



# Opening the doors of memory: is declarative memory a natural kind?

Kourken Michaelian\*

Klein's target article argues that auto-noetic consciousness is a necessary condition for memory; this unusually narrow view of the scope of memory implies that only episodic memory is, strictly speaking, memory. The narrow view is opposed to the standard broad view, on which causal connection with past experience is sufficient for memory; on the broad view, both declarative (i.e., episodic and semantic) and procedural memory count as genuine forms of memory. Klein mounts a convincing attack on the broad view, arguing that it opens the 'doors of memory' too far, but this commentary contends that the narrow view does not open them far enough. It may be preferable to adopt an intermediate view of the scope of memory, on which causal connection is sufficient for memory only when it involves encoding, storage, and retrieval of content. More demanding than the simple causal condition but less demanding than the auto-noesis condition, the encoding-storage-retrieval condition implies that both episodic and semantic memory count as genuine forms of memory but that procedural memory does not. © 2015 Wiley Periodicals, Inc.

How to cite this article:

*WIREs Cogn Sci* 2015, 6:475–482. doi: 10.1002/wcs.1364

## THE SCOPE OF MEMORY

While Klein's discussion of the scope of memory is ultimately meant to feed back into empirical memory research, his central question belongs squarely to what philosophers refer to as the metaphysics of memory (e.g., see ref. 1): when does a given mental occurrence count as an instance of remembering? In attempting to answer this question, Klein formulates a set of conditions that are meant to be individually necessary and jointly sufficient for a given occurrence's being an instance of remembering. The matter of necessary and sufficient conditions for memory is one about which philosophers have had much to say, and Klein's discussion draws extensively on the history of philosophy of memory, identifying a common thread in ancient, modern, and contemporary philosophical treatments, namely, an insistence on the importance of what Tulving

has influentially dubbed *auto-noetic consciousness*.<sup>2</sup> Memory, on the view that Klein finds in these historical treatments, is characterized by its past-oriented subjective temporality: 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' (p. 6); it 'is not the content of experience, but the experience of that content' (p. 20).

If this view is right, then, of the systems which psychologists standardly group under the heading of memory—including episodic, semantic, and procedural systems—only episodic memory is, strictly speaking, memory, as it alone enables us to subjectively relive the past. Like Tulving,<sup>3</sup> among others, Klein maintains that auto-noesis is a defining characteristic of episodic memory itself: memory for past episodes that is not accompanied by auto-noesis is not, strictly speaking, episodic memory. In combination with the more general claim that only episodic memory is memory, this characterization of episodic memory implies that subjects with impaired auto-noesis who nonetheless retrieve information about specific past events are not really remembering at all. It likewise implies that, if animal 'episodic-like memory' does not involve

\*Correspondence to: kourken.michaelian@otago.ac.nz

Department of Philosophy, University of Otago, Dunedin, New Zealand

Conflict of interest: The author has declared no conflicts of interest for this article.

autonoetic consciousness, animals are not just incapable of episodically remembering—they are incapable of remembering. While the importance of autonoesis is widely recognized in current research on mental time travel, Klein's view of the scope of memory is thus dramatically narrower than the standard view.

While Klein's attack on the standard broad view is convincing, this commentary will argue that an intermediate view—on which episodic and semantic memory are genuine forms of memory but procedural memory is not—is a viable alternative to his narrow view. This brief commentary cannot provide a decisive case for the view that memory should be equated with declarative memory, and, of course, researchers in psychology, neuroscience, and other fields concerned with memory are free to adopt whatever definition of 'memory' they find most useful. The issue here is about which definition is likely to be useful in the long run; the commentary argues that defining memory as declarative memory is likely to prove more useful than alternative definitions. Klein assumes (along with others in this area<sup>4,5</sup>) that we want our scientific vocabulary to 'carve nature at its joints': ideally, that is, we want to formulate a set of necessary and sufficient conditions that delineate the boundaries of a *natural kind*, a kind found in nature, as opposed to a merely nominal kind, a kind that we project onto nature but that does not accurately reflect boundaries between natural phenomena. Natural kinds, unlike merely nominal kinds, are capable of supporting reliable inductive inference:<sup>6</sup> by learning something about some instances of a kind, we can learn something about others. If the narrow view is right, then any attempt to infer properties of semantic memory on the basis of findings about episodic memory, or *vice versa*, is eventually bound to go astray. If the intermediate view is right, on the other hand, episodic and semantic memory can legitimately be grouped together as members of a common superordinate kind, in line with the standard practice of treating declarative memory as a coherent whole.

### THREE VIEWS

What, exactly, is the broad view? The standard view, as Klein puts it, is that memory 'consists of an initial act of registration (learning) which, via the continuity assumed to be necessary and provided by the mechanism of storage, eventuates in an act of retrieval' (p. 3). This definition is meant to apply to procedural as well as declarative memory, but the language of encoding, storage, and retrieval is ill-suited to describe the former. Though researchers sometimes write as if procedural memory involves processes of encoding, storage, and

retrieval of rule-based information, trying to bring these concepts into play in the context of purely behavioral skills is, as Tulving put it, 'awkward at best and silly at worst.'<sup>7</sup> Because a system need not represent the rules governing a learned behavior in order for its behavior to be governed by those rules, references to storage of information in descriptions of procedural memory are in general otiose.<sup>4</sup>

Nevertheless, the claim that procedural memory is a genuine form of memory clearly makes some intuitive sense (whether or not we ultimately end up rejecting it), so something less demanding than a definition in terms of encoding, storage, and retrieval must be at work here. Klein links the standard view to the causal theory of memory that has been influential in philosophy,<sup>8</sup> and this link suggests a suitable interpretation of the standard view. The core idea of the causal theory is that remembering is a matter of standing in the right sort of causal relation to past events. What it is for a causal relation to be of the 'right sort' is a technical question that we need not go into here (e.g., ref. 1), but such a causal relation in principle need not involve encoding, storage, or retrieval of content. There are various ways in which a subject's performance, at the time of remembering, might causally depend on his past experience. In the case of declarative remembering, the causal connection will normally go via encoding, storage, and retrieval of content. In the case of procedural remembering, the causal connection may not depend on encoding, storage, and retrieval of content but instead on direct modification of the pathways involved in performing the relevant action. Thus a causal condition, as opposed to an encoding-storage-retrieval condition, allows us to classify procedural memory as memory, and hence it is plausible that what is ultimately doing the work in the standard view is a causal condition.

While Klein does not distinguish between these two conditions, the distinction is crucial in assessing the success of the argument for his narrow view of the scope of memory. Running the two conditions together, Klein contrasts the narrow view with the standard view, arguing that 'a current mental state is an act of memory ... if and only if *both* conditions (connection to the past [where this refers both to the causal condition and to the encoding-storage-retrieval condition] and past-oriented subjective temporality [i.e., the autonoesis condition]) are in play' (p. 6). Bearing the distinction between the conditions in mind, we can see that in fact we face a choice among three progressively narrower views of the scope of memory:

- A broad view: a given mental occurrence is an instance of remembering if and only if it satisfies the causal condition.

- An intermediate view: a given mental occurrence is an instance of remembering if and only if it satisfies (1) the causal condition and (2) the encoding-storage-retrieval condition.<sup>a</sup>
- A narrow view: a given mental occurrence is an instance of remembering if and only if it satisfies (1) the causal condition, (2) the encoding-storage-retrieval condition, and (3) the autooiesis condition.

The broad view is the standard view, while the narrow view is Klein's. As noted above, the broad view counts episodic, semantic, and procedural memory as genuine forms of memory; the narrow view counts only episodic memory as genuine memory. As both episodic and semantic memory involve encoding, storage, and retrieval of information but procedural memory does not, the intermediate view counts episodic and semantic memory but not procedural memory as genuine forms of memory. (See Figure 1.)

### THE NARROW VIEW VERSUS THE BROAD VIEW

Given the complexity of Klein's three-stage argument against the broad view and for the narrow view, it is

necessary to briefly review its structure before attempting to determine its success.

The first, historical stage of the argument appeals to philosophical tradition to argue that autooiesis is a necessary condition for remembering. Starting with Aristotle's remark that 'memory is of the past,'<sup>9</sup> philosophers have tended to view remembering as being distinguished from other mental acts by its connection to past experience. The idea here is not merely that memory is of the past in the sense of being *from* the past but rather that memory is of the past in the sense of being *about* the past. Moreover, as Klein interprets this literature, the 'past aboutness' of memory is not supposed to be merely a matter of *content* that refers to the past but rather a matter of the *phenomenology* of remembering: the past-aboutness of memory is 'a directly-given feeling of reacquaintance' with past events (p. 9), i.e., autooiesis.<sup>b</sup>

The second, conceptual stage has several components. First, Klein argues that, unlike episodic memory, semantic and procedural memory 'do not have the "right sort" of temporal orientation' to count as memory (p. 15). Episodic memory is subjectively oriented toward the past, in the sense that it provides the subject with a sense of re-experiencing past events. In contrast, the subjective temporal orientation of semantic and procedural memory is toward the 'now and next,' in

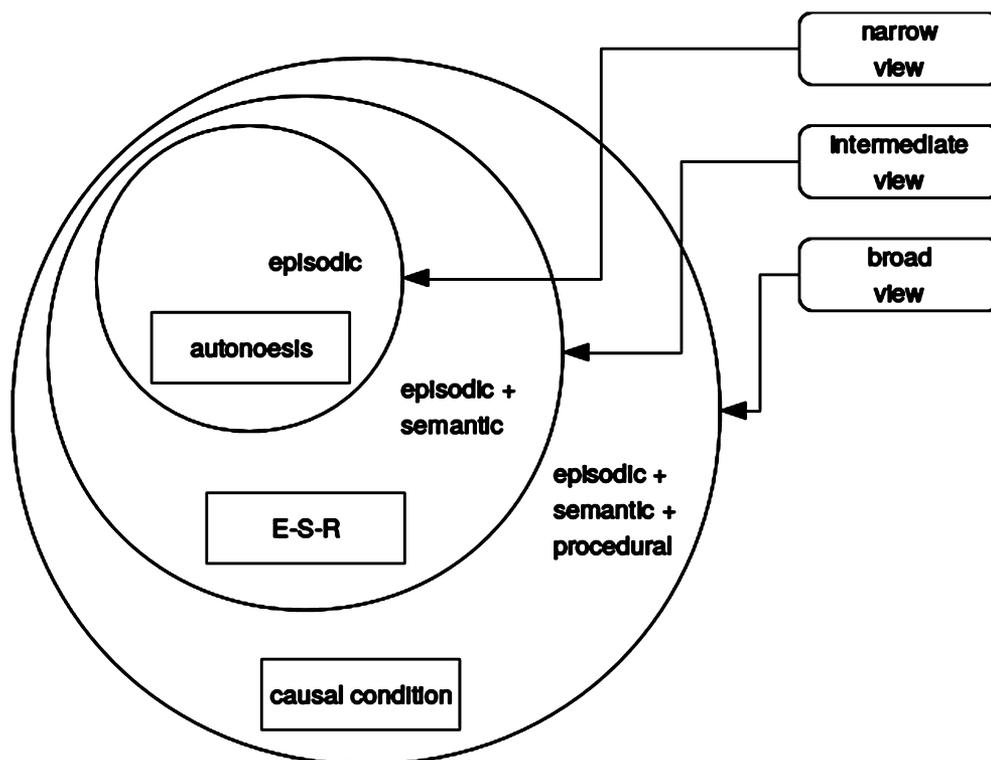


FIGURE 1 | Three views on the scope of memory.

the sense that, while they originate in experience of past events, they function to enable the subject to act successfully in the present and immediate future.

Second, he argues that views which see semantic and procedural memory as genuine forms of memory commit the ‘part/whole error.’ It is natural to view semantic and procedural memory as genuine forms of memory because they satisfy some of the conditions necessary for memory (the causal condition or the encoding-storage-retrieval condition). But such views are mistaken because they ignore the fact that semantic and procedural memory fail to satisfy another condition necessary for memory, namely, the autooiesis condition.

Third, Klein argues that the systems that are standardly classified as memory ‘exhibit a degree of computational and phenomenological diversity’ which suggests that the broad view fails to track ‘meaningful distinctions in nature’ (p. 15). As far as procedural memory goes, he argues that the various forms of learning grouped under this heading obey radically different rules and manifest in radically different ways. As far as semantic memory goes, he argues that ‘[t]he variety of psychological entities that fall under the heading “semantic memory” is extensive (e.g., propositions, facts, abstractions, schemata, images, rules, language, etc.)’ and that semantic memory lacks phenomenological unity (p. 15). In general, he argues that the broad view ‘has the unfortunate consequence of opening the “doors of memory” to most of the mental states and cognitive processes one can envision’ (p. 15): since most cognitive states and processes depend in some way on past experience, treating the causal condition as sufficient for memory implies that we should count all sorts of cognitive states and processes as memory, rendering the term effectively meaningless.

The final, empirical stage of the argument reviews a range of clinical cases of impaired autooiesis to provide support for drawing the episodic/semantic distinction in phenomenological rather than content-based terms. A first key point here is that semantic memory can provide information about the ‘what, where, and when’ of past events, information which may in principle originate in experience of those events; the episodic/semantic distinction therefore cannot be marked by the kind of content provided by the system but must rather be marked by the form of awareness by which that content is accompanied. A second key point is that autooietic awareness is not intrinsic to stored content (the intrinsic view) but rather is optionally conjoined with it at the time of retrieval (the relational view). Patient R.B., who suffered temporarily impaired autooietic consciousness while retaining an intact ability to retrieve detailed information about past events,<sup>11</sup>

provides the central illustration of this point. The upshot is that stored content is neither episodic nor semantic as such—content may meaningfully be referred to as episodic only if and when it becomes the object of autooietic awareness at retrieval.

## THE CASE FOR THE INTERMEDIATE VIEW

If Klein’s argument is successful, it establishes the narrow view of the scope of memory and shows that episodic memory alone satisfies the conditions necessary for memory. A careful examination of the historical, conceptual, and empirical considerations invoked by the argument, however, shows that, while the argument tells strongly against the broad view, the intermediate view remains a viable alternative to the narrow view.

### Historical Considerations

How strong is the positive case for including the autooiesis condition in our view of the nature of memory? The philosophical arguments that Klein cites in favor of the necessity of autooiesis essentially appeal to our pretheoretic intuitions about whether a given state is a state of remembering or not. Such intuitions may provide a legitimate starting point for inquiry, but they should not provide the end point, for intuitions at best which reveal the contours of our folk concepts, and such concepts often fail to track the boundaries of natural kinds.<sup>12</sup> To cite a well-worn example, jade intuitively appears to be a natural kind, but in fact it turns out to consist of two distinct minerals and hence fails to qualify as a natural kind.<sup>13</sup> Moreover, there is reason to think that the folk concept of memory, in particular, may not even be coherent, in which case it is bound not to correspond to a natural kind. Philosophers have indeed often argued that remembering requires a subjective orientation to the past, but there are many exceptions (e.g., Bergson; see ref. 14). The history of the highly varied metaphors that have been used to describe memory likewise calls the coherence of the folk concept into question.<sup>15</sup>

What is needed, then, rather than a priori arguments for the necessity of autooiesis, is an empirically grounded argument; but the prospects for developing such an argument are slim. On one influential account,<sup>16</sup> natural kinds are homeostatic clusters of properties—clusters of properties such that the presence of some of them tends (via underlying mechanisms) to reinforce or bring about the presence of others.<sup>c</sup> What would be required, given such a view of the nature of natural kinds, is evidence that the

presence of autooiesis covaries with the presence of other recognized features of memory. The obvious move to make here is to suggest that the presence of autooiesis covaries with the presence of information about the past. For several reasons, however, this will not work. First, as Klein himself emphasizes, the semantic system is equally capable of providing information about the what, when, and where of past events. Second, focusing on information about the past, as opposed to retrieved information more broadly, would be question begging in the current context, as the question at hand is precisely that of whether memory is broader than episodic memory. Finally, even if we restrict our attention to episodic-like forms of memory, the presence of autooiesis may not covary with the presence of information about the past; certain bird species, for example, are capable of forms of memory that are functionally similar to episodic memory but presumably do not involve autooiesis.<sup>17</sup>

## Empirical Considerations

In short, the historical argument provides little reason to take autooiesis to be a necessary condition for memory, viewed as a natural kind, and there is no obvious alternative argument for that claim in the offing. Do we have reason to take autooiesis, more narrowly, to be a necessary condition for *episodic* memory? There is no need to adopt a definite answer to this question here, but assessing the limitations of Klein's empirical argument for an affirmative answer will suggest that, whether or not autooiesis ultimately turns out to be necessary for episodic memory, there is good reason to deny that it is necessary for memory as such.

In support of the claim that autooiesis is necessary for episodic memory, Klein reviews a number of cases of impaired autooiesis, among which the case of patient R.B. is of particular interest. R.B. manifested impaired autooietic consciousness but was nevertheless able to retrieve detailed representations of events from his personal past. The narrow view of the scope of memory implies that, despite R.B.'s ability to *retrieve* this information, he was incapable of *remembering* the events in question. Against this background, it is noteworthy that the patient repeatedly described himself as remembering, even while being vividly aware of his impaired autooiesis. For example:

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. (p. 19; emphasis added)

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. (p. 19–20; emphasis added)

Klein might argue that the references to remembering in R.B.'s reports are not doing any semantic work—that the occurrences of 'remember,' 'recall,' and so on might be replaced with 'picture,' 'think of,' etc. without altering the meaning of the reports (see p. 14). But this would run roughshod over the patient's insistence that he was remembering: by repeatedly emphasizing that he was remembering, R.B. was presumably trying to mark a distinction between the mental acts that he was performing and other, similar mental acts that he might have been performing instead—he was 'remembering' scenes, not merely 'picturing' them, whether or not it felt like he was doing so.

The distinction marked by the patient is one worth marking in our theory. On one natural interpretation, R.B. is insisting that he is retrieving content originating in his own experience of the relevant events, despite the unusual phenomenology by which his acts of retrieval are accompanied. This is in line with the intermediate view of the scope of memory, on which satisfaction of the encoding-storage-retrieval condition is necessary for remembering but satisfaction of the autooiesis condition is not. The intermediate view thus has the advantage of marking a clear distinction between remembering an event and merely picturing it.

The narrow view, on the other hand, tends to obscure this distinction. Consider three hypothetical subjects. Subject 1 retrieves a representation of an experienced episode and enjoys autooietic awareness. Subject 2 is like R.B.: he retrieves a representation of an experienced episode but lacks autooietic awareness. Subject 3 simply pictures a hypothetical episode that he has not experienced. The intermediate view groups subjects 1 and 2 together: there is something atypical about subject 2, but both subjects 1 and 2 are remembering scenes; subject 3 is merely picturing a scene. The narrow view groups subjects 2 and 3 together: only subject 1 is remembering a scene; subjects 2 and 3 are both merely picturing scenes. The narrow view does permit us to acknowledge that subjects 1 and 2 have something in common, since they both satisfy the encoding-storage-retrieval condition, but it places the fundamental dividing line between subject 1, on the one hand, and subjects 2 and 3, on the other. Given that we are aiming to identify the boundaries of a natural kind, this would seem to be the wrong place to put it: retrieval without

autonoesis has more in common with retrieval with autonoesis than it does with mere picturing.

### Conceptual Considerations

Thus, while it is an open question at this point whether autonoesis is a necessary condition for *episodic* memory, we have good reason to reject the claim that it is a necessary condition for *memory*. What of the conceptual argument, which suggests that rejecting the latter claim forces us to group together a miscellaneous assortment of processes that do not have enough in common to plausibly constitute a natural kind? An assessment of the limitations of the conceptual argument suggests that, while there may be good reason for rejecting the broad view of memory, there are also good reasons for rejecting the narrow view, leaving the intermediate view as a strong contender.

The conceptual argument, again, has three components: first, Klein argues that semantic and procedural memory do not share the subjective temporal orientation of episodic memory; second, he argues that classifying semantic and procedural memory as forms of memory relies on the part/whole error; third, he argues that, since a wide variety of mental states depend on past experience, rejecting the necessity of autonoesis would commit us to classifying far too many mental states as memory. The second component provides no evidence for the narrow view beyond that provided by the historical argument: in order to reject broader views on the ground that they commit the part/whole error, we must assume that autonoesis is necessary for memory; but that is precisely what we are trying to determine here. We may therefore set this component of the argument aside.

The first component of the argument involves an error which, while subtle, quickly leads to an overestimation of the phenomenological differences between episodic memory and semantic and procedural memory. Klein claims that (1) episodic memory is unique among (putative) forms of memory in that it is subjectively oriented toward the past and (2) other (putative) forms of long-term memory are subjectively oriented toward the present and future (the 'now and next'), in that they are designed not to give subjects access to past events but rather to enable them to respond successfully to present and future events. The error here is one of equivocation. Consider the first part of the claim. In a phenomenological sense, episodic memory is indeed past-oriented, and uniquely so: semantic memory, even when it provides information about the what, when, and where of past events, does not involve a feeling of re-experiencing those events; and procedural memory does not provide information

about past events at all. But (in contrast to future-oriented mental time travel, which may involve a feeling of 'pre-experiencing' future events) semantic and procedural memories are clearly not future oriented in the relevant phenomenological sense. Now consider the second part of the claim. Semantic and procedural memories are future oriented in a functional sense: in evolutionary terms, they are designed to enable the agent to respond successfully to upcoming events. The same thing, however, can be said of any cognitive capacity that can be assumed to be an adaptation, including episodic memory, which presumably functions to enable us to respond successfully to upcoming events by giving us access to past events.<sup>d</sup> The upshot is that the difference in temporal orientation between episodic memory and semantic and procedural memory is considerably less pronounced than Klein takes it to be: semantic and procedural memories *lack* the phenomenology characteristic of episodic memory; but they do not have an outright *incompatible* phenomenology.

The third component of the argument likewise goes wrong; identifying the error here takes some work but strongly suggests that, if episodic memory is a natural kind, then declarative memory as a whole must be as well. Klein's worry is that rejecting the autonoesis condition has the consequence of opening 'the doors of memory' much too wide, simply because a wide variety of cognitive states and processes causally depend on past experience. But rejecting the autonoesis condition does not in fact require us to open the doors of memory to just any cognitive state or process that causally depends on past experience. What matters is not simply *that* a state or process is causally connected to past experience but rather *how* it is so connected. Again, this is a technical matter the details of which are irrelevant here, but, to a first approximation, what matters is whether the causal connection amounts to the preservation of something from past experience. As noted above, if we rely on the causal condition alone, we end up counting both semantic and procedural memory as memory, because semantic memory involves the preservation of information and procedural memory involves the preservation of behavioral patterns. If we rely additionally on the encoding-storage-retrieval condition, only semantic memory makes the cut. In neither case do we have to take on board other cognitive states and processes—imagining counterfactual scenes, for example, relies on information originating in past experience but is not about preserving or matching past experience. Thus rejecting the autonoesis condition need not result in throwing the doors of memory all the way open.

It might nevertheless result in throwing them too far open. Klein argues that the generally

recognized forms of memory—episodic, semantic, and procedural—exhibit a high degree of phenomenological, computational, and anatomical diversity, making it unlikely that they have enough in common to constitute a natural kind. There are two aspects to this point: on the one hand, diversity *between* different (putative) forms of memory; on the other hand, diversity *within* each (putative) form of memory. As far as diversity between systems goes, there is an important asymmetry between procedural and semantic memory. We dealt with the phenomenological level above. At the computational level, procedural memory does not involve the encoding, storage, or retrieval of content; it is, in an important sense, noncognitive.<sup>4</sup> Both semantic and episodic memories, in contrast, satisfy the encoding-storage-retrieval condition. At the anatomical level, procedural systems are distinct from episodic memory. Semantic and episodic memory, in contrast, exhibit considerable anatomical overlap, both depending on medial temporal lobe structures. As far as diversity within systems goes, there is likewise an important asymmetry between procedural and semantic memory. Klein points out that semantic memory is concerned with diverse kinds of content; I come back to this point below. This point aside, semantic memory seems to constitute a unified capacity. Procedural memory, however, refers to a highly varied collection of capacities which lack any clear unity. In short, the case for excluding procedural memory from memory, viewed as a natural kind, is considerably stronger than the case for excluding semantic memory.

If we elect to close the doors of memory far enough to keep procedural memory out, should we close them even further, to keep semantic memory out as well? Klein, of course, would have us do so, but he himself raises a consideration that suggests that we should not. As noted above, Klein appeals to the internal diversity of semantic memory at the level of computation or content, pointing out that semantic memory refers to a wide variety of kinds of content; the suggestion is that the representational diversity of semantic memory disqualifies it from constituting a natural kind. If the representational diversity of semantic memory disqualifies it as a natural kind, however, so must that of episodic memory. As Klein emphasizes, both episodic and semantic memories are capable of providing information about the what, when, and where of past events. More importantly, if we grant the relational view of auto-noesis, stored content is neither episodic nor semantic: ‘there is no logical or empirical basis for asserting that the content of these two systems should differ’ (p. 17). For example, content provided by semantic memory can be highly detailed and have complex narrative structure, as with memory

for the script for eating a meal in a restaurant, and content provided by episodic memory can be extremely simple and lack any significant structure, as with memory for a word encountered on a list (p. 23). If content as such is neither episodic nor semantic, and if the representational diversity of semantic memory implies that semantic memory is not a natural kind, then the very same representational diversity should imply that episodic memory is not a natural kind.

Klein does suggest that the unity of episodic memory is underwritten by its phenomenology, asserting that ‘episodic memory consists in a homogeneous collection of mental occurrences’ on the ground that all instances of episodic memory have the same past-oriented subjective temporality (p. 15). For two reasons, this move is not particularly convincing. First, we have seen that there is some reason to think that episodic remembering may occur without auto-noetic consciousness, in which case episodic memory would lack the asserted homogeneity. Second, if auto-noetic consciousness provides sufficient unity to counterbalance the representational diversity of episodic memory, it is difficult to see why noetic consciousness should not likewise provide sufficient unity to counterbalance the representational diversity of semantic memory. In sum, it seems safe to conclude that considerations of representational diversity rule out semantic memory as a natural kind only if they rule out episodic memory as a natural kind. But to rule episodic memory out on this ground would be to close the doors of memory entirely, leaving the category of genuine memory empty. Representational diversity should therefore be set aside: both episodic and semantic memory may qualify as natural kinds, despite their shared representational diversity.

## CONCLUSIONS

How wide, then, should we open the doors of memory? The historical argument does not provide strong positive reason to accept the necessity of the auto-noesis condition, and there is no obvious alternative argument available. Considering the empirical argument actually provides some positive reason to reject the necessity of the auto-noesis condition. Considering the conceptual argument, finally, confirms the insufficiency of the causal condition, taken on its own, and suggests that the encoding-storage-retrieval condition does an adequate job of discriminating between memory and non-memory without the help of the auto-noesis condition. We can thus conclude that, while the broad view of the nature of memory may be too broad, the narrow view is

likely to be too narrow; the intermediate view thus deserves a closer look.<sup>c</sup>

## NOTES

<sup>a</sup> Satisfaction of the encoding-storage-retrieval condition is naturally taken to imply satisfaction of the causal condition, but it may not do so, so they are mentioned separately here.

<sup>b</sup> The philosophical literature does contain other, non-phenomenological versions of the idea that memory has a distinctive sort of past aboutness. Many recent proposals, for example, locate the past aboutness of (episodic) memory at the level of content rather than phenomenology, arguing that the content of a memory representation includes an explicitly past-oriented component (see ref. 10); on such views, memory could refer to the past without necessarily feeling like it does.

<sup>c</sup> Alternative views of the nature of natural kinds are available, but these are mostly designed with the physical sciences in mind and are consequently too stringent to be applicable to most psychological kinds.

<sup>d</sup> Accepting this point does not presuppose any particular account of the way in which access to past events enables successful response to future events, but see ref. 18 for one plausible account.

<sup>e</sup> While this commentary has taken the causal condition for granted, there is a case to be made against it.<sup>19</sup> If we abandon the causal condition—this would admittedly be an unorthodox move—the intermediate view would amount to the claim that remembering only requires satisfaction of the encoding-storage-retrieval condition. As noted above, it is natural to take that condition to imply the causal condition, but the reconstructive character of the memory process suggests that it may not do so. Reconstruction in remembering is normally taken to imply that content may be modified between experience and remembering; as long as some content is preserved between experience and remembering, the causal condition will be satisfied. But if reconstruction in remembering implies that no part of the content of a retrieved memory needs derivation from the content of the subject's experience of the relevant event, the causal condition need not be satisfied. Exploring the implications of a version of the intermediate view which abandons the causal condition is a challenge for future work; see ref. 19 for initial steps in this direction.

## REFERENCES

- Bernecker S. *The Metaphysics of Memory*. Springer; 2008.
- Tulving E. Memory and consciousness. *Can Psychol* 1985, 26:1–12.
- Tulving E. Episodic memory: from mind to brain. *Annu Rev Psychol* 2002, 53:1–25.
- Michaelian K. Is memory a natural kind? *Mem Stud* 2011, 4:170–189.
- Cheng S, Werning M. What is episodic memory if it is a natural kind? *Synthese* 2014. doi:10.1007/s11229-014-0628-6.
- Quine W. Natural kinds. In: Rescher N, ed. *Essays in Honor of Carl G. Hempel*. Synthese Library, vol. 24. Springer; 1969, 5–23.
- Tulving E. Concepts of memory. In: Tulving E, Craik FIM, eds. *Oxford Handbook of Memory*. Oxford: Oxford University Press; 2000, 33–43.
- Martin CB, Deutscher M. Remembering. *Philos Rev* 1966, 75:161–196.
- Sorabji R. *Aristotle on Memory*. 2nd ed. Chicago: University of Chicago Press; 2006.
- Sutton J, Michaelian K. Memory. In: Zalta EN, ed. *Stanford Encyclopedia of Philosophy*. Available at: <http://plato.stanford.edu/>.
- Klein SB, Nichols S. Memory and the sense of personal identity. *Mind* 2012, 121:677–702.
- Kornblith H. *Knowledge and Its Place in Nature*. Oxford: Oxford University Press; 2003.
- LaPorte J. *Natural Kinds and Conceptual Change*. Cambridge: Cambridge University Press; 2004.
- Perri T. Bergson's philosophy of memory. *Philos Compass* 2014, 9:837–847.
- Draaisma D. *Metaphors of Memory: A History of Ideas about the Mind*. Cambridge: Cambridge University Press; 2000.
- Boyd R. Homeostasis, species, and higher taxa. In: Wilson RA, ed. *Species: New Interdisciplinary Essays*. Cambridge, MA: MIT Press; 1999.
- Cheke LG, Clayton NS. Mental time travel in animals. *WIREs Cogn Sci* 2010, 1:915–930.
- De Brigard F. Is memory for remembering? Recollection as a form of episodic hypothetical thinking. *Synthese* 2014, 191:155–185.
- Michaelian K. *Mental Time Travel: Episodic Memory and Our Knowledge of the Personal Past*. Cambridge, MA: MIT Press; In Press.