

## **Implicit Memory**

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Implicit memory is the use of memory without awareness of the activity of remembering. Distinguishing between memory's implicit and explicit forms matters to both memory scientists and philosophers. There are, however, differences in where researchers in each field draw the distinction—between ways of recollecting or types of memory storage, respectively. Each proposal faces a similar problem: our view of explicit memory has shifted over time, making it difficult to understand implicit memory by contrast. These shifts illuminate key features of explicit memory, while an account of implicit memory remains elusive. A fruitful way forward, I propose, is to stop treating implicit and explicit memory as opposites, considering instead a range of implicit features of memory.

### **1. Historical Background**

The 1980s have been described as a golden age for research into implicit memory in cognitive psychology and neuroscience (Schacter 1992). During this time, memory scientists demonstrated various ways that implicit and explicit recollection could be dissociated. Researchers would give participants a set of items to study—words, images, etc.—and then test their recollection of these items with both explicit and implicit measures. Explicit measures probed memory directly: participants would be asked to recall as many items from the previous set as they could, or to identify previously-seen items from within a larger set. Explicit memory performance exhibited a familiar pattern of retention. Initially, participants remembered many items, but performance declined quickly. After only a few days, many could no longer recall or recognize several items, and

after a week, failed on most. Implicit measures, in contrast, typically avoided any mention of memory. Instead, participants would be asked to engage in a seemingly-unrelated activity, such as producing words from presented stems (e.g., TAB to TABLE) or fragments (e.g., A\_A\_IN to ASSASSIN), or reading words aloud as quickly as possible. In these tasks, researchers compared participant performance (speed and accuracy) across previously-presented and novel items. Participants generally performed better on items from the previous set, indicating some form of retention. This retention effect was not as notable as the initial performance on explicit measures, but held constant over the weeklong period during which explicit performance declined (see Schacter 1987 for review). These differences in explicit and implicit performance compelled many researchers to view them as distinct memory processes (Roediger 1990).

Researchers also extended this framework to persons with amnesia—those who have significant explicit memory deficits as a result of neuropsychological trauma or injury. Persons with amnesia cannot remember their past experiences. When performing tasks of the sort described above, they perform poorly on the explicit measures, as expected. Their implicit task performance, however, remained intact (for a review, see Shimamura and Squire 1986). These results led many researchers to argue that explicit and implicit forms of memory are not only distinct processes, but are supported by distinct brain regions. In this way, work on implicit memory played a critical role in the development of the Multiple Memory Systems framework, the project of offering a taxonomy of memory, which occupied cognitive psychology and neuroscience for much of the late 1980s and 90s.

The Multiple Memory Systems framework divides memory into separate forms, each of which was presumed to involve a distinct neurocognitive system. There have been changes to the taxonomy

over the years (compare, for example: Schacter and Tulving 1994; Schacter, Wagner, and Buckner 2000; Squire 2004), but all versions begin from an initial sorting of memory into two sub-types: declarative and non-declarative. Declarative memory involves the explicit recall of facts and experiences—semantic and episodic memory, respectively. Non-declarative memory involves non-explicit forms of recollection, including the forms of priming and retention presented above, as well as procedural memory (habits and skills) and forms of conditioning. Accounts of memory systems differ over whether they take implicit memory to refer to all forms of non-declarative memory or only to the kind of information retention described in the above studies, excluding procedural memory and conditioning.

Implicit memory has not received much attention in philosophy, at least not under that description. There is, however, considerable interest in *knowledge-how*: “the kind of knowledge you have when it’s truly said of you that you know how to do something—say, ride a bicycle” (Fantl 2017). This form of knowledge is often thought to be importantly different from knowledge of facts, often referred to as *knowledge-that*, and so philosophers have offered various accounts of knowledge-how and its distinction from knowledge-that. *Anti-intellectualist* views consider knowledge-how to be a fully distinct form of knowing, one best characterized as an ability (Hawley 2003) or disposition (Ryle 1949). *Intellectualists*, on the other hand, recognize some differences between knowing how to ride a bicycle and knowing that the bicycle was invented in 1817, yet they argue that both forms of knowing involve knowledge of facts (Stanley and Williamson 2001).

Viewed from a wide angle, the discussion of implicit memory in psychology and of knowledge-how in philosophy appear to be tracking the same, or at least highly similar, cognitive phenomena.

Indeed, researchers in both fields have encouraged the association (e.g., Cohen and Squire 1980; Wallis 2008). There are, however, several dissimilarities that are important to keep in mind when making these comparisons. First, in these respective inquiries, psychologists and neuroscientists are concerned with *memory*; philosophers are concerned with *knowledge*. There is overlap between memory and knowledge—some knowledge is likely stored in memory—but on most accounts they're fully dissociable (i.e., we can have knowledge from sources other than memory; it is possible to remember *X* while lacking the justification or some such to count as knowing *X*). As philosophy of memory has grown into its own distinctive subfield in recent years, the concerns about memory have grown beyond its role in preserving knowledge (Bernecker and Michaelian 2017). Second, many researchers have recently noted the lack of straightforward inferences from empirical findings about implicit memory to the intellectualist/anti-intellectualist debate about knowledge-how (Drayson and Schwartz 2019; De Brigard 2019). Third, interest in implicit memory amongst cognitive psychologists and neuroscientists has waned in the decades since its golden age, as researchers have become more interested in declarative memory—especially episodic memory, its errors, and its connections to other cognitive faculties like imagination (Schacter 2019). Research into knowledge-how, in contrast, has been experiencing a resurgence in philosophy (Pavese and De Brigard 2019).

Finally, and most challenging for any attempt at rapprochement, memory scientists and philosophers working on these topics have come to focus on distinct phenomena. For scientists studying implicit memory, the focus is on the *activity* of implicit recollection. For philosophers, the concern is either with the *possession* of knowledge-how or the *storage* of memory in implicit and explicit forms. These

are distinct ways of conceiving of implicit memory. Given this divergence, I discuss each separately below.

## 2. Implicit Recollection

Over time, psychologists and neuroscientists have shifted how they think about implicit memory—from viewing it as a distinct memory system to viewing it as a form of recollection. Current definitions focus on retrieval, contrasting the implicit reactivation or use of previously learned information with explicit recollection. Cubelli and Della Sala offer the following as a consensus definition:

A memory is implicit when the learned information is retrieved and used without awareness of remembering it and with no reference to the learning phase (2020: 345).

Here “implicit” refers to *how* retrieval happens, not *what* is being retrieved. This allows for implicit recollection across memory’s various forms; on this view, there can be implicit recollection of episodic, semantic, and procedural memories. Episodic memory is memory for particular personal experiences. I might have an episodic memory of where I parked my car in a lot, which I could recall implicitly by simply walking toward my car, without any effortful attempt to recall where I parked. Semantic memory is memory for facts or general pieces of knowledge. Suppose I am working on a crossword puzzle, and fail to notice it is one I have completed before. Owing to its nascent familiarity, I complete it more quickly than average, having implicitly remembered its content. Procedural memories include habits and skills, like the ability to knit. When I sit down to knit a

scarf, for example, I remember how to do so implicitly by engaging in the required movements, with little attention to the steps or details. This is in contrast to times when knitting requires procedural memory to be recollected explicitly, as when encountering a difficult pattern, new type of yarn, etc.

Cubelli and Della Sala's definition involves two key elements: 1) lack of awareness of what's retrieved and used, and 2) the absence of reference to the previous experience or learning event. The examples of implicit retrieval offered above contains these features. However, they each do so in different ways, highlighting ambiguities in the definition.

Consider the first component of the definition: lack of awareness. What, exactly, is the awareness that is missing in cases of implicit remembering? It doesn't seem that I am fully unaware of what is being remembered in any of the sample cases. When finding my car, completing the crossword, and knitting the scarf, I make use of the remembered information to complete the activity. What these cases lack seems more like awareness *of remembering*. Indeed, Cubelli and Della Sala caution against treating implicit as synonymous with unconscious because "the memory content is the object of consciousness" (2020: 345), even if the person making use of that content does not recognize it as a memory or cannot articulate the content.

Characterizing the feature as a lack of awareness of remembering does seem to capture at least some of what is going on in each of these cases of implicit recollection. When a particular answer to the crossword springs to mind, for example, I am aware of the content, but not aware of it as a memory of encountering the clue before. To get clear on how implicit recollection works, we want to pin down this lack of awareness more precisely. A definition that appeals to the *absence of X* is most

useful when there is a clear sense of *X* in play. The *X* in question here is awareness of remembering, and that poses a problem: there is no clear sense available of what this awareness involves.

This question may not strike psychologists and neuroscientists as particularly pressing, given that the experimental protocols they use generally require providing participants with overt instructions and information about the tasks involved. Participants are presumably aware of their remembering because the task involves asking them to remember. When we shift, however, to thinking about implicit memory beyond experimental settings and how to characterize awareness of remembering more generally, the question becomes more urgent—and more difficult to answer.

The difficulty does not stem from a lack of attempts to characterize the feeling of remembering. Amongst philosophers and psychologists, there is a long tradition of theorizing about remembering's distinctive feature(s), which distinguish it from other psychological states. A variety of such features been proposed: familiarity (Locke 1690), a feeling of pastness (Russell 1912), vivacity (Hume 1739), spontaneity (Furlong 1951), intimacy (James 1890), etc. Each candidate feature has encountered considerable opposition, over the nature of the proposed feature (e.g., Reid's (1785) challenge to Hume's concept of vivacity) or the feature's ability to capture all and only instances of explicit remembering (e.g., Furlong's spontaneity doesn't easily capture cases of effortful retrieval). Even without a settled account of the form of awareness distinctive to remembering, some have argued that the experiential component is essential to remembering, such that there could be no such thing as implicit memory (Klein 2015; Moya-Sharroock 2009).

Many other contemporary philosophers have taken the opposite approach, avoiding the appeal to any awareness condition in their accounts of remembering. Instead, they require only that the retained content is represented at the time of remembering. As noted earlier, this alone will not distinguish explicit and implicit forms of recollection, both of which have the retained content as the focus of awareness/representation. When contemporary philosophers have proposed adding further features to distinguish remembering, they have avoided appeals to awareness, opting instead to use functional characteristics of the psychological state (e.g., Debus' (2010) *epistemic relevance condition*). This may be effective for distinguishing remembering in one respect—the functional role of memory seems quite different from that of perception or imagination or desire. The functional characterization looks less promising, however, for distinguishing between remembering's implicit and explicit forms.

Let's turn now to the second component of Cubelli and Della Sala's (2020) definition: the lack of reference to the previous event or learned information. Like the previous, it is contrastive.

Understanding this feature of implicit memory will again require us to start with an examination of the explicit case from which it is being opposed. The definition implies that explicit remembering involves a "learning phase" that is absent in implicit remembering. This alone does not make clear where the reference is located in explicit cases. In the cue presented to spark remembering? In the mind of the rememberer? In the experimental design and setup?

The last of these options is the most straightforward. It is easy to measure and fits with standard ways of performing tests of implicit and explicit remembering. Implicit remembering tasks are those that probe retention without any mention of memory, where participants are engaged in a task that

is not obviously tied to remembering but nonetheless allows the experimenter to look for effects of retaining prior information. In explicit remembering tasks, participants are asked to remember, recognize, or recall. The task is overtly about memory and the instructions given must make some kind of reference to the learning event—e.g., *was X on the list of items you saw yesterday? Which of these items was previously presented? How many items from yesterday's list can you recall?*

Using task features to distinguish which instances of recollection make reference to a learning phase works well in experimental contexts, but it is difficult, if not impossible, to extend beyond experimental settings so as to track implicit and explicit remembering in everyday interactions. To see the point, consider some cases of explicit remembering in day-to-day life. Do they always reference the previous event where the remembered information was learned or experienced? This happens at least some of the time—I recall that I am supposed to bring a bottle of wine to the dinner and, in so doing, I see in my mind the host's face as she made the request. But there are also plenty of times when this does not happen. I can remember that I am supposed to bring wine to dinner without remembering who told me that, or when. I can even remember past experiences, representing aspects of the experience in great detail, without locating the experience at a particular point in time. More generally, psychologists distinguish source memory (memory for where, when, and how information was acquired) from item memory (Johnson 1992). Reference to the learning event is treated as a distinct form of memory, not an aspect of explicit remembering.

The definition of implicit recollection used in contemporary psychology and neuroscience relies on a contrast with explicit recollection. It may be possible to draw this contrast clearly in experimental contexts, where the procedures used to conduct studies provide explicit recollection with the

requisite features. The aim of this research, however, is to provide insight into the memory processes at work in our everyday lives. But explicit recollection outside of experimental contexts often lacks the features that would be required for this extension. Those who continue to support a distinction between implicit and explicit forms of recollection must either refine their definition or accept its limited scope.

### 3. Implicit Memory Storage

Philosophical interest in implicit memory also relies on the contrast between implicit and explicit. Instead of drawing the contrast between forms of recollection, philosophers make a distinction between what is stored in memory, and how. Here is Bernecker's account of the philosophical distinction:

You explicitly remember that  $p$  if this representation is actually present in your mind in the right sort of way, for example, as an item in your memory box or as a trace storing a sentence in the language of thought. To implicitly remember that  $p$  your mind may not contain a representation with that content. The contents of implicit memories...have never previously been tokened and don't inhabit our long-term memory (2010: 29).

The intended distinction is clear enough and parallels the distinction philosophers have drawn between explicit and implicit forms of other mental states, like belief (Lycan 1986; Audi 1994). Drawing the contrast in this way requires some account of explicit mental representation, but does not compel the endorsement of any particular view. As Bernecker illustrates above, explicit *memory*

requires not only storage of an explicit representation, but also a previous experience where that representation was tokened. An explicit memory representation is a representation that was at some point occurrent, then stored and made available for subsequent reactivation in remembering. Explicit memory storage does not require remembering, of course; there are plenty of items in memory that could be remembered, but are never called upon.

The contrast between explicit and implicit memory storage is best illustrated with an example. Suppose I received a yellow bike for my 8<sup>th</sup> birthday. For the purposes of this example, let's treat the case as a semantic memory with the content "I received a yellow bike for my 8<sup>th</sup> birthday," but the point could also be made with an episodic memory. An explicit semantic memory of this fact requires that this content was, at some point in my past, an occurrent representation—maybe as the birthday party was happening, or when talking about the party afterward with a friend—and also that this representation is stored in my memory, in a format that retains the content for later retrieval/reactivation. I could also have an implicit memory of this fact about my 8<sup>th</sup> birthday. In this case there would be no explicit representation of the form "I received a yellow bike for my 8<sup>th</sup> birthday," either because no such representation was ever tokened (e.g., maybe I did not pay much attention to presents at my own birthday party) or because the representation was not stored or lost over time through the process of forgetting. Implicit memory of this fact about the yellow bike is still possible if it can be inferred from other facts that *are* part of my explicit memory/stored beliefs. My memory store may include the following explicitly represented beliefs: as a child my favorite color was yellow, my birthday is in May, and I broke my arm by falling off my bike while learning to ride the summer I was 8 (indicating I received the bike shortly before this incident), etc. This would allow me to infer, and thus implicitly remember, that I received a yellow bike for my 8<sup>th</sup> birthday.

The distinction between explicit and implicit forms of memory storage has been straightforward for philosophers of memory because of the long-standing and widespread commitment to the idea that explicit remembering requires a memory trace (De Brigard 2014a; Robins 2017). A memory trace is a stored representation of a past experience or piece of information, held in the mind of the rememberer since the acquisition event. Its subsequent reactivation is necessary (although on most views not sufficient) for remembering. Characterized as such, it meets the requirements for explicit memory storage. Implicit memory is then a derivative form, where the information is retained more diffusely, without a corresponding trace.

Recent work in the philosophy of memory has challenged the commitment to memory traces. Philosophers are increasingly inclined to endorse constructivist or simulationist views of memory, which reject trace requirements on remembering (e.g., Michaelian 2016). They propose instead that representations in remembering are constructed from a general network of information about the past. Rather than store individual representations of gifts received at past birthdays, for example, I store general information about birthday parties and gifts and the like, amalgamated across experiences. On this view, all cases of remembering look at least somewhat like the case of inferential implicit memory above. This shift in characterizing memory storage is thought to have many advantages: it better accounts for the frequency of memory errors, which are well documented in cognitive psychology (Loftus 2003) and better aligns philosophical work on memory with the trend toward constructivism in memory science (Schacter 2019). Even philosophers of memory who remain committed to a role for memory traces have adjusted their accounts of memory traces to

achieve similar ends, characterizing them as distributed (Sutton 1998; Bernecker 2010), dispositional (De Brigard 2014b), or content-free (Hutto and Peeters 2018).

The move to a trace-free or modified trace theory may be advantageous in some respects, but changing the view of explicit memory in this way blurs the distinction between implicit and explicit forms of memory storage. If memory traces are distributed or without content, then they do not meet the requirements for explicit storage. If memories are constructed rather than stored, then all memories are implicit rather than explicit. These implications of current trends in theorizing have gone mostly unnoticed, largely as a result of the lack of direct attention to implicit memory amongst philosophers of memory.

#### **4. Partially Implicit Memory**

The previous two sections addressed psychological and philosophical approaches to implicit memory. They each focused on a distinct aspect of the memory process—recollection vs. storage, respectively—but they both conceived of implicit and explicit memory as opposites, attempting to draw a clear distinction between them. As I illustrated in the above discussions, neither proposed distinction has been clearly articulated or easily maintained. Moving forward it thus seems productive to explore other ways to conceive of implicit memory, which highlight implicit features of memory. In this section, I draw out a few such possibilities from recent work in the philosophy of memory.

In *Memory and the Self* (2016), Mark Rowlands offers an account of personal, autobiographical memory that includes a central role for a phenomenon he dubs “Rilkean memory.” Named for

observations made by the poet Rainer Maria Rilke, Rilkean memories are those that have transformed from an explicit to implicit form over time. Rilkean memories have become so implicit, in fact, that they no longer include the original details and content. Instead, they register only as a behavior or feeling. They are cases where “the act of remembering becomes divorced from what is remembered” (Rowlands 2016: 73). Rilkean memories may be embodied, as when one returns to visit their childhood home and instinctively avoids walking too near a closet they feared was haunted as a child. They can also be affective, as when encountering a scent conjures an ineffable emotional response, but without any explicit recognition of its connection to a romantic encounter from much earlier in life. As Rowlands explains, these memories defy characterization within the frameworks standardly used: procedural vs. declarative, semantic vs. episodic, voluntary vs. involuntary—even implicit vs. explicit. The failure of existing distinctions to capture Rilkean memory does not make these memories any less implicit. Instead, they offer an opportunity to expand our conception of implicit memory in ways that reflect memory’s dynamics. A memory might be implicit at one time, but not at another.

Reflecting on memory’s ability to change over time, we can also consider cases that move in the other direction, from implicit to explicit. In *Remembering from the Outside* (2018), Chris McCarroll defends the view that observer memories—memories of one’s own experience, represented from an outside perspective—can be genuine memories. To establish this counterintuitive view, McCarroll illustrates several ways that observer memories can be formed. One such route involves using information that is implicitly available during an experience to build an observer perspective of that experience in subsequent remembering. McCarroll observes, “perceptual experience is profoundly copious, colorful, and occasionally chaotic” (2018: 53). Our experience of an event involves an array

of multimodal details, embedding—implicitly—a range of features about the world around us. When we return to these experiences in remembering, the previously implicit details can be used to construct an explicit representation of the past experience from an observer’s standpoint. During their first performance on stage, for example, a person may be highly attuned to sounds throughout the venue and the facial expressions of audience members. When recalling this debut later in life, those features may lend themselves to a representation of the experience where the person sees herself on stage rather than from the perspective she occupied during the performance.

For other memories, some features may remain implicit throughout—even when the rest of the memory is fully explicit, and indeed highly salient. Barbara Montero (2020) discusses sensational memory and its role in our recollection of intensely physical experiences. She focuses especially on painful experiences, like childbirth, and the commonly professed inability to remember how it felt. This inability to directly access the prior sensation is notably odd, in comparison to the vivid detail with which persons are often able to remember many other features of such experiences experience. One can remember *that* the experience was painful and possibly even descriptions of that sensational experience, but the sensational experience itself remains an implicit feature of the memory.

Aspects of memory may also be implicit in other ways: in our habits, rituals, and performances; in our relationships, social practices, and monuments. Merlin Donald (1991) dubbed these external forms of retention *exograms* and John Sutton has marshalled them in service of an extended and collective view of remembering. Sutton identifies an array of such exograms: “other people, scrabble tiles, theater architecture, cocktail glasses, slide rules, incised sticks, shells, languages, moral norms, knots, codes, maps, diagrams, fingers, monuments, software devices, rituals, rhythms and rhymes,

and roads” (2010: 214). Precisely because of the ways these differ from the operations of our mind and our internal memory capacities, he argues, these features of the world contribute to what and how we remember in a range of implicit ways. They prompt, unify, and update our memories, in roles that are subtle but critical to what and how we recall.

## **Conclusion**

This entry has surveyed a range of possible ways to understand implicit memory, each of which requires further exploration and elaboration. Considering how implicit memory can be understood and distinguished from explicit memory remains an important task for surveying the full range of memory phenomena and illuminating the contrast with memory’s more canonical, explicit form. Going forward, it is sensible to advocate for the distinction between implicit and explicit memory, even as we continue the search for what implicit memory might be.

## **References**

Audi, R. 1994. “Dispositional belief and a disposition to believe”. *Nous*, 28: 419-434.

Bernecker, S. 2010. *Memory: a philosophical study*. Oxford: Oxford University Press.

Bernecker, S. and Michaelian, K., eds., 2017. *Routledge handbook of the philosophy of memory*. London: Routledge.

Cohen, N.J., and Squire, L. R. 1980. “Preserved learning and retention of pattern analyzing skill in amnesia: dissociation of knowing how and knowing that.” *Science*, 210: 207–209.

Cubelli, R. and Della Sala, S. 2020. "Implicit memory". *Cortex*, 125: 345.

De Brigard, F. 2014a. "The nature of memory traces". *Philosophy Compass*, 9: 402–414.

De Brigard, F. 2014b. "Is memory for remembering? Recollection as a form of episodic hypothetical thinking". *Synthese*, 191, 1–31.

De Brigard, F. 2019. "Know-how, intellectualism, and memory systems". *Philosophical Psychology*, 32: 720-759.

Debus, D. 2010. "Accounting for epistemic relevance: a new problem for the causal theory of memory". *American Philosophical Quarterly*, 47: 17-29.

Drayson, Z. and Schwartz, A. 2019. "Intellectualism and the argument from cognitive science". *Philosophical Psychology*, 32: 662-692.

Donald, M. 1991. *Origins of the modern mind*. Cambridge, MA: Harvard University Press.

Fantl, J. 2017. "Knowledge how". In E. Zalta, ed., *The Stanford encyclopedia of philosophy*, Fall 2017 Edition, <<https://plato.stanford.edu/archives/fall2017/entries/knowledge-how/>>.

Penultimate draft, to appear in R. Thompson (ed.), *Routledge Handbook of Philosophy of Implicit Cognition*. Routledge

Furlong, E. J. 1951. *A study in memory*. New York: Thomas and Sons.

Hawley, K. 2003. "Success and knowledge-how". *American Philosophical Quarterly*, 40: 19–31.

Hume, D. (1739/1978). *A treatise of human nature*. L. A. Selby-Bigge (ed.). Oxford: Clarendon.

Hutto, D. D. and Peeters, A. 2018. "The roots of remembering: radically enactive recollecting". In K. Michaelian, D. Debus, and D. Perrin, eds., *New directions in the philosophy of memory*. London: Routledge: 97-118.

James, W. 1890. *The principles of psychology*. London: Macmillan.

Johnson, M. K. 1992. "MEM: mechanisms of recollection". *Journal of Cognitive Neuroscience*, 4: 268 – 280.

Klein, S.B. 2015. "What memory is". *Wiley Interdisciplinary Reviews: Cognitive Science*, 6: 1-38.

Locke, J. (1694/1979). *Essay concerning human understanding*, ed., P. H. Nidditch. Oxford: Clarendon.

Loftus, E.F. 2003. "Make-believe memories". *American Psychologist*, 58: 864-873.

Lycan, W. G. 1986. "Tacit belief". In R. Bogdan, ed., *Belief: form, content, function*. Oxford: Oxford University Press.

Penultimate draft, to appear in R. Thompson (ed.), *Routledge Handbook of Philosophy of Implicit Cognition*. Routledge

McCarroll, C. J. 2018. *Remembering from the outside: personal memory and the perspectival mind*. Oxford: Oxford University Press.

Michaelian, K. 2016. *Mental time travel: episodic memory and our knowledge of the personal past*. Cambridge, MA: MIT Press.

Montero, B. G. 2020. “What experience doesn’t teach: pain amnesia and a new paradigm for memory research”. *Journal of Consciousness Studies*, 27: 102-125.

Moyal-Sharrock, D. 2009. Wittgenstein and the Memory Debate. *New Ideas in Psychology*, 27: 213-227.

Pavese, C. and De Brigard, F. 2019. “Editor’s introduction to special issue: memory and skill”. *Philosophical Psychology*, 32: 585-587.

Reid, T. 1785/1951. *Essays on the intellectual powers of man*, A.D. Wozzley (ed.). London: MacMillan and Co.

Robins, S.K. 2017. “Memory traces”. In S. Bernecker and K. Michaelian, eds., *Routledge Handbook of the Philosophy of Memory*. London: Routledge: 76–87.

Roediger, H. L. 1990. “Implicit memory: retention without remembering”. *American Psychologist*, 45: 1043–1056.

Penultimate draft, to appear in R. Thompson (ed.), *Routledge Handbook of Philosophy of Implicit Cognition*. Routledge

Rowlands, M. 2016. *Memory and the self: phenomenology, science, and autobiography*. Oxford: Oxford University Press.

Russell, B. 1912. *The problems of philosophy*. London: Williams and Norgate.

Ryle, G. 1949. *The concept of mind*. London: Hutchinson & Co.

Schacter, D.L. 1987. "Implicit memory: history and current status". *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 9: 39-54.

Schacter, D.L. 1992. "Understanding implicit memory: a cognitive neuroscience approach". *American Psychologist*, 47: 559-569.

Schacter, D.L. 2019. "Implicit memory, constructive memory, and imagining the future: a career perspective". *Perspectives on Psychological Science*, 14: 256-272.

Schacter, D. L. and Tulving, E. 1994. "What are the memory systems of 1994?" In D.L. Schacter and E. Tulving, eds., *Memory systems 1994*. Cambridge, MA: MIT Press: 1-38.

Schacter, D. L., Wagner, A. D., and Buckner, R. L. 2000. "Memory systems of 1999". In E. Tulving and F.I.M. Craik, eds., *The Oxford handbook of memory*. New York: Oxford University Press. 627-643.

Penultimate draft, to appear in R. Thompson (ed.), *Routledge Handbook of Philosophy of Implicit Cognition*. Routledge

Shimamura, A. P., and Squire, L. R. 1986. "Memory and metamemory: a study of the feeling-of-knowing phenomenon in amnesic patients". *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 12: 452–460.

Stanley, J. and Williamson, T. 2001. "Knowing how". *Journal of Philosophy*, 98: 411-444.

Squire, L. R. 2004. "Memory systems of the brain: a brief history and current perspective". *Neurobiology of Learning and Memory*, 82: 171-177.

Sutton, J. 1998. *Philosophy and memory traces: Descartes to connectionism*. Cambridge: Cambridge University Press.

Sutton, J. 2010. "Exograms and interdisciplinarity: history, the extended mind, and the civilizing process". In R. Menary, ed., *The extended mind*. Cambridge, MA: MIT Press: 189-225.

Wallis, C. 2008. "Consciousness, context, and know-how". *Synthese*, 160: 123-153.