

Lexis

Journal in English Lexicology

Words about #1 | 2025

The words about Memory

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Electronic version

URL: <https://journals.openedition.org/lexis/9627>

ISSN: 1951-6215

Publisher

Université Jean Moulin - Lyon 3

Electronic reference

Kourken Michaelian, Shin Sakuragi and Vilius Dranseika, "Trends in philosophy of memory: A quantitative approach", *Lexis* [Online], Words about #1 | 2025, Online since 12 May 2025, connection on 12 May 2025. URL: <http://journals.openedition.org/lexis/9627>

This text was automatically generated on May 12, 2025.



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Trends in philosophy of memory: A quantitative approach

Kourken Michaelian, Shin Sakuragi and Vilius Dranseika

Thanks to audiences at the public seminar of the Centre for Philosophy of Memory (Grenoble, 2023), the Eurasian Memory Meeting (Taipei, 2024), and Concepts et taxinomies de la mémoire: de la philosophie à l'ingénierie des connaissances (Nancy, 2024) for feedback and to the members of the Centre for Philosophy of Memory for discussion. SS's work on this paper was supported by JSPS KAKENHI Grant Number JP19K00042. VD's work on this paper was supported by a grant from the Faculty of Philosophy under the Strategic Programme Excellence Initiative at Jagiellonian University, as well as by funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation program (grant agreement 805498). KM's work on this paper was supported by ANR grant number ANR-23-CE54-0004-0 and by ORCHID grant number 113-2927-I-A49A-501. SS's, VD's, and KM's work on this paper was supported by the ANR in the framework of the "Investissements d'avenir" program (ANR-15-IDEX-02).

1. Introduction

- 1 Until the middle of the twentieth century, there was relatively little philosophical work on memory. The volume of literature began to grow in the middle of the century and has increased rapidly in recent years, as memory has come to constitute a distinct field of research within philosophy (Sutton [2010]; Bernecker & Michaelian [2017]; De Brigard [2023]; Sant'Anna, McCarroll & Michaelian [2023]; Sant'Anna & Craver [in preparation]). Indeed, the number of publications in the field has exceeded a hundred per year for the last decade and continues to grow (see Figure 2). Given the growth in the literature, the time is right to attempt to identify trends in the field. Applying quantitative techniques to PhilMemBib, a database of roughly two and a half thousand English-language philosophical publications on memory, this article surveys over a century of philosophical research on memory, describing the conceptual landscape of the field in both synchronic and diachronic terms. Our research is exploratory. Its aim

is to describe large-scale trends in philosophy of memory during the latter half of the 20th and first decades of the 21st century.

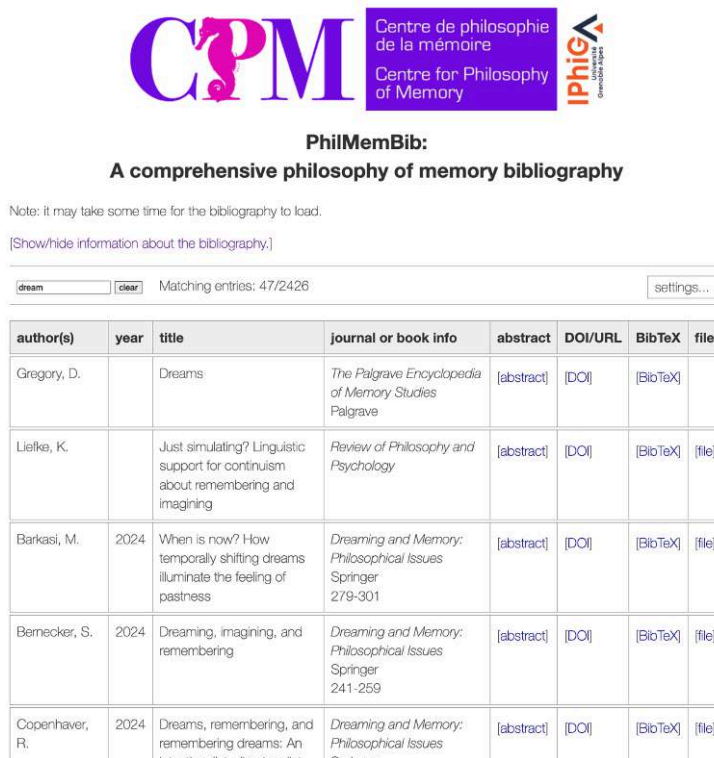
- 2 The article is structured as follows. Section 2 introduces PhilMemBib. Section 3 provides an overview of the shape of the philosophy of memory literature, focussing on volume of publications, publication venues, and authors. Section 4 identifies trends in the literature by means of co-occurrence networks and correspondence analyses. Section 5 concludes by summarizing the large-scale trends in philosophy of memory and discussing limitations and potential applications of this research.

2. PhilMemBib: a comprehensive philosophy of memory bibliography

- 3 PhilMemBib is a comprehensive philosophy of memory bibliography hosted by the Centre for Philosophy of Memory (CPM) at the Université Grenoble Alpes. As of 28/10/2024 (when the snapshot of the bibliography on which the analyses presented below are based was taken), it contained entries for 2424 publications: 1664 articles, 187 authored books, 567 chapters in edited books, and 6 papers in conference proceedings.
- 4 Work on PhilMemBib began in 2017, with the primary goal of providing ready access to literature within the field and the secondary goal of enabling the sort of research about the field that we report here. No similar resource was or is available¹. The bibliography was produced and is maintained by Kourken Michaelian with periodic support from research assistants and interns. Initially, a list of entries was generated from Michaelian's personal files. Systematic searches were then performed using the Philosophers' Index, PhilPapers, Google Scholar, the archives of roughly a hundred journals, bibliographies of key works, and websites of researchers working in the area. The bibliography was first published in April 2019 and is updated on an ongoing basis, with major updates typically occurring once per year.
- 5 Ideally, the database would include all and only philosophical work on memory. In practice, certain restrictions are necessary. One important restriction is temporal: PhilMemBib contains only work published since (roughly) the beginning of the twentieth century. Another is linguistic: PhilMemBib contains only English-language work. There are two reasons for the latter restriction. First, the overwhelming majority of contemporary research in the area is published in English. Second, it was practically infeasible to include work in all languages, and no other nonarbitrary set of languages could be defined². Several additional qualifications should be noted. Straightforwardly nonphilosophical work (e.g., work by historians or sociologists on topics such as collective memory) has been excluded even where it is of direct philosophical relevance. Nonphilosophical work by philosophers (e.g., interdisciplinary collaborations of a primarily empirical character) has also been excluded, but philosophical work by nonphilosophers has (where it engages with work by philosophers) been included. The emphasis of the database is on analytic philosophy; coverage of other approaches (e.g., phenomenology, non-western philosophy) may be relatively incomplete. Works primarily on topics other than memory but including significant discussions of memory have been included; nevertheless, coverage of certain debates in which memory has played important roles (e.g., content externalism, extended cognition, personal identity) may be limited. Dissertations and theses have

been excluded, as have book reviews (though longer critical reviews or discussion notes have been included). Coverage is certainly better for more recent years than for earlier years and is most likely better for articles and books than for chapters in edited books. Very recent publications may not be included, and information about forthcoming publications may be incomplete or require updating.

Figure 1. PhilMemBib interface. Screenshot taken on 24/12/2024



The screenshot shows the PhilMemBib interface. At the top, there are logos for CPM (Centre de philosophie de la mémoire / Centre for Philosophy of Memory) and IPHIG (Institut pour la Philosophie de la Mémoire / Institute for the Philosophy of Memory). Below the logos, the title "PhilMemBib: A comprehensive philosophy of memory bibliography" is displayed. A note states: "Note: it may take some time for the bibliography to load." Below this, there is a link "[Show/hide information about the bibliography.]" and a search bar containing the word "dream". To the right of the search bar, it says "Matching entries: 47/2426" and there is a "settings..." button. Below the search bar is a table with the following columns: author(s), year, title, journal or book info, abstract, DOI/URL, BibTeX, and file. The table contains five entries:

author(s)	year	title	journal or book info	abstract	DOI/URL	BibTeX	file
Gregory, D.		Dreams	<i>The Palgrave Encyclopedia of Memory Studies</i> Palgrave	[abstract]	[DOI]	[BibTeX]	
Liefke, K.		Just simulating? Linguistic support for continuum about remembering and imagining	<i>Review of Philosophy and Psychology</i>	[abstract]	[DOI]	[BibTeX]	[file]
Barkasi, M.	2024	When is now? How temporally shifting dreams illuminate the feeling of pastness	<i>Dreaming and Memory: Philosophical Issues</i> Springer 279-301	[abstract]	[DOI]	[BibTeX]	[file]
Bernecker, S.	2024	Dreaming, imagining, and remembering	<i>Dreaming and Memory: Philosophical Issues</i> Springer 241-259	[abstract]	[DOI]	[BibTeX]	[file]
Copenhaver, R.	2024	Dreams, remembering, and remembering dreams: An	<i>Dreaming and Memory: Philosophical Issues</i> Springer	[abstract]	[DOI]	[BibTeX]	[file]

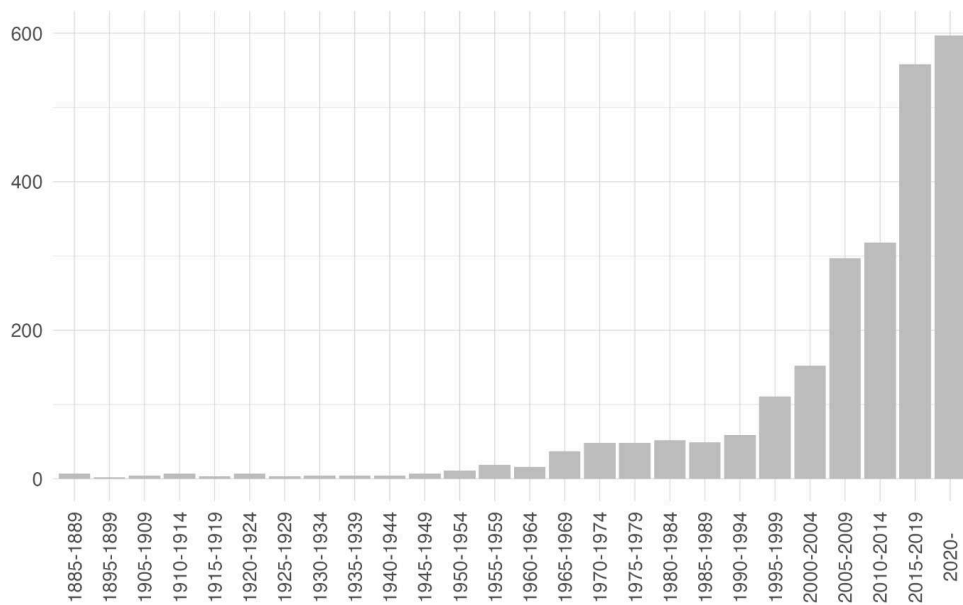
- 6 The bibliography is available at <http://phil-mem.org/philmembib.html/>. Entries are sorted by year, then by author, and then by title. No date is given for forthcoming work, which appears first. Abstracts and DOIs are included where available. URLs are included for online-only publications. BibTeX entries are provided for all items. See Figure 1. The bibliography is stored as a BibTeX file, and the html for the page is generated by JabRef, an open-source reference manager, using a modified version of a custom export filter³.

3. The shape of the philosophy of memory literature

- 7 This section provides an overview of the evolving shape of the philosophy of memory literature, focussing on volume of publications, publication venues, and authors.

3.1. Volume of publications

Figure 2. PhilMemBib entries per period



- 8 As noted above, the number of publications in the field of philosophy of memory currently exceeds 100 / year. This volume of literature is a recent development, as indicated by Figure 2, which depicts the distribution of publications from 1885 on in 5-year bins. Until the 1960s, publications are sporadic, with only 82 publications from 1887 to 1959 in total. There have since been three major turning-points. The first is situated in the mid-1960s, coinciding with the publication of Martin and Deutscher's highly influential article "Remembering" (1966): the number of publications increases noticeably in the mid-1960s and then remains stable until the 1990s. The second is situated in the late 1990s: the number of publications begins to grow noticeably, more than doubling from 15 in 1995 to 36 in 1999. The third turning point is situated in the first decade of the new millennium, since which time the number of publications has grown extremely rapidly: from 2015 to 2019, for example, there were 558 publications, roughly five times as many as the 111 that there were from 1995 to 1999.
- 9 Although the recent increase might in principle simply reflect a trend towards increased numbers of publications in philosophy overall, we offer reasons below to suppose that it in fact reflects the emergence and consolidation of philosophy of memory as a coherent research field. Whatever the explanation for the growth, it is noteworthy that the field is young, with the overwhelming majority of philosophical work on memory having been published within the last few decades; indeed, roughly 71% of the entries in the database are for work published since 2005.

3.2. Publication venues

Figure 3a. Journals with the most entries in PhilMemBib

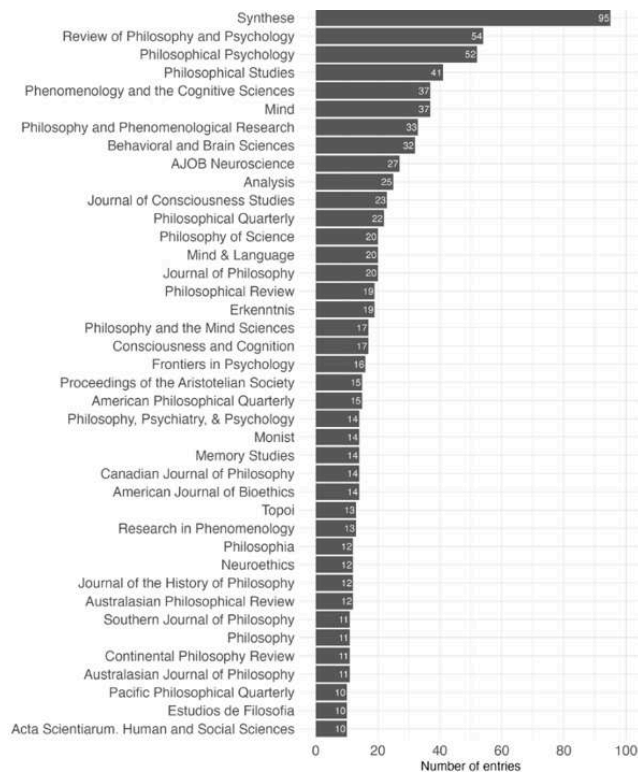


Figure 3b. Top journals in the early period (2009 or earlier)

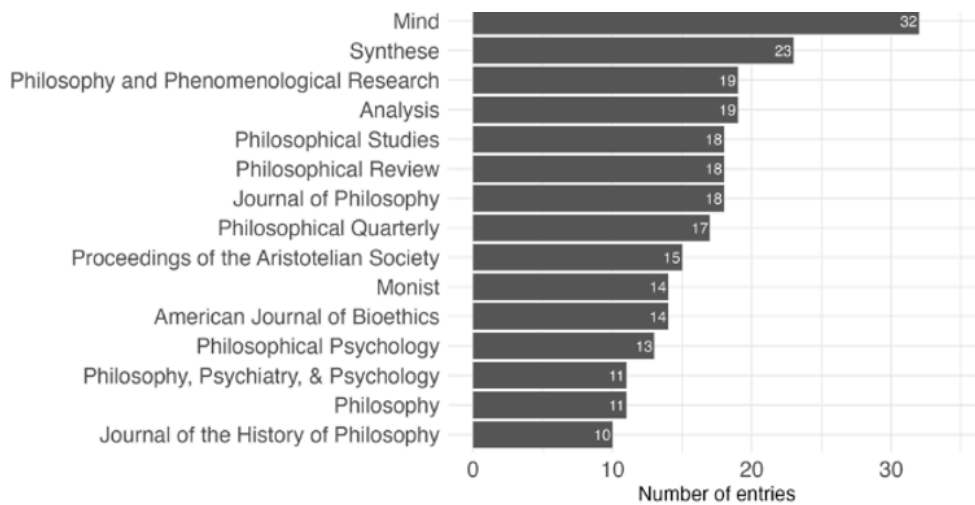
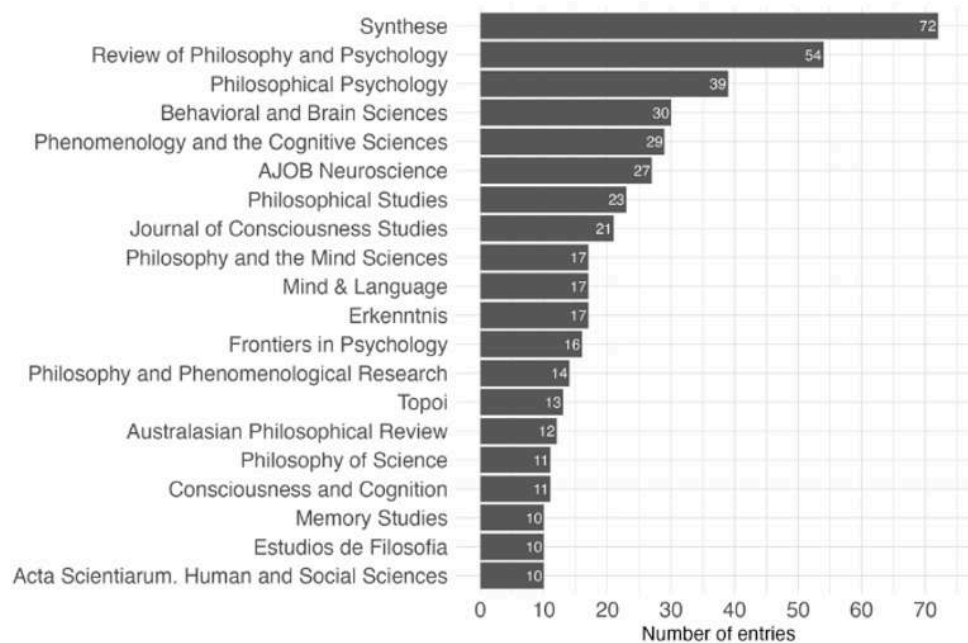


Figure 3c. Top journals in the late period (2010 or later)



- 10 As noted above, the overwhelming majority (roughly 69%) of work in the field consists of journal articles. Figure 3a provides an overview of the journals with the largest numbers of entries in PhilMemBib. Overall, philosophers of memory have published in a mix of specialist and generalist journals. There are few surprises among the top ten journals, as many of the titles in this range (*Review of Philosophy and Psychology*, *Philosophical Psychology*, *Phenomenology and the Cognitive Sciences*, and, to a lesser extent, *Synthese*, *Philosophical Studies*, and *Mind*) publish large quantities of work in philosophy of mind, philosophy of psychology, and other areas in which memory figures prominently. The appearance of *Behavioral and Brain Sciences* in eighth place presumably reflects that journal's unusual format (consisting of target articles plus large numbers of commentaries). The appearance of *AJOB Neuroscience* in ninth place in part reflects that journal's format (which is similar to that of *Behavioral and Brain Sciences*) and in part reflects activity in a field (bioethics) that is largely unconnected to mainstream philosophy of memory⁴.
- 11 While useful, the static view provided by Figure 3a may be misleading in certain respects. Indeed, a comparison of the top journals for 2009 or earlier (Figure 3b) to the top journals for 2010 or later (Figure 3c) reveals a clear shift. In the earlier period, philosophers working on memory published primarily in what are considered to be general journals: there is not a single strongly specialized journal among the top ten journals for this period. In the later period, philosophers of memory have tended to publish primarily in specialist journals: a clear majority of the top ten journals for this period consists of specialist journals with a focus on philosophy of psychology and cognitive science⁵. This is a first piece of evidence for the claim that the recent growth in the volume of publications reflects the emergence and consolidation of philosophy of memory as a coherent research field: as philosophy of memory has developed as a field, philosophers of memory appear to have increasingly prioritized communication with other philosophers of memory and thus to have published preferentially in specialist journals. It is, however, noteworthy that philosophers of memory also now tend to

publish in a wider range of journals: as Figure 4a indicates, they published in 137 unique journals from 2015 to 2019, compared to 50 in 1995-1999.

3.3. Authors

Figure 4a. Coauthorship, unique authors, and unique journals in PhilMemBib: unique journals per period

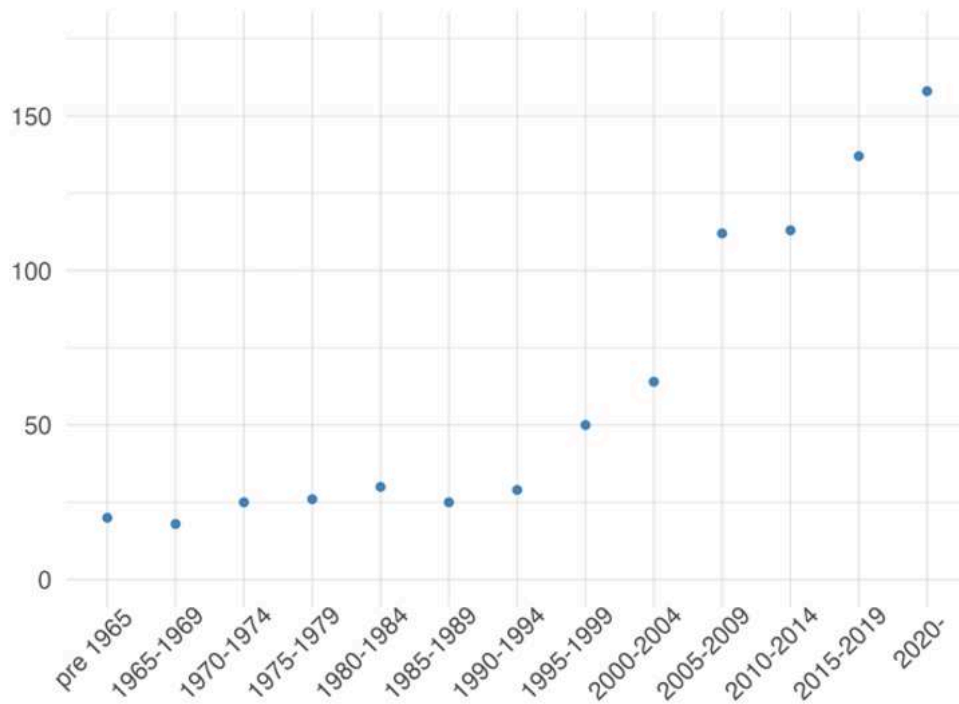


Figure 4b. Coauthorship, unique authors, and unique journals in PhilMemBib: unique authors per period

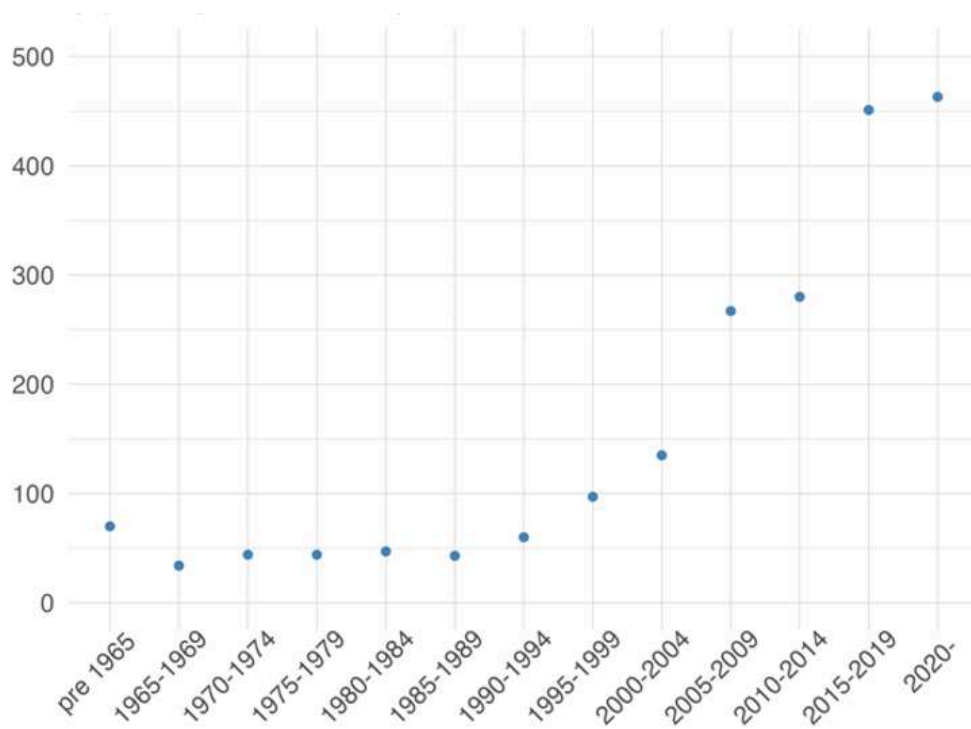


Figure 4c. Coauthorship, unique authors, and unique journals in PhilMemBib: mean number of co-authors in an entry per period

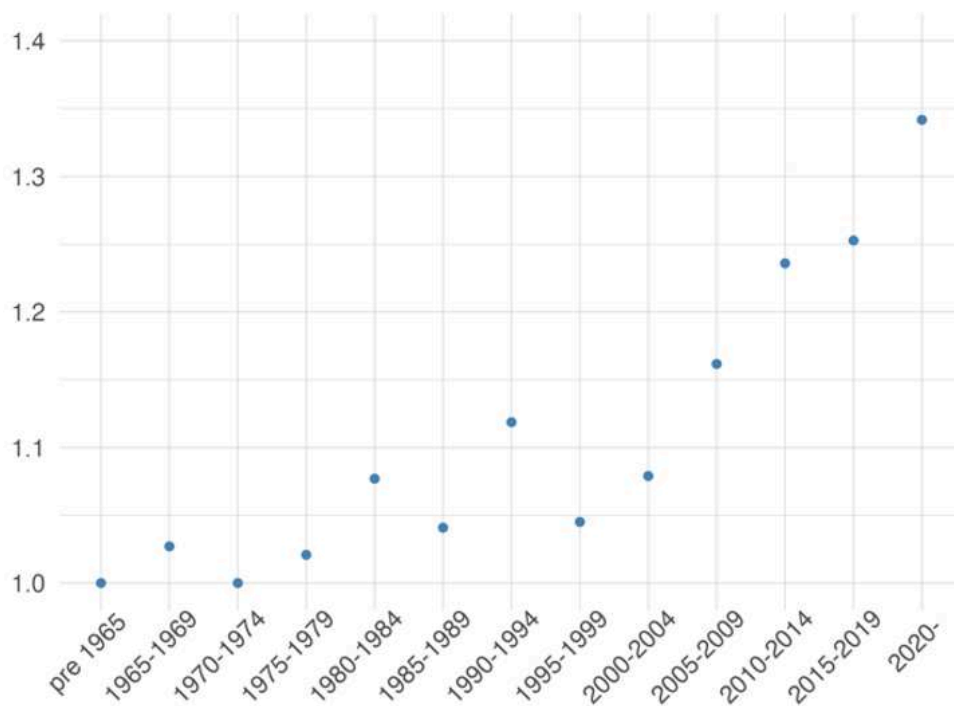
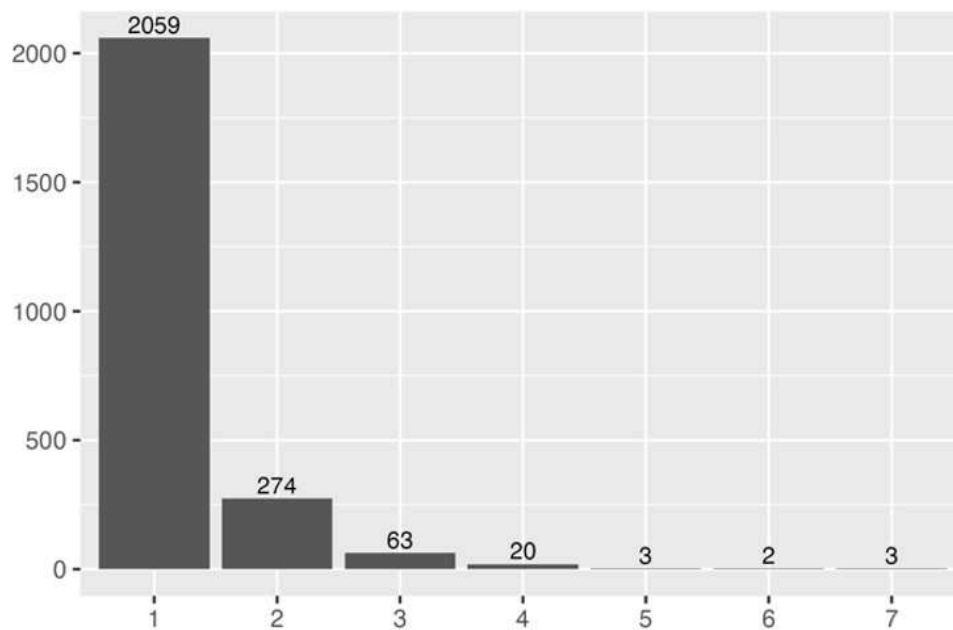


Figure 4d. Coauthorship, unique authors, and unique journals in PhilMemBib: number of entries by number of coauthors



- 12 It is perhaps unsurprising that, as the number of publications has increased, so has the number of authors: whereas the number of unique authors represented in the bibliography hovers around 50 per 5-year bin throughout most of the latter half of the twentieth century, it increases to about 100 in the late 1990s and then increases sharply starting in the first decade of the new millennium; in the current period (2020-), it is 463. See Figure 4b.
- 13 In line with a broader trend towards increased coauthorship in philosophy as a whole, the mean number of coauthors per entry has likewise increased in recent years. See Figure 4c. The average for the current period, however, is only 1.34, and the overwhelming majority of the publications in the bibliography as a whole, roughly 85%, consists of single-authored articles. See Figure 4d. This, too, is in line with norms in philosophy as a whole.
- 14 If the increase in the mean number of coauthors simply reflects a broader trend in philosophy as a whole, the same is arguably not true of the increase in the number of authors, which is arguably not fully accounted for by the increase in the number of philosophers or by the number of philosophers publishing in English. As we suggested above, while the recent increase in the number of publications might in principle simply reflect a trend towards increased numbers of publications in philosophy overall, there is reason to suppose that it in fact reflects the emergence and consolidation of philosophy of memory as a coherent research field. Three pieces of evidence are relevant here.
- 15 An initial piece of evidence is that, as noted above, those publishing in the field have increasingly published preferentially in specialist journals, suggesting that they increasingly prioritize communication with other philosophers of memory.
- 16 An additional piece of evidence is that a new generation of philosophers who have memory as their primary area or one of their primary areas of specialization has emerged. Though the emergence of this generation of authors is not made immediately

apparent by the static view of the authors with the largest numbers of entries in the bibliography provided by Figure 5a, a comparison of the top authors in 2009 or earlier (Figure 5b) to the top authors in 2010 or later (Figure 5c) makes it evident. The threshold for inclusion on both lists is 5 publications. Several points are worth noting here. First, the number of authors on the first list is far lower than the number on the second, despite the fact that the second covers a far shorter period. Second, there is relatively little overlap between the first list and the upper portion of the second list. This is no doubt due in part simply to the passage of time: some of those on the first list have moved on to other things, retired, or (unfortunately) passed away. But the passage of time does not fully explain the difference, as many of the authors on the first list remain active and continue to work on memory. (These authors appear on the second list, though in some cases further down.) Moreover, the upper portion of the second list is disproportionately made up of relatively young (mid-career or early-career) researchers who focus primarily on memory. Finally, the number of publications by each of the top 10 or so authors on the second list is much higher than the number of publications by each of the top 10 or so authors on the first list.

Figure 5a. Authors in PhilMemBib: authors with most entries in PhilMemBib

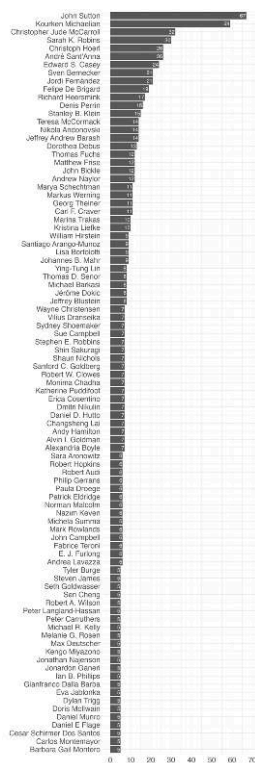


Figure 5b. Authors in PhilMemBib: top authors in the early period (2009 or earlier)

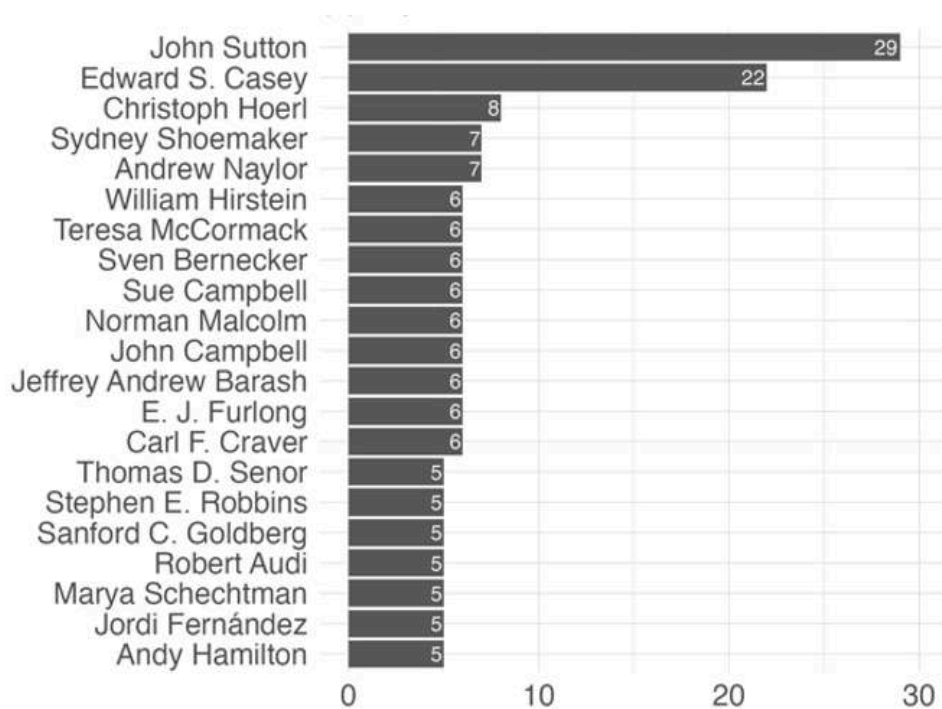
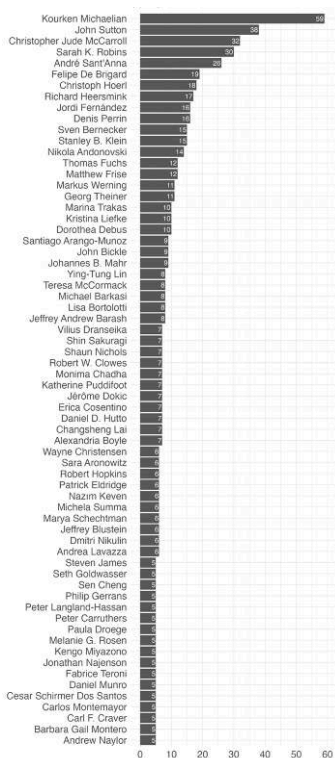


Figure 5c. Authors in PhilMemBib: top authors in the late period (2010 or later)



- 17 A final piece of evidence that does not show up or at best shows up indirectly in the bibliography is that the field has begun to develop a structure and indeed an infrastructure, with the emergence of professional organizations, including the Philosophy of Memory Organization (phomo.org), the Eurasian Memory Network

(eurasianmemory.com), and the Philosophy of Memory Network Japan (philmemjapan.com); dedicated research centres, such as the Centre for Philosophy of memory (phil-mem.org) and MemLab (ufsm.br/laboratorios/memlab); conferences, including Issues in Philosophy of Memory (held first in Cologne in 2017 and subsequently in Grenoble, Durham, and Geneva), the “IPM .5” early-career researcher conferences (online, now going on its third iteration), and Generative Episodic Memory (Bochum, going on its second iteration); frequent online and in-person workshops (held, it is worth pointing out, in multiple regions and multiple languages); seminar series, such as the Bochum-Grenoble-Taipei Memory Colloquium (phil-mem.org/seminars/bochum-grenoble-taipei.php) and the International Memory Reading Group (sites.google.com/view/memoryreadinggroup); teaching resources, including a repository of syllabi (phomo.org/teaching-repository) and textbooks (Senor [2019]; De Brigard [2023]); frequent edited collections; a book series (global.oup.com/academic/content/series/p/philosophy-of-memory-and-imagination-pomi/); an essay prize for early-career researchers (phil-mem.org/prize.php); and even a weekly blog (thememorypalacephil.substack.com/).

- 18 Overall, then, there is good evidence for the emergence and consolidation of philosophy of memory as a coherent research field. This indicates that the philosophy of memory exists, but it does not yet tell us what philosophers of memory study. The next section takes up this question, identifying trends in the literature by means of quantitative analyses.

4. Trends in the literature: co-occurrence network and correspondence analyses

- 19 These analyses – a co-occurrence network (Section 4.1) and correspondence analyses (Section 4.2) – were carried out using a text mining tool, KH coder, created by Koichi Higuchi (<https://kncoder.net/en/>). KH Coder is a standalone application that uses R to support a range of methods – including co-occurrence network analysis and correspondence analysis, as used here – via a graphical interface that requires no programming skills (Higuchi [2016]; Higuchi [2020]; Higuchi, Nakamura & Shu [2022]).
- 20 The dataset used for the analyses was extracted from PhilMemBib. PhilMemBib consists of multiple arrays of data, but we focus on titles and / or abstracts and on years of publications. Among the 2424 entries in PhilMemBib, only 1268 have abstracts⁶. The titles and abstracts of those entries contain 200 763 tokens of 12 058 words. Some elements – stop words, punctuation marks and HTML tags – are automatically excluded from the text mining process. Also, 64 terms (for example, “theory”, “argument”, “question”, “memory”, “objection”, “paradigm”, “origin”) are manually excluded from analyses mostly because of their generic meanings which may hinder meaningful analyses. Hence, the total word count subject to this analysis is 119 238 tokens of 11 526 words. Although we refer to other parts of speech when relevant, the focus of the following two analyses is on nouns, simply because our focus is primarily on topics, and words of other parts of speech used in the corpus are less informative in this regard. (This includes terms which are manually specified terms, TAG for short (in accordance with the terminology used in KH coder), as 6 technical terms (e.g., “epistemology”), 12 philosophers names (e.g., “Husserl”)⁷ and 38 de facto compound

“consciousness”, “event”, “self”, and “role”) are excluded because including them is likely to result in a coarse-grained, less interpretable network, given that they co-occur with most of the terms.

- 23 Because of the nature of the analysis, each of the clusters included in the figure does not necessarily correspond to an independent topic in philosophy of memory. Some of the clusters clearly point to a topic in the field of philosophy of memory, whereas others merely indicate that certain terms frequently co-occur.
- 24 Figure 6 includes 22 clusters. The remainder of Section 4.1 provides a brief description of each. The “title term” listed at the beginning of each entry represents the cluster (and number in the parentheses shows in how many texts this term occurs). When other terms from the same cluster are discussed, the following parameters are provided: (i) number of texts in which this term co-occurs with the title term out of all the texts in which the term occurs (thus, 40 / 100 means that the mentioned term occurs in 100 texts, and in 40 out of these texts it co-occurs with the title term) and (ii) the Jaccard index of the two terms. The visualized co-occurrence network only consists of nouns appearing $40 \leq 300$ times in the corpus, but – when interpreting clusters – we also checked the terms’ co-occurrences with other parts of speech (e.g. “misremember”) or their derivatives (e.g. “agent” and “agency”) as well as terms that occur less than 40 times in the corpus (and thus do not show up in the network visualization). When the term’s derivative or other part of speech is evaluated, its part of speech is specified in the parentheses.
- *Cluster 1*: “mental time travel” (TAG – a term coined by Endel Tulving [1985]), appears in 70 texts. The term shows a significant connection to “future” (noun, 25 co-occurrences of “mental time travel” and “future” / 98 texts in which “future” occurs: Jaccard 0.175; adjective, 16 / 72 texts: Jaccard 0.127). This cluster points to a topic focussing on the relationship of memory to future-oriented mental time travel.
 - *Cluster 2*: “belief” (131 texts) is frequently used with a cluster of epistemological terms including “justification” (37 / 70: Jaccard 0.226), “epistemic” (adjective; 43 / 136: Jaccard 0.192), “knowledge” (42 / 201: Jaccard 0.145), and “evidence” (28 / 123: Jaccard 0.124).
 - *Cluster 3*: “group” (noun 43, verb 1) and “collective memory” (35 texts) often co-occur (8 texts: Jaccard 0.113). “Group” is frequently used with “individual” (noun, 15 / 77: Jaccard 0.142; adjective, 11 / 71: Jaccard 0.106). The cluster points out a relatively small topic of on collective memory.
 - *Cluster 4*: “Plato” (TAG, 53 texts) and “Aristotle” (TAG, 33 texts) often co-occur (9 texts: Jaccard 0.117). Plato is more frequently used with “recollection” (19 / 92: Jaccard 0.151). This cluster points to a topic centered on Plato’s account of recollection.
 - *Cluster 5*: “Husserl” (TAG, 60 texts) is strongly tied to “time-consciousness” (15 / 19: Jaccard 0.234) (which does not show up in the diagram because it appears only 32 times in the corpus). It is no surprise that the term is frequently used with “phenomenological” (adjective, 24 / 94: Jaccard 0.185) and “phenomenology” (31 / 140: Jaccard 0.183). The cluster demonstrates that Husserl and phenomenology comprise a major topic in English-language philosophical research on memory.
 - *Cluster 6*: “neuroscience” (65 texts) is frequently used with “mechanism,” (18 / 83: Jaccard 0.139), “technique” (11 / 32: Jaccard 0.128), and “finding” (11 / 43: Jaccard 0.113). The term also coincides with adjectives: “experimental” (13 / 45: Jaccard 0.134), “cognitive” (30 / 208: Jaccard 0.124), and “molecular” (8 / 14: Jaccard 0.113). The cluster corresponds to a topic focussing on the consequences of neuroscientific research for philosophy of memory.

- *Cluster 7: “externalism”* (TAG, 20 texts) refers to a position in philosophy of mind according to which one’s thought contents are determined by one’s surroundings, in which case introspection may not be sufficient to provide “self-knowledge” (TAG, 37 texts). The two terms are often used together (9 texts: Jaccard 0.188). This cluster points to a small topic even in the context of philosophy of memory.
- *Cluster 8: “confabulation”* (37 texts) is frequently used with “error” (13 / 55: Jaccard 0.165), and “misremember” (verb, 8 / 15: Jaccard 0.182). The cluster points to a relatively small topic on unsuccessful remembering.
- *Cluster 9: “perception”* (133 texts) is used with “object” (25 / 98 texts: Jaccard 0.121) and “experience” (44 / 299 texts: Jaccard 0.113). Interestingly, the term does not frequently coincide with explicitly memory related terms. “Perception” and “perceptual experience” (25 texts) are mentioned in a certain number of papers, but they do not seem to be frequently discussed in relation to specific subjects in philosophy of memory.
- *Cluster 10: “dream”* (noun 34, verb 30) is frequently used with the noun form of “report” (12 co-occurrences of “report” and both forms of “dream” / 35: Jaccard 0.174), “wake” (verb, 8 / 8: Jaccard 0.174), and the noun form of “sleep” (6 / 8: Jaccard 0.125). This cluster points to a relatively small topic on memory and dreaming.
- *Cluster 11: “Augustine”* (TAG, 31 texts) often co-occurs with “book” (8 / 45: Jaccard 0.118), which probably refers to Book 10 and Book 11 of Augustine’s *Confessions*, in which the topic of memory is discussed. “Augustine” typically co-occurs with “confession” (14 / 15: Jaccard 0.438), which does not appear in the network as it was mentioned only 21 times in the corpus. This cluster indicates that Augustine’s work on memory constitutes a topic in its own right in philosophy of memory.
- *Cluster 12: “episodic memories”* (33 texts) is often used with “construction” (7 / 32: 0.121). Although “episodic memory” (182 texts) is used with “construction” (9 texts) less often (Jaccard 0.044), the cluster overall points to a topic on the constructive character of episodic memory.
- *Cluster 13: “system”* (131 texts) is most frequently used with an adjective, “cognitive”, (43 / 208: Jaccard 0.145). “System” is often used with “memory systems” (19 / 33: Jaccard 0.131), “function” (25 / 111: Jaccard 0.115) and “information” (24 / 104: Jaccard 0.114). It is not clear, however, that those terms combined together point to a specific topic in philosophy of memory, though they may point to discussions of kinds of memory.
- *Cluster 14: “agent”* (76 texts) is often used with “agency” (13 / 41: Jaccard 0.125), and “agency” is often used with an adjective “moral” (13 / 75: Jaccard 0.126). This cluster seems to point to a relatively small topic on agency.
- *Cluster 15: “field”* (60 texts) and “observer” (20 texts) are terms introduced by Nigro and Neisser (1983) to describe the different perspectives adopted in episodic remembering. The two terms often co-occur (9 texts: Jaccard 0.127). “Observer” is typically used with “observer memories” (5 / 7, Jaccard 0.227), and often co-occurs with “scene” (7 / 21: Jaccard 0.206), “point of view” (TAG, 7 / 30: Jaccard 0.163), and “imagery” (6 / 34: Jaccard 0.125). The cluster seems to point to a relatively small topic on observer perspective memory.
- *Cluster 16: “technology”* (44 texts) is used with “mmt” (i.e., memory modification technology) (8 / 9: Jaccard 0.178), “modification” (10 / 24: Jaccard 0.172), the noun form of “concern” (11 / 54: Jaccard 0.126), and “enhancement” (7 / 19: Jaccard 0.125), as well as an adjective “ethical” (16 / 62: Jaccard 0.178). This cluster points to a topic on the use of memory modification technology.
- *Cluster 17: “personal identity”* (102 texts) is a major topic in contemporary metaphysics. The term is frequently used with “Locke” (TAG, 21 / 41: Jaccard 0.172), who first proposed the

memory theory of personal identity, and “continuity” (19 / 50 texts: Jaccard 0.143), “person” (24 / 98 texts: Jaccard 0.136), and “identity” (22 / 95 texts: Jaccard 0.126). “Identity” often co-occurs with the noun form of “narrative” (20 / 79 texts: Jaccard 0.130), a term that characterizes the influential narrative approach to personal identity.

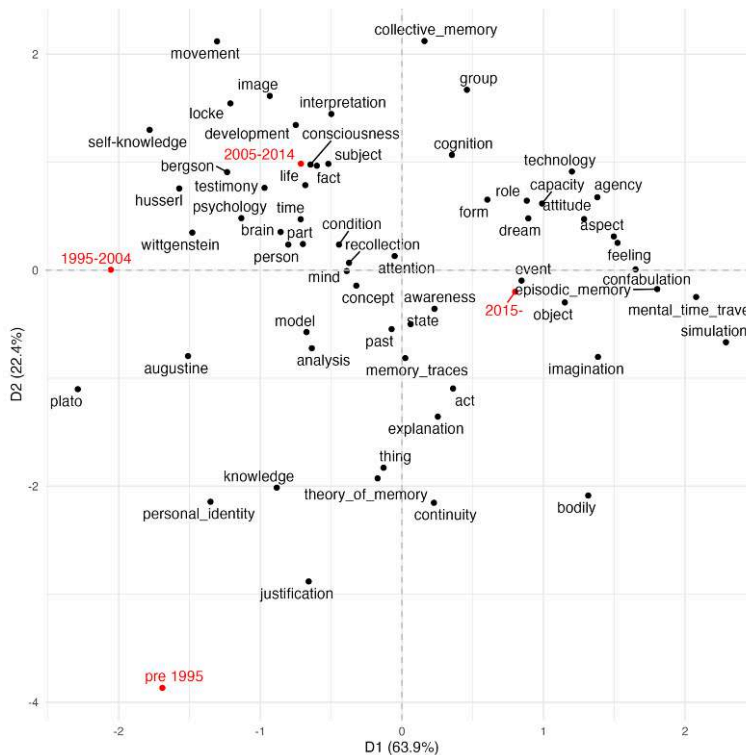
- *Cluster 18*: “analysis” (137 texts) and “notion” (137 texts) often show up together (28 texts: Jaccard 0.114). But there is presumably no specific topic tied to this cluster.
 - *Cluster 19*: “habit” (28 texts) memory is a type of memory introduced by Russell (1921). The term coincides with “skill” (7 / 36: Jaccard 0.123). Interestingly, “habit” is not often used with terms used to characterize “procedural” (adjective, 3 / 27: Jaccard 0.058) memory, such as “body memory” (2 / 22: Jaccard 0.042), although “skill” and “procedural” often coincide (7 times: Jaccard: 0.125). This suggests that “habit” and “skill” do not compose a specific topic, and are only remotely related to the topic of body memory.
 - *Cluster 20*: “body” (69 texts) co-occurs with “bodily” (TAG, 18 / 48 texts: Jaccard 0.182) and “body memory” (12 / 22: Jaccard 0.152). “Body memory” frequently co-occurs with “sediment” (verb, 5 / 5: Jaccard 0.227), “habitual” (adjective; 5 / 12: Jaccard 0.172) and “implicit” (adjective; 8 / 33: Jaccard 0.170). It is notable that “body memory” is often used with “phenomenological” (adjective, 12 / 94: Jaccard 0.115). The cluster points to a relatively small topic on body memory.
 - *Cluster 21*: “grief” (8 texts) is often used with “loss” (4 / 25: Jaccard 0.138). But the total number may not be large enough for this to constitute an independent topic.
 - *Cluster 22*: “philosophy” (183 texts) and “psychology” (97 texts) coincide (30 texts: Jaccard 0.120), and “philosophy” is also used with “concept” (36 / 165: Jaccard 0.115). But those usages are merely generic, and there is presumably no specific topic tied to this cluster.
- 25 Overall, the co-occurrence network depicted in Figure 6 offers us a glimpse of the landscape of topics in philosophy of memory that corresponds reasonably well to the intuitive sense of the landscape that researchers in the field (including the authors of this paper) are likely to have. It does not, however, show us how that landscape has changed over time. In Section 4.2, we provide a view of changes over time in the form of correspondence analyses based on the likelihoods with which terms appear in different periods. Since the number of publications before the 1990s is very small, we focus on the period before 1994 and on three ten-year periods from 1995 on – before 1994, from 1995 to 2004, from 2005 to 2014, and after 2015.

4.2. Correspondence analysis

- 26 Correspondence analysis is “an explanatory multivariate technique for the graphical and numerical analysis of almost any data matrix with nonnegative entries, but it principally involves tables of frequencies or counts” (Blasius & Greenacre [2006: 4])¹⁰. It plots elements in two different arrays of data on the same plane in such a way as to graphically indicate relations between the arrays as well as among elements in the same arrays. We carried out two correspondence analyses; terms used 60 times or more in all titles and abstracts (Figure 7) and terms used 15 times or more in all titles only (Figure 8).

4.2.1. Titles and abstracts

Figure 7. Correspondence analysis (based on (i) titles and abstracts and (ii) publication years of PhilMemBib entries)



27 Figure 7 is the plot of 60 representative terms (in black) out of 154 total terms identified in titles and abstracts, along with four periods (in red). The figure depicts associations among terms and periods. The axes in a correspondence analysis graph, labeled “D1” and “D2,” represent the first two dimensions of variance in the data. These dimensions capture the most significant patterns of association between the elements being analyzed. The percentages associated with each axis indicate the proportion of the total variance (or inertia) in the data explained by that dimension. Given that D1 explains 63.9% and D2 explains 22.4%, these two dimensions together account for 86.3% of the total variance. Shorter distances between terms and periods indicate stronger associations, reflecting when terms are more prominently associated with particular periods. Furthermore, terms located close to each other share similar association patterns across the periods. If a certain set of terms is associated with multiple periods, their positions reflect a balance of their associations with those periods. The closer a term is to the origin, the more uniformly it tends to occur across all periods, contributing less to the distinctive associations captured in the first two dimensions. For example, “attention” is at the very center, with “mind,” “recollection,” “awareness,” and “concept” near the origin. These terms regularly appear in every period, suggesting that philosophy of memory has consistently been associated with key themes in philosophy of mind. The remainder of Section 4.2 provides an overview of each period and of the relations between them.

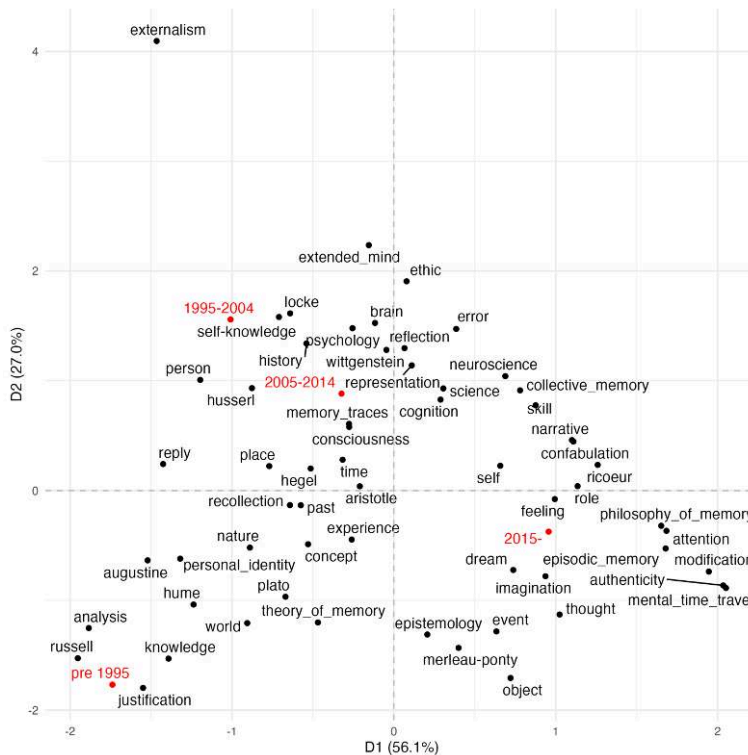
- *Pre-1995*: Neither particular terms nor any other periods are located near the pre-1995 mark. This is probably because there are only small numbers of articles published before 1995, many of which have no abstracts.
- *Between pre-1995 and 1995-2004*: Terms related to the personal identity (cluster 17: “personal identity”) and epistemology (cluster 2: “justification”) topics are found in the area spreading

out from the origin in the direction of the two periods. Toward 1995-2004, we find terms from the ancient philosophy (cluster 4: “Plato” and cluster 11: “Augustine”) topics, but no specific terms are located immediately to the left from the 1995-2004 mark, suggesting there’s no vocabulary that is especially strongly associated with this period.

- *Between 1995-2004 and 2005-2014:* 1995-2004 and 2005-2014 are located relatively near to each other. This indicates that certain topics are discussed throughout the two periods. “Husserl” (cluster 5) and “psychology” (cluster 22), “person” (cluster 17), and “self-knowledge” (cluster 7) are found between the two periods. “Self-knowledge”, in particular, is far from the origin, indicating that the topic may be predominantly found in these two periods.
- *2005-2014:* We find “consciousness,” “fact,” “subject,” and “life” right around the 2005-2014 mark, meaning that these terms are characteristic of that period. “Locke” (cluster 17), “development”, “image”, and “movement” are located on the side of the 2005-2014 mark opposite the origin, which indicates that those terms are the most characteristic of that period, although it is not obvious why that should be the case. It is notable that “brain,” “recollection” (cluster 4), and “mind” are located in the region between the mark and the origin, which indicates that philosophy of mind-related topics are often discussed in this period, although those terms are commonly used in other periods as well.
- *Between 2005-2014 and 2015-:* The 2005-2014 mark and the 2015- mark are located relatively far from each other, and the origin lies between them. There are thus not many terms which characterize the two periods. “Group” and “collective memory” (both cluster 3), and “cognition” are three exceptions.
- *2015-:* This period is located on the right of the plot and is isolated from the other three periods. Crucially, most of the terms that appear to the right of the mark also appear in the co-occurrence network, including “episodic memory” and “mental time travel” (cluster 1), “agency” (cluster 14), “dream” (cluster 10), “technology” (cluster 16), “capacity” (cluster 13), and “confabulation” (cluster 8). This suggests that some of these topics track relatively new developments in philosophy of memory, gaining traction after 2015.
- *Between 2015- and pre-1994:* Some of the terms show up in the area around the extended line passing through the midpoint between the two marks are generic, such as “explanation” and “thing.” But it is noteworthy that “memory traces” and “theory of memory” show up right in that area. These two terms, which are discussed in older articles, appear to have been revived in the recent development of philosophy of memory.

4.2.2. Titles only

Figure 8. Correspondence analysis (based on (i) titles and (ii) publication years of PhilMemBib entries)



- 28 A correspondence analysis of titles and abstracts combined runs on a much richer vocabulary (11 526 words) than one of titles alone (3010 words). One could think that terms in a title are likely to be especially diagnostic of the topics discussed in the document. For this reason we decided to conduct a separate analysis based on titles only to see if it paints a different picture. The same term rarely shows up in a title more than a couple of times whereas the same term often appears repeatedly in an abstract. Those characteristics of titles mean that a correspondence analysis of titles alone will differ from a correspondence analysis of titles and abstracts at least in some respects; in particular, since the threshold of minimum appearance is very low (15 times), some of the terms that are not included in the analysis of titles and abstracts are included in the analysis of titles alone.
- 29 Figure 8 is the result of a correspondence analysis on titles only. The terms included are the 60 representative terms among 80 terms used more than 15 times in all titles. The basic distributions of the periods and the terms remain similar to those in the analysis on title and abstract: terms related to the traditional topics (epistemology and personal identity) are likely to be located on the left side of the diagram.
- 30 More traditional philosophers show up than in the analysis on titles and abstracts, because the required number of occurrences is much smaller in the titles-only analysis (15 vs. 60). The bulk of philosophers' names in history are situated on the left, close to the pre-1995 mark. The four periods are located from left to right in chronological order, and only 2015- is on the right side. Those suggest that there has been a shift away from studies of the history of philosophical thinking about memory. This suggests that there has been a shift away from studies of the history of philosophical thinking

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about memory. It is notable, however, that “Ricoeur” and “Merleau-Ponty” are relatively new topics.

5. Conclusion

- 31 We conclude by summarizing the large-scale trends in philosophy of memory and discussing limitations and potential applications of this research.

5.1. Large-scale trends

Table 1. Frequency rankings of the terms used in titles and abstracts of PhilMemBib entries published during the three periods (-1994; 1995-2014; 2015-)

	-1994		1995-2014		2015-	
	TERM	FREQ	TERM	FREQ	TERM	FREQ
1	knowledge	51	time	321	episodic_memory	392
2	personal_identity	30	experience	247	experience	367
3	past	28	knowledge	200	time	289
4	time	28	consciousness	197	past	244
5	experience	22	past	182	event	228
6	justification	20	self	124	role	205
7	model	16	mind	120	belief	196
8	consciousness	15	concept	116	form	196
9	mind	15	model	115	self	195
10	analysis	14	personal_identity	115	knowledge	194
11	concept	14	philosophy	105	process	180
12	definition	12	event	101	system	173
13	state	12	belief	99	perspective	167
14	theory_of_memory	12	form	99	kind	164
15	belief	11	perspective	99	consciousness	161
16	logic	10	life	97	imagination	147
17	part	10	role	97	object	140

18	theories_of_memory	10	process	95	mental_time_travel	137
19	condition	9	system	90	phenomenology	136
20	continuity	9	cognition	89	concept	135
21	event	9	part	89	philosophy	135
22	explanation	9	bergson	86	perception	133
23	plato	9	phenomenology	86	nature	130
24	recollection	9	analysis	85	evidence	129
25	aristotle, augustine, brain, conception, husserl, life, perception, person, phenomenology, philosophy, structure, thing, world	8	kind	85	representation	127
26			content	84	mind	126
27			husserl	84	dream	123
28			notion	83	model	123
29			person	83	cognition	121
30			idea	82	relation, sense	118
Total word counts		1495		19729		29264

32 Table 1, which lists the rankings of the most frequently used terms in each period, provides an overview of the changes in topics in the field that we see in the two correspondence analyses. The key features of the overall picture that emerges are the following.

- Before 1995, the major topics in philosophy of memory are personal identity and epistemology.
- Personal identity is no longer frequently discussed after 2014. Epistemology continues to be discussed after 2015, but it no longer occupies a dominant position.
- Traditional philosophy of mind is dominant in the 2000s, but it rapidly declines after 2015.
- There is a dramatic change around that time, as the focus shifts to philosophy of psychology and cognitive science or to philosophy of mind informed by empirical work in those disciplines. (This shift corresponds to that described by Knobe [2015] for philosophy of mind in general.)

33 Overall, the correspondence analyses offer a view of changes over time in the landscape of topics in philosophy of memory that corresponds well to the intuitive sense of those changes that a researcher in the field is likely to have.

5.2. Limitations and potential applications

- 34 While the analyses reported in this paper allow for the detection of coarse-grained topical structures in the philosophy of memory, as well as the identification of some major diachronic trends, a more fine-grained analysis would require using a more extensive corpus – preferably one consisting of full-text documents. In particular, it would be valuable to triangulate the present findings by employing natural language processing tools, such as topic modelling, on a more comprehensive corpus and by using bibliometric methods on citation data. Some of this work is currently being undertaken by the present authors. Additionally, it would be beneficial to explore alternative approaches to delineating the boundaries of the philosophy of memory – approaches that do not rely solely on the inclusion criteria of PhilMemBib. If the observed patterns could be replicated using alternative operationalizations of the field, this would significantly strengthen the conclusions.
- 35 Beyond its intrinsic interest, this research has a number of potential uses, three of which we note here. First, researchers interested in metaphilosophy might build on the research to compare developments in philosophy of memory to developments in other fields. For example, they might consider how the shift towards psychology- and cognitive science-oriented topics that occurred in the mid-2010s in philosophy of memory compares to similar shifts in other fields. Second, students and early-career researchers might make use of it to get a sense of the lay of the land in the field and of where the field is likely to head in the future. For example, a young epistemologist might note that interest in the epistemology of memory tends to remain steady despite the fact that there is relatively little work on that topic and conclude that the epistemology of memory is a promising area on which to focus. Third, researchers, whether early-career or more advanced, might draw on the analysis to identify neglected topics and connections. For example, a researcher might note that, while interest in episodic memory is now well established, there is much less work on habit memory and procedural memory and conclude that the latter topic represents an area likely to lend itself to doing groundbreaking work.

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NOTES

1. While PhilPapers (<https://philpapers.org/>), a widely-used “comprehensive index and bibliography of philosophy”, does include a “memory” category, that category has certain limitations: it omits some philosophical literature on memory, includes some nonphilosophical literature on memory, and includes both some philosophical and some nonphilosophical literature on topics other than memory. It also imposes few constraints on included works and thus includes unpublished papers, theses, and so on. PhilMemBib, in contrast, is highly curated and thus constitutes a more appropriate basis for the research reported here.
2. Translations into English are included, but there are few of these.
3. The BibTeX file can be obtained by emailing the third author.
4. Discussions of memory in bioethics largely focus on the ethics of memory modification.
5. The appearance of journals such as *Estudios de Filosofia* and *Acta Scientiarum: Human and Social Sciences* further down the list is explained by the fact that those journals have published special issues on memory.
6. Unfortunately, abstracts are rarely – if ever – available for older documents, as the inclusion of abstracts became standard in academic publishing only relatively recently. Faced with a trade-off between the temporal coverage and the homogeneity of our dataset, we prioritized coverage.

Consequently, we rely on titles alone when abstracts are unavailable. While this raises concerns about potential distortions, it is worth noting that in correspondence analysis, the patterns observed using only titles closely resemble those derived from combined title-and-abstract data.

7. Those 6 terms and 12 names are manually specified because KH coder sometimes misjudges their parts of speech.

8. The Jaccard index measures similarity between two words based on their co-occurrence across documents, ignoring frequency. It reflects how often both words appear together, relative to how often either appears at all.

9. Please note that these numbers refer to the total number of occurrences of the term in the corpus rather than the number of texts in which the term occurs (a term may occur several times in the same text). Some of the analyses will rely on numbers of texts in which a term occurs rather than on absolute number of occurrences of the term.

10. A good summary of correspondence analysis using KH coder can be found in chapter 10 of (Ishikawa, Maeda & Yamazaki [2010]).

ABSTRACTS

Until the middle of the twentieth century, there was relatively little philosophical work on memory. The volume of literature began to increase in the middle of the century and has increased rapidly in recent years, as memory has come to constitute a distinct field of research within philosophy. Indeed, the number of publications in the field has exceeded a hundred per year for the last decade and continues to grow. Given the growth in the literature, the time is right to attempt to identify trends in the field. Applying quantitative techniques to PhilMemBib, a database of roughly two and a half thousand English-language philosophical publications on memory, this article surveys over a century of philosophical research on memory, describing the conceptual landscape of the field in both synchronic and diachronic terms. It finds that, before 1994, the major topics are personal identity and epistemology. Personal identity is no longer frequently discussed after 2015. Epistemology continues to be discussed after 2015, but it no longer occupies a dominant position. Traditional philosophy of mind is dominant in the 2000s, but it rapidly declines after 2015. There is a dramatic change around that time, as the focus shifts to philosophy of psychology and cognitive science or to philosophy of mind informed by empirical work in those disciplines.

Jusqu'au milieu du vingtième siècle, les travaux philosophiques sur la mémoire étaient relativement peu nombreux. Le volume de la littérature a commencé à augmenter au milieu du siècle et s'est rapidement accru ces dernières années, la mémoire constituant désormais un domaine de recherche distinct au sein de la philosophie. En effet, le nombre de publications dans le domaine a dépassé la centaine par an au cours de la dernière décennie et continue de croître. Compte tenu de la croissance de la littérature, le moment est venu d'essayer d'identifier des tendances dans le domaine. En appliquant des techniques quantitatives à PhilMemBib, une base de données d'environ deux mille cinq cents publications philosophiques anglophones sur la mémoire, cet article passe en revue plus d'un siècle de recherche philosophique sur la mémoire, décrivant le paysage conceptuel du domaine à la fois en termes synchroniques et diachroniques. L'article démontre qu'avant 1994, les thèmes principaux sont l'identité personnelle et la connaissance. Après 2015, l'identité personnelle n'est plus fréquemment abordée. La

connaissance continue d'être discutée après 2015, mais elle n'occupe plus une position dominante. La philosophie de l'esprit traditionnelle est dominante dans les années 2000, mais elle décline rapidement après 2015. Un changement radical a lieu vers cette date, l'accent étant mis désormais sur la philosophie de la psychologie et des sciences cognitives ou sur des approches en philosophie de l'esprit fondées sur des recherches empiriques dans ces disciplines.

INDEX

Mots-clés: philosophie de la mémoire, réseau de cooccurrences, analyse des correspondances

Keywords: philosophy of memory, co-occurrence network, correspondence analysis

AUTHORS

KOURKEN MICHAELIAN

Université Grenoble Alpes – Centre for Philosophy of Memory, IPhiG & Institut Universitaire de France (IUF), France

kourken.michaelian@univ-grenoble-alpes.fr

SHIN SAKURAGI

Shibaura Institute of Technology, Japan

sakuragi@shibaura-it.ac.jp

VILIUS DRANSEIKA

Interdisciplinary Centre for Ethics, Jagiellonian University, Poland

vilius.dranseika@uj.edu.pl