory’ is more than semantic hair-splitting or linguistic

posturing. Our language, as is well known, plays a critical role in our appreciation of reality and the questions we address to nature. A more nuanced and circumscribed delineation of the states and processes we take to be acts of memory has consequences for how we conduct and interpret our research—whether that work consists in traditional psychological empiricism or more recent radiological efforts to identify memory’s neural correlates.

Conceptual prudence also has the consequence of helping investigators formulate questions that better capture the ontological commitments of nature. As Heisenberg and Bohr<sup>6,7</sup> and many others have noted, we learn from nature only what she chooses to reveal in response to the questions we ask. Asking the ‘right’ questions about memory is thus essential if we hope to cut nature at her ontological seams. In short, the value of calling attention to the problem of making explicit the criteria we use to justify attribution of the term ‘memory’ stands on its own, independent of any specific ‘solution’ to the question of ‘what mental states qualify as acts of memory?’

The ideas presented also have implications that go beyond the issue ‘what memory is’. This more encompassing aspect of the paper will not be apparent at the outset, but by the time the reader arrives at the penultimate section, I hope he or she will see that my stance with regard to memory is a particular instance of a more general proposal for how the *mind* works. It seems worth calling attention to this meta-theoretical aspect of the paper up front (so the reader can keep a lookout for the ‘big picture’), but to not detract from the specifics, explicit mention of the broader issue is deferred until Section *The Big Picture: How the Mind Works*.

## WHAT IS MEMORY? THE OFFICIAL DOCTRINE

Memory is a mental-construct term. Like most such terms, we know how to apply the word (and its cognates; e.g., remembering, reminiscing, recollecting) with ease and efficiency in everyday conversation and introspective reports. However, while most people know how to talk about memory, the principles justifying its use can be stated only with great difficulty, if at all<sup>8,9</sup>). This need not worry the layperson. But for academics, it is essential that we be able to map the logical as well as phenomenological topography of the mental constructs we deal in. This is the task of philosophers and psychologists. A review of their efforts will, I believe, show that current usage of the term ‘memory’ often is misapplied and thus in need of emendation.

So, how do academics define ‘memory’? Most philosophers and behavioral scientists subscribe, with minor reservations, to the following principles: Memory consists in an initial act of registration (learning) which, via the continuity assumed necessary and provided by the mechanism of storage,<sup>c</sup> eventuates in an act of retrieval.

In broad outline, memory can be taken as organically-based activity (I will not deal with the ‘memory’ of artifacts, such as computational devices) in which information made available (via perception of the external world or introspection) results in an alteration of the neural machinery (i.e., encoding). These neural signatures are laid down (typically subject to considerable and ongoing modification<sup>14–19</sup>) in various cortical substrates (i.e., storage). To qualify as an *act* of memory—as opposed to a *disposition* to remember (i.e., the idea that a memory can both precede and outlast its expression; see Section *Memory Is Not Unconscious*)—these alterations must be causally linked to changes in the organism’s behavior (mental and/or physical) at some point in time following their acquisition (i.e., retrieval).

This definition is sufficiently general to encompass most contemporary views of memory. There are, of course, issues and controversies it does not *directly* address (e.g., is memory unitary or multiple, conscious versus unconscious, a process or a substance, malleable or stable?). But the definition is expansive enough to allow room for discussion of these concerns.

Not surprisingly—since the definition is crafted to capture the ‘received view’—the majority of contemporary definitions of memory are in substantial conformity. Thus, Crowder<sup>20</sup> defines memory as a term ‘used for both the product of learning and process of retention and retrieval’ (p. 4; see also Refs 21–23). That this three-stage progression (encoding, storage, retrieval) captures memory’s sequential logic is evidenced by its durability: Similar formulations are found in texts dating back several centuries. Edridge-Green,<sup>24</sup> for example, defines memory as ‘the process by means of which the external world and ideas are retained for use on future occasions’ (p. 1). Von Feinaigle,<sup>25</sup> taking a similar view, sees memory as ‘that faculty that enables us to treasure up, and preserve for future use, the knowledge we acquire’ (p. 1).

### Subjective Temporality

So what, if anything, might be missing from a definition of memory that (1) has been common currency in the behavioral sciences for most of their existence, and (2) has been crafted to capture the key features of the concept in the broadest of brush strokes?

The answer is subtle but critically important: What is missing is an *explicit* statement of the relation between memory and the mode of subjective temporality it affords. Perhaps the fact that memory is about the past is so apparent that it goes without saying. Why bother to state the obvious? (Note: phrases such as ‘on future occasions’ [see the above definitions] are mute with respect to phenomenology; they simply reference the retentive property of memory).

Everyone knows that memory has a special connection with the past. This is reflected in the fact that the overwhelming majority of memory studies explore it in its relation to the past—we measure retention, evaluate the veracity of recollection, explore the manner in which the past is represented in the brain, assess the amount of information that has been accumulated and the duration it remains accessible, etc.—with fidelity to the past serving as the essential criterion (for reviews, see Refs 26, 27, 23, and 28). But the subjective temporal orientation of the act of remembering remains unvoiced in most contemporary definitions of the construct (similar concerns are raised by Kvale<sup>29</sup>). As we will see in Section *Memory as a Feeling of Pastness: An Historical Review*, this was not always the case.

The absence of explicit mention of subjective pastness in definitions of memory likely is an example of what Rescher<sup>30</sup> calls a scientific precommitment—that is, a presumption that plays a critical (though largely unquestioned and typically unstated) role in determining the formative background of the questions we ask of about a construct. But does this precommitment have epistemic warrant? What underwrites the unique connection we presume to exist between memory and the past? What makes it distinctive?

The most obvious answer is that memory’s very existence, of logical necessity, depends on its causal connection to past occurrences.<sup>5</sup> Unfortunately, the demonstration of a relation between an initial act of registration and a present mental state is not sufficient to legitimize the ascription of ‘memory’ (see Section *Procedural Skills and Semantic Knowledge are about the Present and Future, not the Past*). Many psychological states and processes, including, but not limited to, planning, judging, categorizing, deciding, believing, imagining, desiring, intending, thinking, recognizing, searching, navigating, hope, and fear are contingent on past experience. Indeed, with the exception of purely vegetative, homeostatic, and regulatory function, virtually every neural activity and the states in which it eventuates result from some form of learning (of which there are many<sup>31</sup>).

All consciously experienced states of the brain are ‘something’ that came from ‘somewhere’. And, with the exception of genetically preprogrammed acts of mentation, that ‘somewhere’ is one’s past. But coming *from* the past does not sanction the inference that the ‘something’ in awareness is *about* the past. And, as I hope to show in Sections *Memory as a Feeling of Pastness: An Historical Review* and *Procedural Skills and Semantic Knowledge are about the Present and Future, not the Past*, memory is not just *from* the past; it is also *about* the past. The fact that a mental state can be shown to be connected to the past does not license the conclusion that it is a memory any more than showing that a tree comes from a seed entails that the seed is a tree. As Allport<sup>32</sup> observed, psychological faculties often become functionally autonomous from the conditions of their origination. The act of learning can, and does, produce a variety of mental outcomes, only some of which merit the designation ‘memory’.

This is a critically important point that, in the context of contemporary treatments of memory, cannot be overstressed. In more formal terms, the belief that attributing memorial status to an occurrent mental state is justified by its origin in the past is to engage in a logical fallacy. The fallacy can be stated as follows:

1. Memories are mental states that originate from past experience.
2. Experiences in my past are causally connected to my present mental state.
3. Therefore, my present mental state is a memory.

Arguments taking this form can lead to a false conclusion even when statements 1 and 2 are true (which, in the present case, they are). Since memory is not the only mental state known to be born of previous experience, the fact that an occurrent state derives from past experience does not guarantee that it is a state of memory.

This is not to deny that non-memorial states can, and often do, draw on the resources provided by memory (primarily in their formative stages—i.e., prior to their automatization<sup>33,34</sup>). It is to say that including under the heading ‘memory’ all those states whose genesis traces to information acquired in one’s past stretches the concept to the point at which just about everything we think and do can be considered as an act of memory. The concept becomes so inclusive that it becomes a meaningless designator.

Moyal-Sharrock<sup>35</sup> nicely summarizes these concerns: ‘... events in one’s past determine our current

success in engaging in virtually every thought and behavior possible, but I do not find this reason enough to envisage every learned pattern of thought or behavior as involving memory. The acquisition of these patterns may have involved memory at some point (e.g., prior to their automatization or habituation), and this may be grounds enough to see them as the products of memory, but this is trivial ground ... it is no more than to say that memory has played a role in the achievement of (i.e., various mental states), not that it continues to do so in the subsequent deployment of all our behavior and thought’ (p. 226; parentheses added for clarification).

In summary, while memory is causally connected to experiences in one’s past, past experiences do not necessarily result in memory. Accordingly, the demonstration of a connection between past experience and a present psychological state is insufficient to do the work necessary to legitimize the claim that a state is a memory. It is instructive to note in this regard that, despite their commitment to a view of the mind as a *tabula rasa*—and thus populated by products of past experience—philosophers from Aristotle to present day treat memory as a *particular* manifestation of that experience (see Section *Memory as a Feeling of Pastness: An Historical Review*). Clearly more is at stake in classifying mental events than their connection to the past. The question is ‘in what way or ways does the pastness of memory differ from the pastness of non-memorial states?’

### The Core Thesis: What Memory Is

The position championed in this paper trades on the proposition that memory is not simply the content of an experience, but the manner in which that content is experienced (see Section *The Special Case of Episodic Recollection*). More specifically, memory is a special mode of experiencing—one that provides the experiencer with a phenomenological relation to his or her past that cannot be conferred by non-memorial mental states (see Section *Memory: A Present Mental State Felt as Past*). On this view, there are no unconscious, implicit, or dispositional memories (see Section *Memory Is Not Unconscious*). Nonexperiential processes contribute to memorial experience, but they are not memory (where memory is taken as the manner in which mental content given to experience: see Box 1). Nor is their presence necessarily predictive of a memorial experience (sub-experiential background conditions are a necessary but not sufficient condition for memorial experience; e.g., Sections *The Part/Whole Error and Implications: The Neural Correlates of Memory*).

## BOX 1

## NOTES ON SOME OF THE KEY TERMS USED IN THIS PAPER

In this box, I spell out the intended meaning of several terms that play an important role in this paper. My reasons for doing so are two-fold. First, each of these terms is sufficiently central to the ensuing discussion that explicit specification of my (perhaps idiosyncratic) conceptualizations seems warranted. Second, some of these terms have more than one colloquially accepted use (e.g., experience); accordingly, a precise treatment of their usage helps establish a common referential base. While not everyone will agree with my definitions, there should be little question of the meanings I intend.

1. *Mental State*: X is a mental state only if and only if there is 'something it is like'<sup>1</sup> for the organism to have the mental state. A mental state contains *both* content (e.g., objects of awareness— or what is sometimes called aboutness or intentionality) and qualitative (i.e., the subjective feel of the content) aspects. It is thus the experiential outcome of a process (or set of processes) that can have nonexperiential aspects supporting its realization. While these non-experiential preconditions are necessary for realizing the mental state, they are nonmental in the sense that they are mechanisms that help make experience possible, but are not the experience *per se*—that is, as it is felt. They conceivably could go on without there being any experience. An analogy may help: A play consists in a great deal of behind the scenes activity, but, strictly speaking, none of this activity is the play *per se* (I thank Galen Strawson for calling my attention to this analogy). All mental states are experiential in the sense described next.
2. *Experience*: Experience is the qualitative aspect of the mental states you are having right now. Experience is what most philosophers have in mind when they talk about consciousness. In my usage, all experience is conscious experience. While some who use the term 'experience' have in mind sensation (e.g., pain) and perception (e.g., that tree over there), experience, as I use the term, can take as its intentional object such things as thought, belief, memory, and other mental content. In this way, experience can be cognitive as well as sensory.

3. *Experience and Feeling*: Although some philosophers hold that a feeling is an additional mental item accompanying the experienced content of a mental state (see points 1 and 2), for my purposes nothing substantive rides on this distinction. Accordingly, when I use the term 'feeling' I refer to the qualitative mode in which a mental state is apprehended. In my sense, all experience is felt—i.e., it is the particular 'what it is like-ness' of the mental state you are having right now.
4. *Precondition*: I occasionally will talk about nonmental preconditions (e.g., the operations of encoding storage and retrieval). These preconditions, though necessary for a mental state (e.g., memory), are not sufficient for its realization as experience (see point 1 above). They are building blocks that can, when combined in the proper way with a particular subjective context (e.g., temporally propertied), eventuate in, say, a memorial experience.

The building block metaphor may help unpack my intended meaning. Encoding, storage, and retrieval (to use 'memory' as my example) can be viewed as the building blocks that, when conjoined with the proper 'instructions' (internal or external context; preexisting neural pathways, etc.) *and* subjective feelings of pastness, result in a memorial experience. But these preconditions are no more 'memory' than a collection of concrete blocks and a set of blueprints is a house. Under different circumstances (different contexts, different plans, and so on), they can be used to construct any number of mental and nonmental outcomes. They are thus necessary, not sufficient.

Thus, while memory is dependent on the integrity of a set of causally necessary stages (encoding, storage, and retrieval), it is not their inevitable product. They are the preconditions (see Box 1) that make memory experience possible. But the same stages can give rise to a variety of experiences: Memory is the manner in which content acquired at encoding and retrieved from storage is experienced. To be a memory, content *must* be the subject of recollective experience (while it might appear that retrieval is being equated with memory, this would be an incorrect reading. Retrieval, *per se*, may produce memory. But it also may result in mental states better described as belief, thought, desire, etc. It is the conjoining of the act of retrieval with a particular mode

of temporal subjectivity that makes the content in awareness ‘memory content’.

Recollection consists in two separate but interdependent parts. First, to count as an act of recollection (i.e., memory), a mental state must be causally linked to an experience the individual formerly enjoyed. Second, memory is not simply *from* the past; it is a special way of being *about* the past (see Section *Procedural Skills and Semantic Knowledge are about the Present and Future, not the Past*). To qualify as an act of memory, the content in awareness must present itself as a reexperience of an experience previously had. This feeling of reexperiencing is directly given to consciousness, rather than as the product of an act of inference or interpretation (of course, if that inference, though lacking an immediate sense of pastness, were to subsequently evoke—in some unspecified manner—a feeling of temporal subjectivity, it then would be taken as a memory. In contrast, an inference that only led one to conclude that occurrent mental content was due to past experience would be a belief, but not an experience of recollection).

Thus, a current mental state is an act of memory (i.e., recollection) if and only if *both* conditions (connection to the past and past-oriented subjective temporality) are in play. On this view, recognizing a tune as a Beatle’s song, and knowing that you have heard it in the past, does not license the inference that you are remembering the tune. In most cases, you simply hear a song (and may know certain facts about it; e.g., its name, composers, and so on). But you do not hear it *as* a song previously heard. You may believe, know, or infer this to be the case; but more typically you do not consider whether your recognition derives from past experience (see Section *Implications: Measures and Methods of Assessing Memory*).

By similar reasoning, knowing my name is Stan is not an act of memory. It is knowledge presented to consciousness without any hint of connection with past experience. I know my name is Stan, and that is that. Of course, this knowledge was previously acquired. But reexperiencing the act of acquisition plays no role in my occurrent experience. I may subsequently infer that I learned my name in the past, but this inference is not concurrent with the content on presentation to awareness (See Section *So, What Is Episodic Memory? The Role of Autonoetic Awareness*).

Thus, in contrast to contemporary psychological and neuroscience treatments (see Sections *Psychological Treatments of Memory: The Beginnings* and *Contemporary Psychological Views of Multiple Systems of Memory*), acts of knowing are not necessarily

acts of memory.<sup>d</sup> As we will see in the Section *Memory as a Feeling of Pastness: An Historical Review*, the proposed reconceptualization of memory as content conjoined with a specific type of temporal subjectivity (i.e., a non-inferential feeling of past *as* past) has a long history in Western intellectual thought, tracing back to Aristotle (384–322 BCE).

In summary, the fact that a current mental state derives from past experience does not, by itself, justify labeling that state a memory. In its most general form, my reasoning is as follows: I can have an experience of X which *mentions* Y or enables an *inference* of Y without having an *experience* of Y. Substitute the word ‘content’ for X and ‘pastness’ for Y and my thesis is laid bare: ‘Memory’ is a term that is (or should be) reserved for those experiences directly felt to be a reliving of the circumstances from which they were acquired (support for this assertion will be presented in Sections *Memory: A Present Mental State Felt As Past* and *Procedural Skills and Semantic Knowledge Are about the Present and Future, Not the Past*). While the pastness of a mental state may be known in virtue of conceptual analysis, such analysis does not legitimize the ascription of the term. To remember is to have an immediate, non-analytic feeling that one’s current mental state is coterminous with past experience. Memory, in *all* its manifestations, entails the *experience* of the past *as* past.

## MEMORY: A PRESENT MENTAL STATE FELT AS PAST

So, how might this conception of memory be supported? One way is to examine the history of ideas about the nature of memory. The belief that human memory consists of mental content *known* in the present, but *felt* to be from the past, has deep roots, originating in Greek antiquity (see Section *The Rise of Multiple Systems View of Memory and the Gradual Repositioning of the Past*).

While long-held beliefs about nature are no guarantee that they capture the natural order (the earth, after all, was believed to be the center of the universe for thousands of years<sup>36</sup>), they have considerably more epistemic warrant when their subject matter is personal phenomenology.<sup>37–40</sup> Beliefs about experience, rather than the content of experience, take as their object undeniable, introspectively-given states whose experiential characteristics are made visible by the experience itself. As Gallagher<sup>41</sup> notes, ‘My access to myself (my self) in first-person experience is immediate and non-observational; that is, it doesn’t involve a perceptual or reflective act of consciousness’ (p. 15). While our interpretation of the content of experience

may be inaccurate (e.g., the sun travels around the earth; two parallel lines appear to be converging), we cannot be mistaken about what that content is.<sup>37</sup> As regards the experiential character of mental states, ‘how they are given is how they are’ (Ref 37, p. 51).

In short, the psychological topography of our mental constructs is ultimately based on first-person acquaintance with the experiential acts in which they are realized.<sup>38,42</sup> There is simply no other way to reliably know what a mental state, qua mental state, entails.<sup>43</sup> While experience eventually may prove grounded in events taking place at the neural, molecular, atomic, or subatomic level, reducing our phenomenology to the motion, shape, and size of its constituents (or knowledge thereof) cannot provide the information we acquire in virtue of having the experience.<sup>37,42,44</sup> As Varela et al.<sup>43</sup> note: ‘When it is cognition or mind that is being examined, the dismissal of experience becomes untenable, even paradoxical’. They continue ‘To deny the truth of our own experience in the scientific study of ourselves is not only unsatisfactory; it is to render the scientific study of ourselves without a subject matter’. (p. 13–14). With mental states, experience comes first.<sup>38,40,42</sup>

First-person acquaintance with our phenomenology thus provides the palate we use to give color, form, and texture to our psychological landscape—a depiction not capable of being fully realized from a purely theoretical rendering<sup>37,44,45</sup>). This is not to say we have first-person access to all the workings of our minds. In many (perhaps most) cases, we do not.<sup>46</sup> But we do have a privileged relation with the experienced *outcomes* of the workings of our neural machinery.

Unfortunately, the success of our efforts to translate our experience of mental reality into a consensually sanctioned conceptual landscape is not guaranteed by privileged access. Attempts to catalog psychological faculties have been in a state of continual transition since such things became part of the academic mission.<sup>47</sup> What is remarkable about memory, therefore, is the stability with which our insights about this particular mental occurrence—specifically, its special relation to the past—have remained firmly entrenched (until very recently; see Sections *The Rise of Multiple Systems View of Memory and the Gradual Repositioning of the Past* and *Psychological Treatments of Memory: The Beginnings*) in both popular culture and scholarly venues (see Section *Memory as a Feeling of Pastness: An Historical Review*). While longevity does not assure ontological warrant, it does provide some confidence that, at least with respect to mapping our subjectivity, we might be close to cutting nature at an ontological seam.

Another argument for taking seriously the position that memory entails the experience of a present mental state as reacquaintance with one’s past is the *usefulness* of this stance. The value of a theory is determined, in part, by the extent to which it facilitates the organization of data that otherwise might be viewed as collections of unrelated phenomena.<sup>48–50</sup> The theory I champion offers a parsimonious account for a variety of ‘apparently’ diverse mental phenomena, including amnesia, cognitive dissociations, future-oriented mental time travel, radiological analyses of the brain, non-human memory, *Déjà vu*, and more (some of which I discuss in Section *Considerations and Implications*). It also helps explain why episodic and semantic content often show significant overlap with regard to the very features—i.e., time, place, and self—widely held to be the basis by which we distinguish between the offerings of these systems (see Section *Contemporary Psychological Views of Multiple Systems of Memory*). Finally, the theory draws attention to neurological case material whose relevance for the study memory has, to date, been underappreciated. For example, the study of memory is enriched by the realization that a patient’s suffering a felt loss of felt ownership of their mental states falls within the purview of memory (see Section *Is Autonoetic Awareness Intrinsic to Memory?*).

Obviously, none of these considerations, by itself, constitutes a knockout argument for treating as memory only those psychological experiences that provide a special relation to the past. However, taken together, a reasonable case emerges for taking the proposal seriously. In the next section, I present a brief review of the history of intellectual thought on human memory and its felt relation to the past.

## Memory as a Feeling of Pastness: An Historical Review

In what follows, I present a brief review of the origins of our current ideas about memory. While modern empiricism views such philosophical antecedents primarily as mild curiosities, historical/philosophical treatment of memory provides rich ground to mine with regard to (1) conceptual clarification of the construct, as well as (2) the manner in which we frame our empirical inquiries. Indeed, as we will see, the questions philosophers have raised about memory plainly are visible in contemporary psychological debates.<sup>10,11,51,52</sup>

In Western thought,<sup>e</sup> interest in the topic of memory stretches back to early Ionian and Greek philosophers. However, at this stage, discussion was mostly incidental to debates concerning ‘more

weighty' matters, such as the nature of reality and the soul.<sup>3</sup> The first systematic treatment of memory, *per se*, traces to Aristotle's *De memoria*.<sup>56,57</sup>

Due to well-known ambiguities surrounding the importation of terminology from different cultural and historic contexts,<sup>4</sup> caution must be exercised when attempting to make sense of familiar terms such as remembering, recollection, and reminiscing as used in different times and places. While a critical analysis is beyond the scope of this paper, for Aristotle, a primary feature of memory is the recollective act (in Aristotle's terms, memory is what we now call storage, while recollection maps to retrieval<sup>56</sup>), which *always* makes reference to the past. In contrast, sensations and perception refer to the present.

In modern parlance, memory thus is realized by an act of recollection in which one experiences a current object of awareness *as* something from one's past. Whether Aristotle construed acquaintance with the past as (1) an intrinsic property of the object in awareness, or (2) additional information annexed to the object at retrieval, is not entirely clear (Refs 56 and 58; see also Section *Summing Up*). What is clear, however, is that for Aristotle, memory is *about* the past (as perception is *about* the present, and hope and opinion are *about* the future<sup>3,57</sup>).

The influence of Aristotelian ideas on subsequent generations of Western thought about memory can be hardly overestimated.<sup>3,4</sup> While post-Aristotelian discourse was not always concerned with theoretical explication (many were interested in mnemotechnics—i.e., the art of memory; e.g., Cicero, Pliny, Simonides, Albertus, Camillo, and Romberch—and/or memory in relation to the soul—Plotinus, Augustine, Aquinas; for reviews, see Refs 3, 59, and 60), most treatments were guided by the principles found in *De memoria*.<sup>3,4,60</sup>

Following a long lapse of interest in theoretical aspects of memory (as opposed to its application)—and coinciding with the initial stirrings of the scientific revolution—a resurgence of interest in the 'theories of memory' began in the 17th century. For example, Locke<sup>61</sup> famously stated that memory is the power of the mind 'to revive Perceptions, which it once had, with this *additional* perception annexed to them, that it has had them before' (p. 150; my emphasis). While Locke is somewhat vague about the manner in which this perception of pastness is given in awareness, his other writings are consistent with the idea that it is in the form of a direct, non-inferential feeling. For instance, Locke claims that 'memory *presents itself* as an experience one has previously enjoyed ... not merely thought or judged to be an experience previously enjoyed' (cited

in Ref 62, p. 324; emphasis mine). That is, an act of conceptual reconstruction is not sufficient to identify the content present in awareness as an act of memory; rather the past tense of an occurrent state is a direct, non-inferential feeling given to awareness.

Hume<sup>63</sup> also rejected the idea that a conceptual demonstration of a connection with the past is sufficient for remembering (given Hume's well-known skepticism about causality, this hardly is surprising). For Hume, what makes the content of a mental state an offering from memory trades on phenomenologically-given aspects of occurrent experience (e.g., the liveliness or vivacity with which the content is apprehended), rather than on a conceptual analysis of its causal history. As Flage<sup>64</sup> puts it, these phenomenological indices provide 'guidance for distinguishing the ideas of memory from beliefs regarding temporally located objects that are not based on memory'. (p. 170). Whether these indices (a) are heuristics that enable an inference of pastness, or (b) directly produce feelings of pastness, is not explicit in Hume's analysis. However, other remarks made about memory—e.g., '... what is memory but a faculty by which we raise up images of past perception?' (Ref 63, p. 260)—suggest that he may have leaned toward the latter interpretation. Nonetheless, the jury remains in recess regarding whether for Hume, phenomenology, without interpretation, is sufficient to provide the experience of pastness.

Reid<sup>65</sup> similarly ascribed to the view that memory directs awareness toward events to which one previously bore witness: 'Memory can only produce a continuance or *renewal of a former acquaintance* with the things remembered'. (p. 255; emphasis added). For Reid, memory is not simply a current apprehension of a past event, but rather an act of mind that enables a non-inferential reexperiencing of the past as past. Reason and testimony play no part in this process.<sup>66</sup>

In Reid's terms, semantic memory (had the construct existed) would not count as memory. Rather, it would be seen as knowledge or belief (the two are not the same—for both epistemic and psychological reasons<sup>67</sup>). A person who reports that 'Sacramento is the Capital of California', or states that 'John is tall', is expressing a belief or knowledge, not memory (note: In this paper, I use the word 'knowledge' in its colloquial sense, not its technical meaning as true, justified belief<sup>68</sup>). This is because the information present in awareness is unlikely to preserve a past apprehension<sup>65</sup>—i.e., that X (e.g., 'John is tall') is known in virtue of a feeling of reacquaintance with something that happened to me in my past (i.e., I saw tall John).



As we will see in Section *The Declarative System: Semantic and Episodic*, even temporally propertyed reports such as ‘I remember that I saw Jimi Hendrix in concert in 1968’ are not necessarily memory claims. While I can infer the pastness of this assertion on the basis of temporal information embedded in its content (i.e., that the concert took place in 1968), my occurrent experience does not necessarily entail a direct, non-inferential feeling that I am reexperiencing the concert. What I experience may be belief or knowledge. Our culturally sanctioned use of the word ‘remember’ to express our current phenomenology is thus an ambiguous guide to the memorial status of the state underlying the report of an experience: In many cases, nothing is lost (and, I would argue, something is gained) if the word ‘remember’ is replaced by such words as ‘know’ or ‘believe’ (see also Section *The Declarative System: Semantic and Episodic*).

Recent philosophical offerings continue to echo the idea that memory is about the past and that this aboutness is a direct, pre-reflective constituent of the memory experience. A case in point is Russell’s theory of memory.<sup>69</sup> Russell is adamant that the mental content (which he refers to as the image) cannot, by itself, make a mental state a state of remembering. Rather, the essence of memory is the feeling that the content in awareness is a reacquaintance with one’s past. According to Russell, memory entails both (1) a direct acquaintance with the object in awareness and (2) a feeling (conferred by the act of acquaintance) that one now is conscious of something one was conscious of in the past (i.e., the object present to awareness). In Russell’s terms (like those of Locke, Hume, and Reid), phenomenology plays *the* essential role in making a mental event an act of memory; a feeling of reacquaintance *with* the past takes priority over conceptual knowledge *of* the past.<sup>70</sup>

Husserl<sup>71</sup> also sees memory as an act of experiencing one’s past as past. That is, a past object or event is remembered *as* having been perceived; but not just anywhere, at any time, or by anyone. The object of memory is experienced in a manner that both reflects and reveals the way in which it originally entered the remembering agent’s life. It consists in apprehending the object in awareness as a representation of an earlier perception. Expressed in Husserl’s terms, memory recaptures an elapsed portion of one’s stream of consciousness. In this sense, he sees memory as a doubling of consciousness—i.e., the present act of consciousness apprehends the original act of conscious registration.<sup>71–74</sup>

William James<sup>75</sup> skillfully captures the essence of views presented in this section: ‘A farther condition

is required before the present image can be held to stand for a *past original*. That condition is the fact that the imagined be *expressly referred to the past*, thought as *in the past ...* But even that would not be memory. 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 ... ‘warmth and intimacy’ ...’ (Ref 75, p. 650; emphasis in original).

In summary, although philosophical conceptions of memory spanning more than two millennia vary on a number of specifics, there is important common ground. A core thesis, found in virtually every treatment presented, is that what makes a mental state a memory (as opposed to, say, a thought, belief, or imagination) is that it is *about* one’s past. Moreover, this ‘past aboutness’ is a directly-given feeling of reacquaintance, rather than a result of inference, interpretation, or other conceptual analyses.

I have devoted a considerable amount of text to discussion of the long-held view that memory is acquaintance with one’s past *as* past. My reasons for doing so hopefully will become clear by Section *The Special Case of Episodic Recollection*, where I present evidence (both conceptual and empirical) that this form of temporality is what differentiates memorial from non-memorial experience.

## The Rise of Multiple Systems View of Memory and the Gradual Repositioning of the Past

A typically unvoiced assumption in the treatments thus far discussed is that memory is a unitary faculty. However, a dramatic change, tracing to de Biran’s classic analysis of the faculties of thought, was about to take place.<sup>f</sup> In his book *The Influence of Habit on the Faculty of Thinking*,<sup>76</sup> de Biran proposed that memory is a multiplicity consisting in three distinct types—representational, sensitive, and mechanical.

Although de Biran’s ideas did not have an immediate effect on theorizing, the theme of memory as multiplicity was given a renewed presence by Bergson in 1908. In *Matter and Memory*,<sup>77</sup> he distinguishes between memory as a mental state and memory as manifested in performance of habitual acts. In the years following, philosophical analyses further extended the theme of ‘memory as multiplicity’ to include just about anything one might know or do in virtue of an originating experience (e.g., factual memory, sensory memory, lexical memory, procedural memory, semantic memory, perceptual memory, personal memory, autobiographical memory, and so forth<sup>78–81</sup>).

A three-part scheme gradually developed in which a mental construct qualified as an act of memory provided it entailed, or made possible, (1) a feeling of direct acquaintance with one's past—i.e., episodic memory, (2) the realization (by purely conceptual analysis) that content present in awareness derived from one's past—i.e., semantic memory, or (3) performance of skills and habits learned in one's past—i.e., procedural memory.<sup>79,80,82</sup> Of the three, only the episodic component maintained direct experience of pastness as a necessary constituent. For semantic and procedural forms of memory, explicit reference to the past was neither a necessary accompaniment of nor a requirement for their successful achievement.

During the past 100 years, it has become increasingly acceptable to view as memory forms of learning whose expression in thought and action does not necessarily entail awareness of, or reference to, the past (e.g., habits, skills, knowledge, unconscious memories). Provided the images, propositions, or objects in awareness *can* be demonstrated (via some conceptual operation) to be causally linked to events in one's past, they can qualify as objects of memory.

Thus, the *modus spectandi*—i.e., the manner in which something is given to awareness—no longer was a necessary constituent of memory. All that mattered was that a person having a memory be able to demonstrate (if required or desired) that a causal connection existed between the act of registration and its subsequent representation or implementation in thought or behavior.<sup>5</sup> In short, while being *about* the past remained an essential criterion for memory, this aboutness could take the form of an unstated (but theoretically demonstrable) presupposition (although it is telling that most philosophical treatments remained sharply focused on the question of the manner in which memory enables a person to reexperience the past<sup>78,79,82–89</sup>).

## PSYCHOLOGICAL TREATMENTS OF MEMORY: THE BEGINNINGS

The fact that we can formulate internally consistent, logically coherent mental taxonomies does not guarantee our way of partitioning the psychological landscape honors the ontological commitments of nature (I am assuming here that experience occurs in, and thus is part of, the natural world<sup>42</sup>). For this, we can benefit from insights afforded by empirical investigation.

Thus far, I have concentrated on philosophical treatments of memory. This largely is a consequence of historical precedence: Prior to the mid-1800s, there were no treatments from a purely psychological perspective for the simple reason that psychology, as an

academic discipline, had yet to take root. Memory—both in its clinical<sup>90</sup> and non-pathological<sup>91</sup> manifestations—did not become the object of empirical inquiry until the latter half of the 19th century.

The emergence of a 'psychology of memory' was contemporaneous with philosophy's transition away from memory as a unitary faculty toward memory as a collection of conceptually distinct capacities united by their origination in acts of experience. Not surprisingly, psychological thought was influenced by this more liberal conception. While the idea that memory is 'about the past' still held sway,<sup>92</sup> for many new species of memory (e.g., acts of knowing, performance of learned behaviors) pastness was based on conceptual analysis rather than the experience of reliving.

Academic psychology's commitment to the position that memory consists in multiple types, not all of which require direct acquaintance with the past *as* past, received a significant boost from an unexpected source—the publication of a paper detailing the case of patient H.M. As a result of a surgical resection of his medial temporal lobes, H.M. was rendered profoundly amnesic for events experienced following his procedure.<sup>93</sup> Although not apparent at the time, H.M.'s memory issues would have a transformative effect on academic psychology's conception of memory.

H.M.'s memory presented a puzzle. Despite professing a lack of recollection for any events encountered postsurgically, he nonetheless was able to learn some new things (albeit at a slower pace and with more limited scope than found for neurally intact individuals<sup>34,94–97</sup>). This contrast between H.M.'s profound anterograde amnesia and his spared learning ability presented a dilemma—how could H.M. perform newly acquired behaviors if he was unable to remember anything about them?

An answer began to take shape by the early 1970s.<sup>8</sup> Influenced by the conceptual resources made available by the then current philosophical treatment of memory, the dissociation between H.M.'s fully dysfunctional anterograde memory and partially intact learning could be accommodated by the idea that memory exists in a variety of types, only some of which were impacted by his surgical procedure. In short order, all sorts of dissociations between memory and learned performance were being explained in terms of selective impairment of systems of and subsystems within memory (e.g., systems devoted to knowledge about self, others, body parts, animate objects, inanimate objects, numbers, countries, words, and so on; for reviews see Refs 96 and 99–107).

A second line of support for the multiple systems view came from analyses of nonclinical phenomena. One of the earliest<sup>b</sup> and the most influential treatments was Tulving's<sup>109</sup> classic distinction between the episodic and semantic components of long-term memory (he later added a procedural component<sup>110</sup>).<sup>i</sup> Tulving was motivated, in large part, to effect a rapprochement between recent work<sup>112</sup> that, despite sharing a family relation with traditional memory research (which drew on remnants of behaviorism's verbal learning tradition; e.g., remembering lists of words and paired associates), relied on quite different methods (e.g., priming), measures (e.g., response latency), and constructs (e.g., taxonomic knowledge). To this end, he proposed a unification based on the idea that long-term memory consists in two independent, yet normally interacting types or, as they came to be known, systems—episodic and semantic.<sup>106,109</sup>

### Contemporary Psychological Views of Multiple Systems of Memory

Most (though not all; for discussion see Refs 51 and 113) psychologists and neuroscientists now take it as axiomatic that long-term memory consists in the encoding, storage, and retrieval of two basic types of information—procedural (known also as nondeclarative<sup>105,114</sup>) and declarative.<sup>34,105,106,110,113,115,116</sup> Nondeclarative memory makes possible the acquisition and retention of motor, perceptual, and cognitive skills (e.g., knowing how to ride a bike; knowing how to read a line of text). Its use consists in the performance of previously acquired behavioral skills and cognitive procedures.<sup>34,110,114</sup>

Declarative memory, in contrast, consists in knowing things about the world and oneself (e.g., knowing that canaries are yellow; knowing that I ate lunch with my wife on Saturday). Conceptually, the difference between procedural and declarative memory accords with Ryle's<sup>117</sup> classic distinction between 'knowing how' (operating on the environment in ways difficult to verbalize) and 'knowing that' (stating knowledge in the form of propositions).

Tulving<sup>106,109,110,118</sup> further distinguished between two systems within declarative memory—episodic and semantic (see also Refs 34, 101, and 119). Semantic memory is generic knowledge about the world, such as *Apples are edible*;  $2 + 2 = 4$ ; *Sacramento is the capital of California*. The offerings of semantic memory are 'context-free' in the sense that they are present in awareness as occurrent knowledge without regard to where, when, or from whom that knowledge was acquired, although

such information can be obtained from conceptual investigation.<sup>106,109,118–122</sup>

Episodic memory, in contrast, records events as having been experienced at a particular point in time and space. That is, it provides a record of the temporal (when) and spatial (where) context in which the original learning transpired. In addition, every episodic memory entails a sense of the self (else the content of a mental state could not be taken as part of *one's* past) as the agent or recipient of some action, or as the stimulus or experiencer of some state.<sup>106,109,120,121,123,124</sup> When retrieved, episodic memories are experienced as having happened to the remembering individual in his or her past (a process Tulving calls *autonoesis*; see Section *So, What is Episodic Memory? The Role of Autonoetic Awareness*). Examples of episodic memory are *mentally reliving the experience of a concert I attended last weekend* and *recollecting my meeting with Mike yesterday before class*.

### Contemporary Psychological Views on the Temporal Orientation of Memory

With regard to temporal orientation, a subtle but important change had taken place in the way psychologists viewed memory. Memory was still held to be a current psychological state connected to events experienced in one's past. However, a consequence of the multiple system view was that memory's relation to the past now was, more often than not, one of causal inference (i.e., semantic and procedural) rather than phenomenological acquaintance (i.e., episodic).

Thus, although both colloquial usage and scientific practice continued to subscribe to the view that memory, in *all* its manifestations, is oriented toward the past (see Section *Subjective Temporality* and Ref 92), this 'past aboutness' no longer need be based on a feeling of direct acquaintance; it could be the outcome of a rational analysis. Indeed, in cases of procedural and semantic memory, pastness typically was an unstated (and unexamined; Refs 92 and 125) presupposition, whose warrant could be demonstrated if evidence was requested or otherwise deemed appropriate.

As I argue in the next section, the belief that memory, in all of its instantiations, necessarily is about the past recently has been called into question by consideration of memory's functional commitments.<sup>92,126–128</sup> From a functional perspective, semantic and procedural memories possess not only a causal connection to one's past but also, like their episodic relative, a subjective temporal orientation.<sup>92</sup> However—and this is the *critical* point—unlike episodic memory, their subjectivity

is oriented toward the ‘now and the next’<sup>71,92,126,128,134,135</sup> rather than toward the past. This change in temporal orientation—conferred by adaptive function (see Section *Procedural Skills and Semantic Knowledge are about the Present and Future, not the Past*)—poses a serious problem for multiple memory theory because it means that procedural and semantic memories fail to satisfy a key criterion of what it means for a mental state to be a memory—i.e., that it is subjectively oriented toward the past.

## PROCEDURAL SKILLS AND SEMANTIC KNOWLEDGE ARE ABOUT THE PRESENT AND FUTURE, NOT THE PAST

From an evolutionary perspective, the adaptive function of information storage is intrinsically prospective: ‘It is used to support *future* decisions and judgments, which cannot be known in advance with certainty’ (Ref 115, p. 313; emphasis added). For an organism to behave more appropriately (i.e., more adaptively) at a later time because of experiences at an earlier time, the organism must be equipped with mechanisms designed by evolution to interface with systems for anticipation, planning, and behaving.<sup>115,126,134,136–140</sup>

On this view, most cognitive function has been designed by natural selection to help the organism anticipate contingencies and decide actions to take.<sup>92,115,127,128,134,141,142</sup> These functions, in turn, both require and afford an orientation toward the ‘now and the next’.<sup>92,126,128,133</sup> Life, as we experience it, comes from the future, not from the past, and it is in that direction that our attention and effort are directed.

All mental states, whether externally generated or introspectively given, take place in the present. But this does not mean that all occurrent experience is confined to the temporal stasis of an eternal ‘now’ (for a recent treatment of differences between objective formalism of the punctate present and subjective experience of the specious present, see Ref 143). As noted in Section *Memory: A Present Mental State Felt as Past*, immediate experience often is accompanied by a felt temporal orientation;<sup>92</sup> and, for reasons just discussed, that subjective temporality typically is toward the future.<sup>92,126,128,136,137,144</sup>

Accordingly—with the sole exception of episodic recollection (note: the word ‘recollection’ is critical here)—many, myself included, have proposed that episodic memory has a future as well as a past function/orientation. While this may be the case—though I no longer think so [Section *Implications: The Role*

*of Memory in Future-Oriented Mental Time Travel (FMTT)*—this is *not* its recollective aspect: the systems we call ‘memory’ (i.e., semantic and procedural) exist to help us face life as it comes, rather than to look back as it recedes. But if this is the case, then only episodic recollection, with its subjective orientation toward the past, can legitimately claim to be a type of memory: The subjective temporal commitments of semantic and procedural ‘memories’ point in the wrong direction. How can systems oriented toward the ‘now and the next’ be seen as types of memory?

As noted in Section *Subjective Temporality*, the temporal aboutness of a psychological state or process is determined in reference to its experienced temporal orientation, not its de facto causal history: It is what the content in awareness is temporally *about*, not where it is *from*.<sup>92</sup> While it certainly is the case that semantic and procedural ‘memories’ are causally connected to past experience, this is trivial grounds for ascribing pastness to their actualization in thought and behavior. Very few mental states are not causally tied to past experience. To assign them all on this basis to the category ‘memory’ is to stretch the term to its breaking point (a similar point, directed at the idea of implicit memory, is voiced by Roediger<sup>52</sup>). And to relax the criteria for memory to include an orientation toward the present and future, as well as the past, is to open the door to an inclusive chaos that has the effect of changing our investigation of ‘what memory is?’ to an enquiry into ‘what isn’t memory?’

In the next section, I discuss more fully the legitimacy of ascribing the term ‘memory’ to procedural (non-declarative) systems of learning. In Section *The Declarative System: Semantic and Episodic*, the question is put to the declarative systems (semantic and episodic).

## The Non-declarative System: Procedural Learning

Procedural learning, by definition (see Section *Contemporary Psychological Views of Multiple Systems of Memory*), enables the utilization of previously acquired skills (both cognitive and physical). The exercise of those skills is, by functional necessity, directed toward the ‘now and the next’: ‘To behave’ is to orient toward and prepare for impending contingencies, to perform sequential acts, and so on. On this view, procedural learning is *about* the present and future, not the past.<sup>92</sup>

The temporal orientation of the procedural system is not seriously in question. What is in question is whether learned skills and habits are acts of memory. In light of the arguments presented in Sections

*Memory: A Present Mental State Felt As Past and Contemporary Psychological Views on the Temporal Orientation of Memory*—i.e., that memory is subjectively oriented toward the past—a strong case can be made that procedural learning is not memory. Activation and utilization of skills and habits entail no direct reference to the act of acquisition, and their subjective orientation is toward the ‘now and the next’. If memory is defined as an experience of a particular type—i.e., a feeling of acquaintance with the past—skills and habits seem poorly positioned to be category members.

In the next section, I extend this temporal analysis to the types of ‘memory’ assumed to comprise the declarative system. Even within this (ostensibly) more memory-like domain,<sup>145</sup> I argue that among the systems we normally accept as memory, *only* the episodic component has a legitimate claim to the designation.

## The Declarative System: Semantic and Episodic

As discussed in Section *Contemporary Psychological Views of Multiple Systems of Memory*, semantic memory makes information available to awareness. Sometimes that information is self-generated (e.g., ‘What was the name of the best picture of the year from 1934? Oh yah, “It Happened One Night”; “I know that Emily is a registered Democrat. Therefore ...’); other times, knowledge is cued externally by current contingencies (e.g., requests to share what one knows about XYZ) or the interpretive aspect of perception (e.g., ‘That noise I hear must be a leaf blower’). In all cases, the information retrieved is in the service of current circumstances in instantaneous transition to, and continuation in, the future (even the act of retrieving words during conversation is in the service of taking part in an ongoing social event). One remembers a fact or identifies a sensation because these occurrent states enable one to participate in forward-moving circumstances.<sup>92</sup>

Indeed, the case can be made (see Section *Procedural Skills and Semantic Knowledge are about the Present and Future, not the Past*) that semantic memory is inherently present tense with a clear future-oriented leaning, even if that temporal orientation is not always focal in awareness. For example, the stories we tell (which are constructed largely from semantic knowledge<sup>146–150</sup>) constantly are being reshaped to fit demands of current experience and future goals. Past events may help to determine narrative content, but the narrative itself is contextualized by and tailored to current and impending circumstances.<sup>151–153</sup>

Although the content made available by semantic memory *can* refer to the past (e.g., ‘I remember where I parked my car earlier today—although I don’t recollect the act of parking’), these temporal references are culled from the content of the information made available to awareness (for fuller discussion see Refs 92 and 141). If justification of that temporal knowledge is either requested or felt necessary, we may draw on the resources of episodic memory to support our assertion. But in the absence of a need or request for validation, my ‘knowing’ (for example, where I parked my car) is experienced as knowledge simpliciter—it is occurrent in presentation (i.e., ‘I know that I parked in lot #6, and I know this now’), makes no reference to its causal history (i.e., ‘I know without knowing how I know’), and is temporally oriented to the ‘now and next’ (i.e., ‘I can use my current knowledge to locate my car’).

In contrast, when I have a *memory* of where I parked my car, I reexperience (often quasi-perceptually) the act of parking. Though this information also is occurrent in presentation (i.e., ‘I parked in lot #6, and I know this now’) and can be used to guide future action (i.e., this recollection can help me find my car), it differs from acts such as knowing, thinking, believing, assuming, or imagining in an important way—it is subjectively oriented toward the past, providing me with a direct, non-inferential experience of the origination of my current knowledge in an act I performed earlier (i.e., ‘I know where my car is parked because I recollect the act of parking’).

In short, semantically-given knowledge that ‘X is Y’ simply is a fact present in awareness.<sup>65,92,110,144</sup> Its temporal history plays no direct role in the experience of knowing. If any temporal awareness attaches to retrieval, it is experienced as an orientation toward the ‘now and the next’ (e.g., what I now need to do to find my car), not the past. On these grounds, applying the designation of ‘memory’ to forms of knowing (of which there are many—thinking, believing, imaging, realizing, etc.<sup>35,154</sup>) is highly questionable.

To make this point in a different way, consider a declaration from ‘semantic memory’—e.g., ‘I remember Jan won the race’ (for instance, you experience this information—without any feeling of having personally witnessed the event—in anticipation of meeting him or in response to a question about him). Now replace the word ‘remember’ with the word ‘know’. There is, I maintain, no epistemically important change in the meaning of the proposition: When I say ‘I remember’, taken as a report from semantic memory, I am saying no more or less than that ‘I *now* know’ it to be the case that X (Jan) is Y (the winner of the race). I am not saying I experience this information

as part of my personal past (I may know or infer that it is or must be, but it is not experienced as a personal reliving. This follows from the definition of experiential quality of semantic memory; see Section *Memory Is the Manner in which Content Is Given to Awareness, Not the Content per se*).

I can also substitute for ‘remember’ words such as or ‘believe’ or ‘think’ or ‘form an image’. While the certitude of my assertion (e.g., claims of knowledge being more credible than claims of belief<sup>68</sup>) and its mode of apprehension (e.g., propositional versus imagistic) may be taken to vary by substitution, I am communicating no more or less than that I am *now* aware (with some degree of certainty) that ‘X is Y’, and that I know (or believe, think, or picture) ‘X is Y’ to be the case. The word ‘remember’ is simply a verbal descriptor for an occurrent mental content (which could just as easily be replaced by ‘know’, where to ‘know’ clearly must have a causal history). It sanctions no conclusions about the manner in which that content is presented to awareness, save that it is not experienced as a personal reliving of the event).

By contrast, the same content, taken as a declaration from episodic memory does not submit to such alteration without a dramatic change in meaning. For example, to say that ‘I know X is Y’ is not the same as ‘I remember X is Y’ when the word ‘remember’ is meant to convey a sense of pastness: Knowing now ‘X is Y’ is experientially quite different from reliving the experience in which I learned that that ‘X is Y’. Thus, the replacement of ‘remember’ by ‘know’ or ‘believe’ or ‘think’ or ‘can picture’ dramatically alters the meaning of assertions (beyond simply considerations of certitude; though they are mute with regard to modality of experienced presentation) when those assertions issue from episodic memory.

### The Part/Whole Error

Ascribing the term ‘memory’ to a mental state or process that satisfies some, but not all, of the conditions required for its realization—for example, a process that embodies the principles of encoding, storage, and retrieval, but fails to provide the type of temporal experience required by an act of memory retrieval—is an example of a ‘part/whole confusion’. A part/whole error occurs when one ascribes to a part or parts of a whole a designation that meaningfully can be ascribed only to the whole.<sup>155</sup>

With regard to procedural memory, this is reflected in the readiness with which memory theorists are prepared to label as ‘memory’ learned skills or behaviors, regardless of whether their enactment is accompanied by an experience of reliving the conditions surrounding their acquisition. Preconditions

for the experience of memory (encoding, storage, and retrieval) belong to a host of mental states and processes. To assign the term ‘memory’ to occurrences that eventuate from such processes, but lack the requisite temporal phenomenology, is to designate as an act of memory mental or behavioral occurrences that share only a subset of the properties required. This, as we have seen (e.g., Section *Subjective Temporality*) has the consequence of welcoming as ‘memory’ almost any neurally-based behavior that is not strictly vegetative or regulatory.

In light of such concerns, some theorists have questioned whether the performance of learned skills is an act of memory. If you get up from your chair to leave the room, do you have to remember how? When you race across a tennis court to return a serve, do you have to remember how to do so? ‘Using the word “remember” seems strange in these contexts.’ (Ref 145, p. 39; see also Refs 12 and 156).

The same challenge faces the application of ‘memory’ to semantic systems of knowledge. Moyal-Sharrock<sup>35</sup> captures the essence of the problem with clarity and concision: ‘... to put under the banner of memory the mere use of knowledge acquired in the past, is to, as it were, underemploy the concept of memory; to employ it merely because the knowledge in question was acquired in the past’ (p. 221–222). While the acquisition of knowledge may have involved memory at some point (e.g., during the initial stages of learning), this is not sufficient grounds for asserting that the process of making that information available to awareness constitutes an act of memory. For that, the information must be directly given to awareness as something learned in one’s past; and, as we have seen (e.g., Section *Subjective Temporality*), that is not the case with semantic knowledge (The same is true of procedural learning. Early in its learning history, utilization of skills is often accompanied by memory. But as acts become increasingly automatic, recollective accompaniment fades from one’s phenomenology<sup>33</sup>).

In short, the term ‘memory’ applies only to the totality of its constituent parts standing in a proper relation to one another. Attributing the term to cognitive phenomena satisfying a subset of these requirements makes no sense. To be ‘memory’, a mental occurrence must include all the necessary ingredients (i.e., encoding, storage, retrieval, *and* subjective temporality). To do otherwise is to invite conceptual confusion and taxonomic bloating.

### Memory as a Natural Kind

A different, but related, challenge to the legitimacy of attributing memorial status to procedural and semantic systems concerns whether they constitute

what philosophers term a ‘natural kind’ (i.e., objects or groupings that reflect real distinctions in nature<sup>157,158</sup>). On analysis, things do not appear promising.

Even a cursory examination of the behaviors grouped under the term ‘procedural memory’ reveals a diverse collection of acts that often (1) obey different rules and (2) manifest in radically different ways (e.g., reading versus throwing a baseball<sup>12,52,105,114,145,156,159–163</sup>).

Similar concerns can be, and have been, raised about semantic memory.<sup>35,154,164</sup> The variety of psychological entities that fall under the heading ‘semantic memory’ is extensive (e.g., propositions, facts, abstractions, schemata, images, rules, language, etc.). Moreover, its constituent members lack the phenomenological and computational coherence necessary for semantic memory to be taken as a meaningful grouping, as opposed to an ad hoc partitioning of psychological reality.<sup>165,166</sup> As Piccinini and Scott demonstrate, very different types of mental representations and processes must be invoked to account for the diversity of phenomena falling into the category of semantic concepts. In fact, the only thing that appears to unite this wide assortment of conceptually and phenomenologically dissimilar states (other than their basis in neural activity) is the fact that they share a point of origin in past experience. But, as we have seen, this is shaky grounds for attributing natural kind status.

## Summing Up

The arguments presented in Sections *The Nondeclarative System: Procedural Learning through Memory as a Natural Kind* suggest that our current classification of semantic and procedural systems as types of memory lacks conceptual as well as phenomenological warrant. These systems consist in faculties, traits and behaviors that (1) do not have the ‘right sort’ of temporal orientation, (2) contain only a subset of the component parts required of memory, and (3) exhibit a degree of computational and phenomenological diversity that suggests that their classification as systems of memory is based more on organizational and empirical convenience than on attempts to capture meaningful distinctions in nature. Indeed, the primary argument in support of attributing ‘memory’ to these systems is the causal connectivity principle.<sup>5</sup> But, as shown repeatedly (e.g., Section *The Core Thesis: What Memory Is*), reliance on this criterion has the unfortunate consequence of opening the ‘doors of memory’ to most of the mental states and cognitive processes one can envision.

In light of these considerations, it would appear that most behaviors currently categorized as acts of memory have acquired that classification in virtue of either (1) the causal connectivity principle or (2) their association with tasks whose relation to memory is stipulated rather than explicated (see Sections *Implications: Analysis of Content in Awareness Is Not Informative about the Mental Act in which It Occurs* and *Implications: Measures and Methods of Assessing Memory*). The first is a victim of the part/whole fallacy, while the second simply begs the question.

## THE SPECIAL CASE OF EPISODIC RECOLLECTION

Based on considerations of subjective temporality (orientation toward the past; Section *The Declarative System: Semantic and Episodic*), componential completeness (the part–whole question; Section *The Part/Whole Error*), and taxonomic coherence (i.e., natural kinds; Section *Memory as a Natural Kind*), the label ‘memory’ seems best suited to episodic memory within the declarative system. My reasons are as follows.

First, in contrast to other mental states classified as memory, only episodic recollection provides the proper temporal orientation. Second, only episodic recollection satisfies the componential requirements of the whole, thereby avoiding part/whole error. Third, episodic memory consists in a homogeneous collection of mental occurrences. While episodic memory requires the contributions of systems whose workings entail different cognitive processes with different computational commitments,<sup>167,168</sup> these constituents are common to *all* acts of recollection. Unlike procedural and semantic ‘memories’, there are no known subdivisions within, or types of, episodic memory: Any observed diversity derives primarily (though not exclusively—i.e., imagistic versus propositional) from the nature of the stimuli experienced, rather than the manner in which they are processed or presented to awareness. Episodic memory thus remains a viable candidate for ‘natural kind’ status.<sup>169</sup>

Ironically, contemporary psychological and philosophical treatments of the works of Aristotle, Locke, Russell, and others often are quick to point out that what these thinkers ‘really’ meant by ‘memory’ is what we now know to be the episodic component of a multifaceted system.<sup>62,66,170–173</sup> Similar correctives are voiced by memory researchers concerning conventional use of the term. The arguments presented in this paper, however, suggest that thinkers like Locke and Russell got things exactly right. It is our current criteria—not theirs—that are in need of emendation.

As noted in Section *Procedural Skills and Semantic Knowledge Are about the Present and Future, Not the Past*, episodic memory appears to be the lone exception to the rule that the fruits of learning are directed by functional necessity toward the present and future.<sup>92,126–128,133</sup> While some functional commitments of the episodic system also appear future-oriented (e.g., prospection, scenario building, self-projection, and other forms of future-oriented mental time travel; note: A critical discussion of the role of episodic memory in future-oriented mental time travel is presented in Section *Implications: The Role of Memory in Future-Oriented Mental Time Travel (FMTT)*),<sup>k</sup> it is its recollective function that makes it uniquely deserving of the designation ‘memory’. In the next section, I take a more detailed look at the mechanisms underlying episodic recollection.

### So, What Is Episodic Memory? The Role of Autooetic Awareness

As initially conceptualized (see Section *Contemporary Psychological Views of Multiple Systems of Memory*), episodic memory was held to be a system within declarative memory whose content provided its owner with a record of the temporal, spatial, and self-referential context in which the original learning transpired.<sup>106,109</sup> By contrast, the experience of semantic knowledge lacked this trio of indices: Its offerings were experienced as content devoid of contextual elements present during its acquisition. However, as I argue in the next section, the diagnostic value of these indices is called into question by evidence from the clinical domain.

The position I take in this paper is that a more promising distinction between these systems involves their subjective relation to the past. Episodic memory makes available mental content experienced as a reacquaintance with happenings that transpired previously in one’s life. By contrast, content provided by semantic retrieval is experientially oriented toward the ‘now and the next’. Although one logically can infer that this content was acquired at some time in one’s past, recollection of its acquisition is not part of its experienced presentation (see Section *Contemporary Psychological Views on the Temporal Orientation of Memory*).

These differences in subjective temporality were fully appreciated by Tulving, who by the mid-1980s had adopted them as the preferred basis for distinguishing between acts of episodic and semantic memory.<sup>110</sup> Tulving argued that episodic retrieval makes available autooetic awareness while semantic retrieval provides a type of awareness he called noetic.<sup>110,118,122,128,144,180</sup> Autooetic is the ‘... unique

awareness of reexperiencing here and now something that happened before, at another time and in another place’ (Ref 118, p. 68). By contrast, individuals are noetically aware when ‘... they retrieve general information in the absence of a feeling of reexperiencing the past’ (Ref 177, p. 144). Central to the proposed distinction: ‘Only ‘autooetic consciousness’ is thought to bear a personally meaningful relation to time’ (Ref 180, p. 4).<sup>l</sup>

Drawing on the arguments presented in Sections *The Core Thesis: What Memory Is, Memory: A Present Mental State Felt As Past, Procedural Skills and Semantic Knowledge are about the Present and Future, not the Past, The Nondeclarative System: Procedural Learning, and The Declarative System: Semantic and Episodic*, it is reasonable to conclude that only cognitive systems associated with autooetic awareness are capable of providing the temporal resources necessary for experiencing retrieved content as an act of memory. Episodic retrieval—which is accompanied by temporally-rich, past-oriented autooetic experience—thus stands alone among presumptive systems of memory in satisfying *all* the requirements deemed individually necessary and jointly sufficient to identify a current mental state as an act of memory.<sup>m</sup>

### Memory Is the Manner in Which Content Is Given to Awareness, Not the Content *Per Se*

One helpful way to bring the constituents of a system into view is to examine them when the system to which they belong is in the process of breakdown. A system’s component parts, normally masked by the effortless manner in which they work together to affect a common end, are increasingly on display as the whole of which they are part comes undone.<sup>187,188</sup> Accordingly, in much of what follows, I draw heavily on evidence from individuals suffering varying degrees of memory impairment.

Tulving’s reformulation of episodic and semantic experiences in terms of temporal subjectivity has been shown to be a rewarding way of generating testable hypotheses about memory.<sup>119,121,122,179,189–193</sup> A distinction based on the type of subjective temporality associated with memory avoids a number of messy findings that, over the years, steadily have chipped away at the utility of the traditional diagnostic criteria of systems within declarative memory—i.e., the presence or absence of the content referencing whom, where, and when.

For example, countervailing findings have shown that despite the still widely-held assumption that only episodic memory makes available self-referential content, semantic knowledge can also



reference the self (for reviews, see Refs 42, 172, 178, and 194–199). In addition, there is no principled reason why semantic knowledge cannot contain information about ‘when’ and ‘where’ (e.g., ‘I know that John Lennon was born on October 9, 1940 in Liverpool, UK, although I did not experience the event of his birth or reexperience the event in which that knowledge was acquired’). In fact, there is abundant evidence to the contrary.<sup>120,123,124,195–198</sup>

Thus, the core constituents of episodic memory as initially proposed (i.e., temporal, spatial, and self-referential) can also be on display in reports of semantic experience. Indeed, there is no logical or empirical basis for asserting that the content of these two systems should differ (see Section *Implications: The Neural Correlates of Memory* for a discussion of the neuroanatomical basis for this similarity). This is demonstrated in a number of case studies in which patients, having lost access to episodic memory, can be retaught the temporal, spatial, and self-referential details of their life-narrative – albeit details lacking auto-noetic accompaniment.

One of the clearest cases is that of patient J.V., who, as a result of neural pathology, suffered profound retrograde episodic amnesia.<sup>200</sup> Although his disease appears to have compromised both premorbid content and auto-noetic awareness, he was able to relearn specific temporal and spatial details of his personal past—although he experienced this content as factual knowledge, rather than as a personal reliving. Patient A.Z.<sup>201</sup> also demonstrated a capacity to noetically reacquire lost personal memories. Despite his inability to episodically recollect *any* personal experiences, he gradually relearned specific temporal and spatial details of his life (and also relearned information about celebrities). However, he experienced this content as facts (which they were) rather than as recollections.

Patient M.L.<sup>202</sup> shows a similar pattern of lost and relearned personal knowledge. M.L. suffered a brain trauma that left him densely amnesic for episodic memories pre-dating his injury. Despite the severity of his impairment, M.L. was able to ‘relearn significant facts from his own past’ (Ref 202, p. 1956), although this knowledge lacked *any* feeling of reacquaintance with the experiences his relearning was crafted to recapture.

Interestingly, M.L. was also able to retrieve a few pre-morbid personal experiences. However, this spared knowledge was delivered to awareness without any feeling of reliving the circumstances in which it was acquired. Additional testing revealed that M.L.’s auto-noetic awareness was seriously compromised, thus explaining the disconnection between the content

in awareness and the lack of experienced referral to its point of origin.

Demonstrations between an intact ability to (re)-acquire personal (and nonpersonal) knowledge in conjunction with impairments to auto-noetic ability and pre-morbidly acquired personal content are seen throughout the literature.<sup>203–208</sup> The takeaway message is that retrieval of content acquired in one’s past is not sufficient to make that content an experience of memory. To so qualify, the retrieved content must be connected to a pre-reflective mode of awareness—auto-noesis—in which the occurrent experience evokes a feeling of reliving one’s past. Otherwise, the experience is one of knowing, believing, imagining, and so forth, but not one of remembering.

Developmental disorders of episodic memory can show similar patterns of preserved (or relearned—depending on the age of onset) content in the absence of auto-noetic reliving.<sup>209–215</sup> Despite suffering severe (sometimes complete) episodic impairment, most of these children are able to rely on intact non-memorial systems to store and access learned content (rules, language, facts, and so forth). In many cases, they can be taught to read, write, and carry out everyday activities at a level sufficient to permit attendance in a mainstream school. Yet, the experience of this learned content and action lacks any feeling of the original experience of acquisition—i.e., it shows all the hallmarks of auto-noetic impairment.

For example, as a result of neurological insult suffered during childhood, patient M.S. was unable to episodically retrieve events in his life.<sup>213</sup> Nonetheless, M.S. was able to learn and report some facts about his life experienced post-morbidly. For example, he knew that he had spent a recent winter away from home. Although his account was less detailed than might be expected of a person of his age, he could, for example, describe his parents’ condominium and other specifics, suggesting that the acquired content, though not as detailed as recollection-based reports, nonetheless contained significant temporal and spatial information.

Along similar lines, patient V.J.,<sup>211</sup> who suffered dramatic episodic impairment (both retrograde and anterograde) at an early age, could, if cued, give an account of recently experienced events, although his reports did not match the level of specificity one would expect of children of his age. Importantly, the retrieved content lacked any sense of personal reliving.

To summarize, it is reasonable to conclude that in some (though not all) cases of amnesia—both acquired and congenital—patients are able to acquire and access spatial, temporal, and self-referential information. However, this content is experienced as

lacking a sense of reacquaintance with the conditions of its acquisition. This suggests that such persons can retrieve, but not recollect content in varying degrees of detail. This, in turn, suggests that what has been compromised in these cases is not the content presented to awareness (though degradation in detail is often present<sup>9</sup>); rather, it is the manner in which that content is presented to awareness: While content satisfying all the characteristics traditionally assumed to accompany an act of recollection (i.e., temporal, spatial, and self-referential) are available to awareness, those content no longer are experienced as acts of recollection.<sup>9</sup>

### Is Auto-noetic Awareness Intrinsic to Memory?

Memory's connection to the past is not one of logical inference. Rather, it consists in the feeling that the content in awareness stands in a direct, nonconceptual temporal relation to past experience.<sup>61,64,69,75,110,125,128,144,172</sup> This form of attachment to the past (which James called 'warmth and intimacy' and Russell labeled 'feelings of pastness') is part of the subjective quality of recollection, and is made possible by the connection between retrieved content and auto-noetic awareness.<sup>110,125,144,180</sup>

So, in what does the relation between auto-noetic awareness and memory content consist? One possibility is that auto-noetic awareness is *intrinsic* to certain content made available to consciousness. On this view, memory is the outcome of retrieving auto-noetically endowed content. In contrast, a *relational* interpretation suggests that the connection between auto-noesis and content is a matter of contingency (i.e., circumstance), not (bio)logical necessity. On this view, while auto-noetic awareness and content normally are conjoined in the act of memory, they are not inseparable.

The available evidence, though not plentiful, appears to favor the relational view—i.e., what makes an experience a memory experience is not the nature of the content presented to awareness, but the manner in which awareness becomes associated with that content during the act of retrieval. For example, Piolino et al.<sup>192</sup> adopted Tulving's<sup>110</sup> remember/know task (e.g., for review see Ref 182) to examine the relation between retrieved content and auto-noetic experience in patients suffering episodic memory impairment. They found that, compared to non-demented controls, patients with Alzheimer's or Frontotemporal Dementia reported significantly fewer 'remember' responses (presumably indicative of auto-noetic awareness) to describe their experience of retrieval. Based on these findings, the authors concluded that these two

forms of dementia entail impairments to auto-noetic awareness rather than the content in awareness.

While suggestive, these results do not permit strong inferences concerning the relation between content and awareness. It might be that patients' over-reliance of 'know' responses (i.e., noetic awareness) reflects the selective degradation (and thus unavailability for retrieval) of temporally propertied content in storage (i.e., the intrinsic view). By contrast, the bias toward 'know' responses could reflect impairment in patients' ability to conjoin auto-noetic awareness with a-temporal content during retrieval (i.e., the relational view). In what follows, I present evidence that offers clearer support for the relational model.

In a series of papers,<sup>42,125,172</sup> my colleagues and I have presented the case of R.B., a 43-year-old male with an engineering degree from MIT. Following an automotive accident, R.B. exhibited a very unusual, but not unique,<sup>42,217,218</sup> (for review see Ref 42) memory problem. He was capable of describing events from his life with the rich contextual detail traditionally associated with episodic recollection. However, he did not experience this content as an act of recollection. Rather, it was experienced as known from a third person perspective—i.e., it lacked the warmth, intimacy, and feeling of reliving associated with auto-noetic experience. In short, his impairment selectively targeted auto-noesis while leaving stored content unscathed (this is in contrast to most cases of episodic impairment—such as those reported in Section *Is Auto-noetic Awareness Intrinsic to Memory?*—where the dysfunction can include degradation or loss of stored content as well as compromised auto-noetic ability).

For example, in response to a request to remember a specific time involving experiences as a student at MIT, R.B. replied:

'When I remember the scene with my friends, studying, I remember myself walking into the room ... and ... other things I did and felt ... But it feels like something I didn't experience ... (something I) was told about by someone else. It's all quite puzzling.'

He continued:

'I can see the scene in my head ... I'm studying with friends in the lounge in the residence hall. But it doesn't feel like its mine ... that I own it. It's like imagining the experience, but it was described by someone else.'

Asked to report memories of his childhood, R.B. responded:

'I...(am) remembering scenes, not facts ... I am recalling scenes ... that is ... I can clearly recall a scene of me

at the beach in New London with my family as a child. But the feeling is that the scene is not my memory ... as if I was looking at a photo of someone else's vacation.' (He then describes the scene in rich contextual detail)

The retrieval of recent events shows a similar dissociation between content and feeling of reliving:

'I remember eating pizza in at XXX in Isla Vista about a month before (his head injury), but the memory belongs to someone else. But knowing I like pizza in the present ... now ... is owned by me ... when I recall memories from my past I intellectually know they are about me. It just does not feel like it ... when I remember scenes from before the injury they do not feel as if they happened to me—though intellectually I know they did.'

R.B.'s reports (which are treated more fully in Ref 172) show all the hallmarks of episodic recollection, save for one thing—the notable absence of a feeling of auto-noetic awareness. They contain detailed temporal, spatial, and self-referential elements that correctly track (accuracy was obtained via third party reports) the manner in which the original learning transpired. What they lack is the feeling that the content in awareness is a memory of what took place, as well as a nonanalytic confidence that it did take place (i.e., R.B.'s confidence that the content in awareness accurately tracked his life experiences was based exclusively on conceptual analysis). In short, R.B. did not feel as though the content he experienced were personal recollections. Rather, he experienced them as things he believed he should know but most likely were facts related to him by someone else (R.B. reports that he relied on inferential processes to decide whether the content in awareness *could be* something he personally experienced).

It is important to note that R.B. gradually recovered his auto-noetic abilities, at which time the 'same' content now was presented to awareness *as* personal recollections:

'What happened over the coming months ... was interesting. Every once in a while, I would suddenly think about something in my past and I would 'own' it. That was indeed something 'I' had done and experienced. Over time, one by one, I would come to 'own' different memories. Eventually, after perhaps eight months or so, it seemed as if it was all owned ... as if once enough individual memories were owned, it was all owned. For example, the MIT memory, the one in the lounge ... I now own it. It's clearly part of my life, my past'.

While this case stimulates a host of questions about both self and memory (many of these are

addressed in<sup>42,172</sup>), for present purposes, the important points are (1) auto-noetic awareness is *not* an intrinsic property of recollected content (see also Ref 128); content that contains all (or many) of the criterial features and richness of detail associated with recollection can be present in awareness, yet not be directly experienced as reliving one's past, and (2) the same (or essentially indistinguishable) content presented to awareness can be taken as 'not my past' or 'my past' depending on the functional integrity of the mechanisms, which enable auto-noetic awareness.

## Summing Up

As the evidence presented in Sections *Memory is the Manner in Which Content is Given to Awareness, Not the Content Per Se* and *Is Auto-noetic Awareness Intrinsic to Memory?* make clear, there is no logical argument or empirical support for the idea that *only* episodic memory makes reference to the 'who, where and when' of past experience. While the fact that the two systems (episodic and semantic) share features is not a 'death sentence' for their partitioning into distinct categories, it highlights the difficulties faced by investigators who rely on 'time, place, and self' as the basis for classification (and, as we will see in Section *Implications: Analysis of Content in Awareness is not Informative about the Mental Act in which it Occurs*, this three-part classificatory scheme remains a preferred diagnostic tool for distinguishing episodic from semantic experience).

Accordingly, the criterion of 'time, space and self' is insufficient for the task for which it was designed. By contrast, the auto-noetic/noetic criterion (and its assessment by 'remember/know' tasks) captures a fundamental feature of memory phenomenology, providing a rationally warranted and empirically sound means for distinguishing memorial from non-memorial experience.

A strong implication of the relational view is that stored content (often subject to considerable modification) is *neither* episodic nor semantic (see Sections *Implications: The Neural Correlates of Memory* and *Implications: Dedicated Systems of Memory*). It is subjectively a-temporal information (though its content may reference temporal information). It acquires subjective temporality in virtue of a concurrent act of awareness. Seen in this light, there are, strictly speaking, no systems of memory (see Section *Implications: Dedicated Systems of Memory*). Rather, there is content acquired in one's past that can be acted on by processes occurring at retrieval to confer temporal subjectivity. Memory, in short, is the manner in which mental content is experienced, not the preconditions (encoding, storage, and retrieval) that play a role

in enabling that experience.<sup>p</sup> As we saw in Section *Memory Is the Manner in which Content Is Given to Awareness, Not the Content Per Se*, those same preconditions, without auto-noetic accompaniment, result in non-memorial experience.

Episodic recollection thus occupies a unique position among the systems that have been grouped under the heading ‘memory’. It, and it alone, enables an individual to transcend the present, endowing the act of retrieval with a direct, nonanalytic feeling that she/he is reliving a past experience. No additional mental gymnastics are required.

Returning to the question posed at the outset of this paper—‘what is memory?’—the answer, as I see it, points strongly toward the conclusion that episodic recollection stands alone among the systems populating our current taxonomies of memory. The unique manner in which retrieved content is experienced makes recollection the *only* type of mental occurrence that satisfies *all* the requirements of an act of memory—(1) within-system homogeneity (i.e., natural kind status), (2) a causal connection to, and (3) an experienced relation with, the past.

## CONSIDERATIONS AND IMPLICATIONS

Despite historical, conceptual, and empirical evidence in support of my argument to place limits on our use of the term ‘memory’, unless my proposal has consequences for how we think about and conduct our research, it runs the risk of being seen as little more than a squabble over semantics. In this section, I attempt to demonstrate some consequences of my reconceptualization. I do so by pairing my two main theses—(1) that a mental act becomes a memory in virtue of the manner in which retrieved content is connected to one’s past and (2) that memory is not the content of experience, but the experience of that content—with some implications for theory and practice. As noted in the opening paragraphs of this paper, these two theses are deeply intertwined. Accordingly, the pairings I present are based more on expository convenience than conceptual necessity: Many of the implications could reasonably be paired with either thesis.

### Thesis: Memory is the Manner in which Content Is Presented to Awareness

A core contention of this paper is that memory is an experience. It relies on the encoding, storage, and retrieval of content (e.g., facts, rules, procedures), but these are preconditions for memory, not memory itself.

While it certainly is true that preconditions are part of the whole, they do not become part of the whole until there is a whole to part of. There is no memory until it is experienced. These same preconditions, without an auto-noetic complement, can eventuate in a number of non-memorial mental states (e.g., imagination, thought, belief, desire, feeling, planning).

Thus, to conflate memory with the preconditions for its actualization is to fall victim to a part/whole error. Memory *is* the experiential outcome of a sequence of stages that culminate in auto-noetic experience of retrieved content; it is *not* the form, amount, or any other property (causal or predicate) of the content *per se*. In short, it is because the stages of encoding, storage, and retrieval *can* produce memory experience that they are preconditions for the experience of memory; but, they are not memory themselves. Prior to being conjoined with auto-noetic awareness at retrieval (e.g., Section *Is Auto-noetic Awareness Intrinsic to Memory?*), they are agnostic with regard to the mental state or process in which they participate.

As I discuss in Sections *Implications: Analysis of Content in Awareness Is Not Informative about the Mental Act in which It Occurs* and *Implications: Consciousness, Memory and the Science of Psychology*, memory theorists often fail to give experience the empirical respect it deserves—choosing instead (likely out of methodological convenience) to infer memory’s properties, neural correlates, and degree of involvement in ‘memory-based’ tasks on the basis of analysis of reported content. But content is *not* memory. Retrieved content can be informative about memory, but only when it is conjoined with auto-noetic experience. In this sense, the results of encoding, storage, and retrieval are system-neutral: They are available for an array of conceptually and phenomenologically distinct mental states.

### *Implications: The Neural Correlates of Memory*

This confusion of memory with its preconditions is reflected in examination of radiological attempts to locate systems of memory (for reviews see Refs 116, 197, 198, 219, and 220). Despite the guarded optimism of early forays,<sup>221</sup> difficulties in finding systems dedicated to episodic or semantic memory soon became apparent. Researchers were led to conclude that episodic and semantic systems not only were widely distributed in the brain,<sup>122,222–232</sup> but also exhibited considerable functional overlap.<sup>233–235</sup> Moreover, their boundaries were fluid, fluctuating as a function of the task performed, the participant’s age, handedness, gender, emotional state, and a host of other factors;<sup>227,228,236,237</sup> for review see Ref 238.

Complicating matters further, the manner in which investigators operationalized the system under

analysis (which varied considerably across studies) had measurable effects on regions of neural activation.<sup>195</sup> In short, one gets the impression that there is as much (or more) evidence for the incoherence of the constructs under empirical scrutiny as there is for the complexities involved in designing, analyzing, and interpreting findings from brain-mapping endeavors.<sup>47,236,237</sup>

However, in the face of these localization problems, one consistent finding emerged—i.e., structures in the medial temporal lobes were, in varying degrees, associated with both episodic and semantic consolidation and storage.<sup>17,93,116,189,216,220,224–226,228,233,238–244</sup> This, I suggest, is evidence in support of the idea that these regions are linked (in some as yet unspecified manner) to the neural correlates of content prior to its demarcation as semantic and episodic during the act of retrieval.

A second consistent finding was that auto-noetic awareness is associated with structures in the frontal, not temporal, lobes.<sup>122,245–248</sup> The discovery that separate networks of neural activation are associated with content storage and auto-noetic awareness provides provisional support for the idea memory is the experienced outcome of processes acting on content during retrieval. Although content associated with structures in the medial temporal lobes *may* eventuate, on its retrieval, in an experience of memory, the processes that affect this transformation are located elsewhere in the brain. Prior to retrieval, content exists as a general resource whose offerings may be in the service of any number of states, most of which are not memory (e.g., imagery, belief, knowledge). Moreover, as shown in Sections *Is Auto-noetic Awareness Intrinsic to Memory?* and *Summing Up*, there are circumstances in which retrieved content and auto-noesis go their separate ways.

### ***Implications: Dedicated Systems of Memory***

Based on these ideas, the search for *dedicated systems* of memory is seen in new light. Specifically, there is *no* episodic system of memory as traditionally construed—i.e., encoding, storage, and retrieval of episodic information (see Section *What Is Memory? The Official Doctrine*). Rather, there is learned content that is stored in a system-neutral format, and available at retrieval to a variety of experiential outcomes. It is only when retrieved content is subject to auto-noetic processes that the designator ‘memory’ can be meaningfully applied (e.g., Section *So, What is Episodic Memory? The Role of Auto-noetic Awareness*).

In this sense, the radiological and neuroanatomical search for dedicated systems of memory (whether episodic, semantic, or procedural) is a mission that,

as currently conducted, offers no chance of success. Although attempts to locate structures that participate in acts of encoding, storage, and retrieval have good reason to expect reward, locating systems of memory, while failing to appreciate that memory is the manner in which these stages are actualized in experience, is an attempt to search for telltale signs of a conceptual unicorn hidden among the hills and valleys of cortical matter. While we can name the target of inquiry, this does not ensure that a target exists to be found.

### ***Implications: The Role of Memory in Future-Oriented Mental Time Travel (FMTT)***

The topic of FMTT is of great interest to social, personality, developmental, clinical, and cognitive psychologists, as well as neuroscientists. More than 100 papers have appeared in just the past 5 years.<sup>249</sup> Most FMTT researchers take for granted that our ability to imagine the future is grounded in acts of memory. Specifically, the ‘received view’ is that episodic memory underwrites many (though not all<sup>250–253</sup>) forms of FMTT (for reviews see Refs 138, 174, 177, 249, 254, and 255).

But what sanctions the presumed relation between memory and FMTT? One argument is that auto-noesis enables mental travel into one’s past as well as the ability to imagine one’s future.<sup>110,144,180</sup> On this account, episodic memory (the presumed manifestation of auto-noetic awareness) seems a logical basis of our ability to envision the future.<sup>122</sup>

But is there justification for this relation? To date, the association between auto-noesis and FMTT draws primarily on a perceived temporal symmetry between movements toward (future) and away (past) from the present. However, the apparent symmetry of the past and future with respect to ‘now’<sup>71,129,181</sup> is a somewhat superficial (and largely unanalyzed) basis for drawing a causal connection between recollecting one’s past experiences and imagining oneself in the future.<sup>249,256</sup> For example, while most psychologists and philosophers agree that there is ‘something it is like’ to reexperience events in one’s life, one cannot ‘reexperience’ an as-yet nonexistent set of circumstances. *Clearly there is ‘something it is like’ to imagine a not-yet-existent future, but that ‘something’ cannot be, of logical and contingent necessity, the same<sup>257–259</sup> as ‘something it is like’ to remember a once-existent past.* While a relation between recollecting one’s (actual—albeit modified<sup>14</sup>) past experiences and imagining possible future scenarios involving the self has intuitive appeal, a host of metaphysical, epistemological, and experiential considerations remain to be worked out.<sup>129,130,249,260,261</sup> To date, no such analysis has been attempted.

A second line of support for the idea that memory underwrites FMTT derives from the finding that these two phenomena share many of the same neural substrates.<sup>139,262–268</sup> Sharing neural structure apparently confers a degree of respectability on the hypothesis that memory somehow is involved in FMTT, perhaps enabling its achievement.

However, as the evidence presented in this paper shows, this inference requires considerably more support than a demonstration of neuroanatomical overlap. In what way or ways do these shared structures contribute to memory? Are they involved in its experience? Or do they store content that subsequently can be recruited either by memory or by other processes potentially mediating FMTT? Moreover, since memory is an experience, it would seem that for memory to underwrite FMTT, individuals should have recollective experiences while formulating future-oriented scenarios. But, to the best of my knowledge, this is not the case: Rather, people typically draw on learned content to construct possible scenarios, without any experience of recollection.

This is not to say that recollection cannot play a part in some forms of FMTT (of which there are many<sup>249</sup>); it is simply to say that it need not. Which, if any, forms of FMTT require or benefit from recollective experience has yet to be determined. Clearly, much research is needed prior to uncritically accepting memory as *the* basis for FMTT.

### ***Implications: Dissociations and Memory***

Those familiar with research on multiple memory systems might be tempted to ask ‘doesn’t the existence of functional dissociations (both single and double) help legitimize the attribution of multiplicity to memory?’ Simply put, ‘no’. Even if we overlook the epistemic warrant of inferring multiplicity from evidence from task dissociations,<sup>196,269–271</sup> the fact that two processes, systems, or states show functional independence (courtesy of an empirical dissociation) does not sanction the inference that these systems are members of the *same* natural kind.<sup>272</sup>

Consider, for example, one of the most commonly observed and experimentally manipulated forms of ‘memory’ dissociation—that between the presumed episodic and semantic systems.<sup>269,270</sup> The fact these systems dissociate may tell us that they are different. But it is mute with respect to their ontological status. The most it can reveal is that certain variables differentially impact performance on tasks presumed to tap into different systems: But it sheds no light on whether those different systems are systems of memory.

For example, one can find dissociations between tasks that target recollection and belief,<sup>273</sup> but few

would conclude from this that both recollection and belief are types of memory.<sup>67</sup> Indeed, one can find dissociations between visual and recollective task performance,<sup>274</sup> but this does not justify the inference that both these tasks are underwritten by memory. In short, dissociations ‘may’ tell us two systems are functionally independent, but it does not sanction any conclusions with regard to their ontological status.

### **Thesis: Memory Is the Experience of Reliving One’s Past**

To label a mental occurrence as an act of memory is not simply to be able to show that the experience can be causally traced to events in one’s past. It requires that the experiencer have a direct, non-inferential feeling that what is now in awareness is a reexperiencing of events that took place in his or her past. This simple, but fundamental, addendum to the ‘official doctrine’ (Section *What Is Memory? The Official Doctrine*) has far-reaching consequences for how we investigate memory.

### ***Implications: Analysis of Content in Awareness is not Informative about the Mental Act in which It Occurs***

The idea that ‘memory is an experience’ offers a much needed corrective to research practices that do more to cloud than to illuminate the role of memory in task performances. A central idea of this paper is that acts of memory are not distinguished from non-memorial acts by their content (e.g., Sections *Memory is the Manner in Which Content Is Given to Awareness, Not the Content Per Se* and *Is Auto-noetic Awareness Intrinsic to Memory?*), but rather by the way that content is given to awareness. This calls into serious question the advisability of the all-to-frequent practice of exploring the workings of memory via analysis of the properties of reported ‘memory’ content (e.g., time, space, self-reference, detail<sup>q</sup>).

To take one example (a review of the psychological and neuroscientific literature reveals a multitude), the authors of a recent paper<sup>277</sup> attempted to document episodic contributions to future-oriented thought by examining the relative proportions of episodic and semantic content present in participants’ memory transcripts. On present considerations, this analysis is misguided since there is no principled way in which a researcher can accurately classify reported content as the result of recollection as opposed to, say, semantic knowledge; these designations apply only to the manner in which content was experienced at retrieval (see Sections *Memory is the Manner in Which Content Is Given to Awareness, Not the*

*Content Per Se and Is Auto-noetic Awareness Intrinsic to Memory?*).

The complexity and coherence of reported content also has been employed as an index of episodic recollection. However, the utility of these diagnostics has neither rational nor empirical warrant.

For example, while semantic knowledge of one's personal history often—though not invariably—posses fewer details than episodic recollection, content complexity is an unreliable mark of memorial status. Semantic content can show considerable intricacy and narrative coherence (for example, detailed knowledge of the rules for how to behave and what to expect in a restaurant). Conversely episodic memory can yield content of extreme simplicity (for instance, the experience of recollecting a single word from a previously presented list).

### **Implications: Episodic Memory in Nonhumans**

A number of researchers have been keen to investigate whether episodic memory is experienced by nonhumans.<sup>278–285</sup> While some have exercised caution in attributing full-blown episodic memory to nonhumans (e.g., calling the experience episodic-like<sup>282,284,286</sup>), many have been less circumspect.<sup>287–289</sup>

The idea that episodic memory is shared by (or at least has clear precursors in) nonhumans fits comfortably within an evolutionary framework.<sup>290</sup> The origins of animal memory are hypothesized to date to the Cambrian 'explosion'.<sup>291,292</sup> This period, which took place around 545 million years ago, is considered one of the most significant transitions in evolutionary history.<sup>293,294</sup> In a relatively short time (at least by evolutionary standards—approximately 25 million years), essentially all animal phyla first appear in the fossil records.<sup>295</sup>

One popular explanation for the astonishing ecological and morphological diversification found during the 'explosion' is that a genetic reorganization of the central nervous system occurred in parallel among several groups of Cambrian metazoans.<sup>291,292,296</sup> This neural restructuring is hypothesized to have resulted in the development of processes capable of supporting associative learning.

It is well known that evolution builds on existing structures.<sup>297</sup> For example, Fuster<sup>219</sup> has demonstrated a strong overlap among humans and phylogenetically older mammalian species in the cortical areas presumed to be involved in learning. Accordingly, positing a preexisting cortical network that subsequently was overlain with mechanisms that enabled memory proper is consistent with an evolutionary scenario.

Unfortunately, phylogenetic continuity does not guarantee functional or phenomenological equivalence: An acorn may grow into a tree, but no one mistakes the tree (in terms of structure, composition, or function) for the acorn. While it is beyond question that all animals capable of neural-based behavior learn from experience, learning must not be treated as coextensive with memory (e.g., Section *Procedural Skills and Semantic Knowledge Are about the Present and Future, not the Past*). For learned behavior to be considered as an act of memory, learning must be accompanied by subjective temporal experience of one's past. Accordingly, to assume that a demonstrable ability to alter future behavior based on past experience necessarily derives from episodic recollection is logically unfounded.

Since nonhumans lack verbal abilities, researchers have attempted to ground their conclusions about animal memory solely in analysis of behavior. For example, Allen and Fortin<sup>287</sup> reason that (1) since the presence of episodic memory in humans '... relies entirely on verbal reports of subjective mental experience' and (2) since this reliance '... precludes its investigation in animals' that (3) '... a more productive approach to defining episodic memory is to identify fundamental features than can be measured experimentally' (p. 10379). They go on to list some of the behavioral concomitants one should expect from the operations of episodic recollection (i.e., acts that reflect knowledge of spatial, temporal, and other situational contexts in which those acts transpired). Such behaviors, they argue, '... provide *compelling evidence* that core properties of episodic memory are present in nonhumans' (p. 10379; emphasis not in original). Similar sentiments are found scattered throughout the literature on animal memory, perhaps the most blatant of which is Eichenbaum et al.,<sup>289</sup> who title their paper on nonhuman episodic memory: 'If it walks like a duck and quacks like a duck ...'.

Unfortunately, one cannot remove the experiential aspect of a recollection without expunging the phenomenon under consideration. Memory is an experience, and experience is not reducible to, or knowable from, physical behavior (save for evidence provided by introspective report). While the experiential nature of episodic memory may be a source of methodological inconvenience, this does not justify its exclusion from scientific consideration or empower one to affect definitional emendations designed to compensate for empirical limitations. If our available techniques are unable to capture this core feature of memory, then so much the worse for our techniques.

Moreover, the assumption that 'These criteria (e.g., behaviors consistent with temporal, spatial and

self-referential knowledge) have provided a solid theoretical framework for behavioral tests of episodic memory' (Ref 287, p. 10379; parenthesis added for textual clarification) reflects a serious misunderstanding not only of the difference between content and memory, but of the fact that this trio of 'diagnostic' indices is, in fact, not diagnostic: They characterize the content of non-memorial function as well (see Sections *Memory is the Manner in Which Content Is Given to Awareness, Not the Content Per Se* and *Is Autonoetic Awareness Intrinsic to Memory?*).

It thus is fully possible for species lacking the introspective abilities required for autonoetic awareness (as a review of the evidence suggests<sup>298</sup>) to manifest behaviors indicating knowledge of when and where. As one example, consider the well-documented finding that scrub jays, despite lacking structures assumed necessary for episodic recollection (e.g., a prefrontal cortex),<sup>r</sup> nonetheless behave *as though* their acts were mediated by recollection.<sup>283</sup> However, such behavior can be explained without having to attribute episodic abilities to avians. In light of the arguments presented in this paper, a more parsimonious explanation is that scrub jays have evolved a network for storing learned content, some which contains information about time and place. Thus, despite lacking the mechanisms necessary to place that content into subjective alignment with their personal past, they can use their content-based knowledge of time and place to guide their future-oriented behavior (all animals capable of neurally-mediated locomotion show varying degrees of adaptive anticipatory behavior<sup>136,140,300</sup>). In short, despite numerous assertions to the contrary, the question of whether animals are capable of episodic recollection presently is indeterminable.

### ***Implications: Measures and Methods of Assessing Memory***

We explore memory with a variety of measures, including, but not limited to, recognition, response latency, cued recall, and free recall (for reviews see Refs 27 and 28). But, how confident can we be that a particular 'memory task' actually tasks a particular memory? The answer is 'not very'.

Consider, for example, assessments of memory based on recognition. This measure frequently is used to assess such memorial properties as duration, capacity, confidence, and accuracy.<sup>301</sup> But, if memory is the experience of content, rather than the content *per se*, what sanctions the assumption that performance on recognition tasks reflects the operation of memory?

As the remember/know paradigm makes clear, recognition can be accomplished (or, to avoid any causal commitment, 'accompanied') by feelings of

recollection (remember judgments) *or* by feelings of familiarity (know judgments).<sup>110,182,189,302,303</sup> But if memory is recollection, then the presence of 'know' judgments suggests that recognition is at best an impure measure of memory.

In fact, I would argue that recognition based on a feeling of knowing that a word was on a list is not very different than an act of perceptual categorization (e.g., 'Knowing that the object before me is a couch'). Conceptually, the difference between knowing (i.e., feeling it to be the case) that X is a couch and that X is a word from a recently presented list hinges on the temporal proximity of the acquisition of that knowledge (e.g., I know X is a couch and I learned this earlier in my life; I know X is a word on the list and I learned this several minutes before). But what authorizes temporal proximity to serve as the conceptual arbiter between acts of perceptual categorization and acts of memory?<sup>s</sup>

A core argument of this paper is that memory is the experiential outcome of encoding, storage, and retrieval; but these same processes can be in the service of a variety of non-memorial experiences. On this view, the frequent use (seen, for example, in many of the radiological studies cited in Section *Implications: The Neural Correlates of Memory*) of such techniques as 'episodic and semantic encoding tasks' (or worse, 'episodic and semantic information' presented for encoding) are methods without meaning. 'Episodic' and 'semantic' are terms that describe ways of experiencing stored content, not the content *per se* (see Sections *Implications: The Neural Correlates of Memory* and *Implications: Dedicated Systems of Memory*). There is no episodic or semantic information; there are no episodic and semantic encoding tasks. Rather, there is information that, once registered, can be acted on during consolidation and reconsolidation, becoming more or less abstract/specific.<sup>16,17,216</sup> Thus, with regard to presentation and encoding, information in storage is system-agnostic content that may, if subject to certain conditions at retrieval, be realized as memory, belief, knowledge, imagery, thought, and so on.

### ***Implications: Consciousness, Memory, and the Science of Psychology***

Memory, like all mental states, is an experience. It is not (in any presently obvious way) reducible to, or derivable from, conceptual analysis of either the mechanisms of its production or the content available to awareness. As Lorenz<sup>305</sup> notes, evolution often produces outcomes 'that were in no way indicated or even implicit in the proceeding stage from which they took their origin' (p. 73). Memory has to be experienced to be known.<sup>42,43</sup> There is 'something it is like'



to have a memory and that quale (i.e., the phenomenal character of an experience) is not going away.

However, a purely conceptual distinction, no matter how well-crafted, does not license the conclusion that the distinction holds at the level of personal experience. A conceptualization drawn in an entirely theoretical way is only a discourse about experience, not a rendering of the experience. What is needed is a means of connecting theoretical arguments *for*, to the phenomenological reality *of*, the content of experience as it is given in awareness.

One way to do this relies on a person's ability to accurately recount his or her introspections (e.g., the remember/know paradigm; speak aloud protocols). While introspective techniques suffer from a number of interpretive and methodological issues (for review and discussion, see Ref 306), these issues are not insurmountable.<sup>42,307–309</sup> Accordingly, the use of introspective reports as a means of data collection has enjoyed a resurgence among psychologists during the past few decades (e.g., in domains such as memories, self, consciousness, temporal projection<sup>42,148,149,172,266,310–314</sup>). This is due, in large part, to the unique perspective introspective data provided on constructs of interest. As Hurlburt and Schwitzgebel (Ref 309, p. 5) observe, 'Even hard-nosed neuroscientists ask their subjects about their subjectively felt experience while in the fMRI magnet' (what they do with that data, of course, is another question).

The merging of empiricism and phenomenology attempts to save the phenomena by not saddling the investigator with a false choice between either (1) reducing a phenomenon to numerical values or, having failed to do so, (2) forfeiting any claim to scientific respectability. Rather, it focuses on the importance of finding ways to approach phenomena at a level that approximates the way they are given in experience.

Human experience does not easily submit to objectification and quantification.<sup>315</sup> This often is taken as a tacit admission that experience forfeits its status as part of reality. As Stroud<sup>316</sup> sees it, one goal of scientific naturalism is to separate 'reality as it is independently of us from what is in one way or another dependent on us and so misleads us to what is really there'. (p. 4). On this view, objectivity trumps subjectivity when deciding what is 'real'.<sup>317</sup>

The doctrine that 'reality' is that which distinguishes what truly is the case from that which only appears to be the case is seen by many as overly restrictive and without solid foundation.<sup>318–329</sup> Measurements and equations are supposed to sharpen thinking. But, as often as not, they tend to make

thinking noncausal and fuzzy. They become the object of scientific manipulation instead of auxiliary tests of crucial inferences.<sup>42</sup>

Many—perhaps most—of the great issues of facing psychology are qualitative, not quantitative. Equations and measurements can be useful when they are related to experience; but experience comes first. Attempts to capture the richness of mental phenomena in quantifiable terms often have the effect of leaving them experientially barren.

This is not to say that objectification and quantification of mental phenomenon is impossible. Nearly two centuries of psychological research has shown that this is not the case. Given the proper techniques, the content of intra-subjective experience can be subjected to empirical analyses that provide descriptions and conclusions capable of attaining intersubjective consensus. But essential phenomenological properties often are lost in the process.

A classic example is Ebbinghaus's<sup>91</sup> attempt to bestow scientific respectability on the concept of memory by reducing it to a level at which it could be submitted to objectification and quantification (e.g., the number of nonsense syllables retained after passage of various temporal intervals). In so doing, the experience of remembering was so impoverished that it no longer bore strong resemblance to events as experienced.<sup>14</sup> The reduction of memory to a set of numbers (something we still do—e.g., number of words recalled, duration of retention, confidence judgment ratings, etc.) reduced the experience to the point where it became a shadow of the phenomenon under scrutiny.

In summary, if we want a science of memory that does not, in virtue of our current methodological limitations, preclude us from appreciating the very thing that defines memory—i.e., its experience—we need to develop more and better methods for tapping into experiential constructs without stripping them of their phenomenological reality. By placing 'off limits' the core aspect of that which we seek to understand (e.g., the experience of memory), we winnow down our subject to satisfy the Procrustean needs of methodological tractability.

'Method' is not a question we address to nature; it is the manner in which our questions are posed. If our current methods are not up to the task, then they, not the constructs toward which they are directed, are in need of emendation. Until we can more consistently and carefully direct our empiricism toward capturing phenomenology, psychological science runs the risk of defining out of existence the very thing(s) that make a memory a memory (and, more generally, a human a human).

### Memory Is Not Unconscious

A direct implication of Section *Implications: Consciousness, Memory and the Science of Psychology* is that the notion of unconscious or implicit memory is an oxymoron. Memory, defined as the experiential outcome of a set of processes (many of which occur outside awareness), cannot be realized unless the mental state so defined is phenomenologically present. This contrasts with the ever-popular view (particularly in cognitive investigations and clinical applications) that the notion of unconscious memory is not only justifiable but it also has important implications for current behavior. While learned content may operate on, and participate in, various psychological states and behavioral expressions, memory, *per se*, does not exist outside awareness.

This stance has obvious implications for the idea that memory, like most knowledge, attitudes and beliefs, can persist in dispositional form. We would be reluctant to conclude that a person who is not currently considering his or her belief about X or knowledge of Y, has no ‘X beliefs’ or ‘Y knowledge’ at moments during which his or her awareness is directed elsewhere. To avoid the problem of vanishing and reappearing mental properties, we appeal to the notion of ‘a disposition to X or Y’. But memory, being the manner in which content is given to awareness during an act of retrieval, admits to no dispositional instantiation. Some of the mental constituents that result in memory (e.g., stored, but presently inactivated, content) may be dispositional, but the memory itself is an occurrent experiential state. Accordingly we cannot talk about memory as a disposition in the way we do for other mental states—e.g., knowledge, attitudes, beliefs, and so on.

### THE BIG PICTURE: HOW THE MIND WORKS

But, do we actually have warrant to talk about the dispositional status of beliefs, attitudes, and the like? The ideas presented in this paper suggest otherwise. Adopting the Lockean position that the mind is a tabula rasa, it follows that the brain (particularly cortical structures), by contingent necessity, is, in part, a system for learning (clearly not all neural structures serve this purpose—e.g., those that mediate regulatory and genetically preprogrammed cognitive functions). The mental states we experience result from the manner in which this acquired content is conjoined at retrieval with various motives and procedures to produce conscious experience.

In this paper, I have focused on one particular mental experience—that of memory. But the principles I educe apply broadly. Learning is assumed to be one of the primary tasks of the brain. The experienced consequences of that learning are a function of acquired content (and procedures) conjoined with consciousness during the act of retrieval. On this view, there are no dispositional or unconscious thoughts, memories, beliefs, and so forth prior to consciousness taking content as its intentional object.<sup>71,330</sup> The mind in general and mental states in particular, *is* an experience.<sup>37</sup> Prior to its experiential realization, stored content and the procedures that work on it are state-independent; they may be recruited in the service of belief, memory, thought, imagery, etc., but they do not exist as such until consciously intended.

Psychology is awash in specific theories designed to account for specific mental and behavioral outcomes. Perhaps, in keeping with the modularity of mind popularized by evolutionary psychology,<sup>331</sup> this is the best we can expect. But, I do not think so. Even strong adherents of the modularity thesis see a need to posit some form of ‘central agency’<sup>332,333</sup> to bring order to the computational chaos that otherwise would result from a host of modularized procedures going their separate ways.

While I do not ascribe to the notion of a central executive, I too see a need to rein in the potential disunity that appears endemic to many versions of ‘modules of mind’.<sup>334</sup> On the view described herein, the mind ‘works’ by acting on state-agnostic content (which changes as a function of the time since its initial registration<sup>14,16,216</sup>) which, depending on the (1) nature of conscious (e.g., auto-noetic, noetic) involvement and (2) demands (both internal and external) placed on the organism, takes on the phenomenological character of belief, knowledge, attitude, memory, imagery, etc., when it is experientially actualized during retrieval. Prior to this experiential ‘end state’, the vast and ever-morphing body of neurally-instantiated content is neither dispositionally nor unconsciously allied with any particular mental state.

While this view of the mind has some of the advantages (e.g., simplicity of function despite—perhaps massive—modularity) of theories relying on the operation of a unifying executive, it avoids some of the issues (e.g., homuncular regress) that plague notions that trade on the decisions of a cerebral overlord. Clearly, there remains a great deal to be fleshed out before my proposal gains serious traction. And it is equally clear that this is not the place to do so. But I hope the basic points described can serve as a general outline for how such a theory of the mind might work.

## FINAL THOUGHTS

Our waking minds are filled with thoughts, beliefs, memories, images, desires, feelings, and other mental states. The thoughts we think, the words we use, and the images we form are typically experienced without knowing or caring how, where, or when they were acquired. They simply are things we know and do; how they came to be known or done is of no immediate concern (unless there is need for evidentiary support).

Psychologists are interested in understanding that part of the natural world that makes room for psychological reality—i.e., the states that populate everyday experience. Even for those unfamiliar with the notion of the *tabula rasa*, it is clear that most of what we know we came to know, most of what we think we came to think, and most of what we imagine we came to imagine. It is in this sense that behavioral scientists see the footprint of memory in virtually every act of cognition and behavior. But, does such profligate application of the term do us any good? When everything becomes a member of the club, what does it mean to be a club member?

The challenge for psychological science is to understand the human part of nature. We do this by asking questions and waiting for nature to ‘push back’. But it is not enough to pose questions to nature; we need to ask the ‘right’ questions.<sup>6,7</sup> One way of finding the ‘right’ questions is to draw on the resources provided by a clear theoretical specification of the constructs being scrutinized. By formulating the ‘right’ questions, we increase the odds that nature’s responses will place us on a path to better understanding.

For the most part, nature does not care which path we take. Nature does not remember our failures or our success: She simply responds to our queries. But—as implied by the phrase ‘for the most part’—there are exceptions. A small part of nature—the human part—does care and does, at least on occasion, remember. It is this self-inquiring part of nature that captures the theoretical imagination and empirical attention of the psychological sciences. Well-considered conceptual analyses and clearly specified theory help us find fertile paths of inquiry—they guide us in formulating questions of the ‘right sort’.

It is my contention that, in regard to ‘memory’, we have strayed from this path. We ask many questions, but these questions too often are based on unstated (and not fully examined) scientific precommitments.<sup>30</sup> Until we drag these precommitments into the cleansing light of rational scrutiny, and make changes as indicated, nature will continue to answer our questions, but the ‘right’ answers may be long in coming.

In this paper, I have proposed a set of guidelines that I hope will help us more closely approximate the ‘right’ questions to pose to nature. And, as Wittgenstein<sup>335</sup> notes, we do not always need to look for something beneath the surface, hidden from view—sometimes that something ‘already lies open to view and ... becomes surveyable by a rearrangement’ (p. 92). This, I contend, is the case with my definition of memory *as* experience (e.g., Section *Memory: A Present Mental State Felt as Past*).

But, as with all definitions, there is no guarantee that my partitioning of the conceptual landscape ultimately will be found viable. Indeed, in light of the variability characterizing previous taxonomies of mind,<sup>47</sup> history is not on my side. But as we await nature’s verdict, it is important to note that, unlike many contemporary approaches to memory, the proposal on display has the virtue of historical, conceptual, and phenomenological backing. Although these factors do not guarantee success, they increase our chances of finding more promising paths than does our current reliance on questions whose formative backing too often draws on unexamined scientific precommitments. While one can take issue with whether episodic recollection best captures what we mean by ‘memory’, the need for more conceptually nuanced consideration of the criteria we use to justify the application of the term ‘memory’ takes precedence over any specific answer to the question of ‘what mental state(s) qualify as acts of memory?’

## NOTES

<sup>a</sup> The idea of ‘causal history’ receives its most analytic treatment in Martin and Deutscher.<sup>5</sup> In their view, three statements are separately necessary and jointly sufficient to justify the inference that a person’s current mental state is an act of memory: ‘1. Within certain limits of accuracy, he represents that past thing. 2. If the thing was ‘public’, then he observed what he now represents. If the thing was ‘private’, then it was his. 3. His past experience of the thing was operative in producing a state of successive states in him finally operative in producing his representation’ (p. 166).

<sup>b</sup> The contention that my two theses are functionally independent does *not* mean that one has nothing to do with the other. Functional independence implies that one thesis can be considered independently of the other, though they support and supplement each other. In short, they are mutually reinforcing, not codependent.

<sup>c</sup> The storage assumption, being the least visible of the three stages of memory (i.e., encoding, storage, and retrieval), is also the most controversial. Questions pertaining to this stage are many—e.g.,

where is information stored, in what form is it stored, how stable or malleable is stored information? Although radiological analysis provides some clues, there remains considerable controversy pertaining to issues of information storage.<sup>10–12</sup> In fact, in Malcolm's<sup>13</sup> estimation, the notion of storage is required primarily because “‘action at a distance’ is a repugnant idea’ (p. 178).

<sup>d</sup> While I am aware that the above examples can be seen as fitting the semantic subtype within declarative memory, the classification of semantic knowledge as a type of memory is based more on stipulation than conceptual justification. Knowledge is one of a multitude of mental occurrences that trace to the past. What criteria separate forms of knowing from forms of believing, thinking, assuming, wondering, imagining, and so on as acts of memory? To the best of my knowledge, there are no conceptual or empirical grounds for ascribing ‘memory’ to acts of knowing, but not to (the many) other mental states that have roots in the past.

<sup>e</sup> A systematic analysis of the act of remembering has a relatively small presence in Eastern wisdom traditions.<sup>53</sup> And the treatments that exist largely are tangential—the byproduct of conceptual and practical concerns with other topics such as the question of past lives.<sup>54</sup> This paucity hardly is surprising given the Eastern tradition of regarding the self as illusory and reality as impermanent. That being said, a recent analysis of Buddhist texts reveals that certain writings (e.g., Vasubandhu's theory of mind) show striking similarities to Western thought concerning the role of the subjective feelings of pastness associated with mental states taken to be acts of memory.<sup>55</sup>

<sup>f</sup> Although the initial presentation of a taxonomy of memory typically is attributed to de Biran,<sup>76</sup> Cassel et al.<sup>2</sup> make a strong case that 14 centuries earlier, Augustine of Hippo organized the first taxonomy—e.g., intellectual memory, sensory memory, memory of feelings, and even memory of memories.

<sup>g</sup> One of the first demonstrations that amnesic patients can show a dissociation between recently learned task performance and recollection of the act of learning is a classic study by Warrington and Weiskrantz.<sup>98</sup>

<sup>h</sup> Atkinson & Shiffrin's<sup>108</sup> partition of memory into a temporally ordered sequence of stages (sensory, short-, and long-term) predates Tulving's work by 5 years. However, the categories they discuss—which derive in large part from James<sup>75</sup> distinction between primary and secondary memory—are more a map of the phases through which a hypothetical memory trace is assumed to pass than a partition of memory into a set of functionally independent systems.

<sup>i</sup> A perceptual component was added later.<sup>111</sup>

<sup>j</sup> To head off potential confusion with my use of the expression ‘now and the next’, I need to make clear that despite the use of the word ‘now’ in my phrase the ‘now and the next’ the ‘now’ is decidedly future-oriented. Analysis of the formal properties of ‘present of objective time’ reveals it to be instantaneous,<sup>129–131</sup> becoming the next ‘present’ essentially as soon as it makes an appearance.<sup>71,75,132</sup>

It thus is a mistake to speak of the present (mathematically or experientially) in any way that implies measurable duration.<sup>71,131–133</sup> The present is a process consisting in an endless series of ‘nows’ transitioning instantaneously to the ‘next’ (as well as retreating into the past<sup>71,75</sup>). What is subjectively present necessarily is oriented toward, and phenomenologically indistinguishable from (i.e., instantaneous moments lack experiential resolution), what will be present—i.e., the future. In short, the moment of the present is, formally speaking, instantaneous, an abstract point in a temporal continuum moving *toward* the ‘next’ and *away from* the past.

<sup>k</sup> Many contemporary theories of future-oriented mental time travel draw heavily on the conceptual resources provided by consideration of episodic memory (and thus seem to suggest that future-orientated temporal subjectivity applies to this system of memory as well; for recent reviews, see<sup>92,174–177</sup>). However, the most distinctive temporal feature of episodic memory remains its recollective function—which provides a direct, unmediated sense that a ‘memory’ of the past is indeed from the past.<sup>92,110,125,128,178,179</sup>

<sup>l</sup> Although I take issue with Szpunar & Tulving's assertion that *only* auto-noetic awareness bears a personally meaningful relation to time (a relation to the present *also* is a personally meaningful temporal relation<sup>71,75,131,133,181</sup>), I agree with the gist of their thesis—i.e., that phenomena attributable to the operation of semantic memory, though dependent on the past, are not given to awareness as oriented toward the past.

<sup>m</sup> I have discussed the adaptive significance of the temporal orientation accompanying procedural and semantic knowledge (i.e., toward the ‘now and next’) in Section *Procedural Skills and Semantic Knowledge are about the Present and Future, not the Past* (see also Ref<sup>92</sup>). Episodic recollection, however, poses a problem: What is gained from temporality directed toward one's past? And if benefits can be identified, a further question is: ‘Why do such benefits require direct, pre-reflective acquaintance? Couldn't the same advantages be had from retrieval of content referencing the past but unaccompanied by a feeling of re-living the conditions of its acquisition?’

One answer is that recollection may be nature's solution to the problem of how we can feel confident that at least some of the information presented to awareness is a 'truthful' rendition of reality, rather than a less-trustworthy result of imagination, creative analysis, motivated reasoning, selective judgment, idiosyncratic belief, and so forth. Recollection is alone among modalities of 'knowing' (e.g., thinking, believing, suspecting, imagining) in providing a feeling of confidence that the content present in awareness accurately portrays events that transpired in one's past (for discussion, see Klein<sup>141</sup>; similar views can be found in Flage,<sup>64</sup> and Michaelin, unpublished data, 2014). When asked 'how do you know that "X is Y"', a conventionally appropriate answer is 'It must be the case because that is what I remember happened'.<sup>78,82</sup> Unlike, for example, semantic offerings, we do not have to infer, search for indices, use heuristics, consider properties, or otherwise establish that the content of recollection accurately represent lessons of life. Consistent with this hypothesis, a review of the evidence from the remember/know paradigm<sup>182</sup> shows that participants' feelings of confidence in the accuracy of retrieved content is considerably higher when retrieval is accompanied by 'I remember' (i.e., auto-noetic) than 'I know' (i.e., noetic) responses.

Whether our certitude in the authenticity of auto-noetically-given knowledge is warranted by the 'facts' is not at issue. Clearly, there is abundant evidence that we can be wrong about what we 'know to be the case' even via an act of recollection.<sup>19,183,184</sup> But this is a different concern (for a discussion of the relation between truth and memory, see Refs<sup>185,186</sup>).

<sup>n</sup> Possible reasons for differences observed in the details of content associated with auto-noetic and noetic awareness are discussed in.<sup>125</sup>

<sup>o</sup> The cases I have discussed involve a form of memory impairment in which (among other things) auto-noetic abilities have been compromised. But amnesia can result from dysfunction at any (or a combination) of the stages (i.e., encoding, storage, retrieval) that eventuate in the experience of recollection; and each particular pattern of pathology will have certain unique characteristics associated with its presentation.

For example, when storage is afflicted, one can expect retrieval of less detailed content (this follows from Nadel and Moscovitch Multiple Trace Theory,<sup>16,17</sup> see also Ref<sup>216</sup>).

<sup>p</sup> Although the present model has historical, conceptual, and empirical support, an obvious limitation is that identification of the factors responsible for whether retrieved content will be subject to auto-noetic embellishment is, at present, not entirely clear (one possibility is presented in Klein<sup>125</sup>). But this is not necessarily a cause for dismay: Such shortcomings point to the need for additional experimentation designed to clarify how the processing differences apparent at retrieval are put into place.<sup>14</sup>

<sup>q</sup> A common assumption among neuroscientists is that episodic recollection entails the retrieval of previously experienced events.<sup>275,276</sup> However, while events *may* be the object of recollection, there is nothing that prevents nonevents from being acted on auto-noetically. For example, a 'remember' judgment may accompany memory of a specific word on a list. To construe this recollection as the reexperience of an 'event' plays havoc with meaning of the term 'event'.

<sup>r</sup> The avian brain has been shown to contain structures that, while not homologous with the mammalian prefrontal cortex, may make possible some prefrontal functions.<sup>299</sup>

<sup>s</sup> Along these lines, Hayes, Heit, and Rotello<sup>304</sup> recently suggested that memory, categorization (and reasoning) may be different ways of operationalizing a common set of underlying processes. They further propose that distinctions drawn between these mental constructs are likely the result of pre-theoretical assumptions, social convention, and methodological convenience.

While I endorse these suggestions, my reasons for doing so differ somewhat from those expressed by the authors. They worry that the boundaries we establish between these constructs lack empirical confirmation. I agree, but think that the primary issue is not empirical, but the failure of psychological science to fully embrace and thoroughly analyze what is entailed by the constructs in which we trade—e.g., what it means, both logically *and* phenomenologically, to remember, categorize, and reason.

## ACKNOWLEDGMENTS

I wish to thank Daniele Moyal-Sharrock, Sven Bernecker, Ron Fisher, two anonymous reviewers, and Lynn Nadel for their excellent feedback on an earlier version of this paper. The finished product is far better as a result of their insights. Please address all correspondence concerning this paper to Stan Klein, Department of Psychological and Brain Sciences, University of California, Santa Barbara, CA. 93106. E-mail: klein@psych.ucsb.edu

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