

John Sutton

Remembering as Public Practice: Wittgenstein, memory, and distributed cognitive ecologies

John Sutton: University of Sydney, john.sutton@mq.edu.au

1 Prelude: three cases of remembering

A woman is listening to Sinatra before work. As she later describes it, ‘suddenly from nowhere I could hear my mother singing along to it ... I was there again home again, hearing my mother ... God knows why I should choose to remember that ... then, to actually hear her and I had this image in my head ... of being at home ... with her singing away ... like being transported back you know I got one of those ... like shivery feelings really suddenly’ (Anderson 2004, 9-10). An older couple, discussing their honeymoon forty years ago, each say that they can’t remember the show they saw, until through iterative, puzzled cross-cuing they finally get there – ‘Desert Song, that’s it’ (Harris et al 2011, 292). An elderly English veteran of a prisoner of war camp in Japan, finishing up morning tea with a young Japanese social scientist interested in reconciliation, suddenly calls out loudly – in Japanese – ‘stand to attention’. He stands to attention in front of her: like many of the men she interviews, he physically re-enacts fragments of that long-past world of the camp, bringing that absent past into this new present context with a visceral shock (Murakami 2001, 2012; Middleton & Brown 2005, 133-136).

These three cases exemplify, in distinctive ways, remembering as public practice. In each case, there are past personal experiences at stake, affectively-charged and highly significant, embedded one way or another in these people’s rich narrative histories, the weave of their lives. In each case, particular constellations of circumstances shape and colour current activity: each person involved experiences emotions and remembers events by way of specific sensory, bodily, and interpersonal interactions, both past and present. One woman is alone with her music and her memories, while the social interactions in the other two cases are dramatically different. In each case, dynamic neural and bodily processes are involved, over many timescales. But remembering is something these people are doing now, in complex culturally- and technologically-

mediated settings. It is happening, we might say, in these specific cognitive ecologies. Distributed cognitive ecologies are ‘the multidimensional contexts in which we remember, feel, think, sense, communicate, imagine, and act, often collaboratively, on the fly, and in rich ongoing interaction with our environments’ (Tribble & Sutton 2011, 94). In each of these cases, what occurs is a distinctively-balanced response – embodied, emotional, cognitive, social, and cultural all at once – to the webs of interdependent processes and activities spread across the various elements of these particular sociocognitive ecosystems (Hutchins 2010). In this paper, aiming to throw light on a range of issues in the contemporary interdisciplinary study of memory, I compare this distributed cognitive ecologies framework with Wittgenstein’s remarks on remembering, especially as interpreted in a prominent recent tradition of Wittgensteinian enactivism.

2 Wittgenstein and the cognitive sciences: isolation, conflict, or integration?

If, as suggested by these three cases, remembering in everyday life is deeply embedded in complex, circumstance-dependent webs of significance and social practice, how is it to be studied? What theories and methods can help us understand memory? In particular, how do (and how should) philosophical and scientific approaches to remembering relate to each other? Perhaps they can peacefully coexist, addressing separate conceptual and empirical issues, maintaining a respectful isolation. Alternatively, there might be some kind of engagement or active relation between them.

Ridiculing the neurophilosophical associationism of William James and other ‘scientific’ psychologists, Wittgenstein complained at the metaphysical machinations to which, he thought, the confused new discipline was prone:

How needed is the work of philosophy is shown by James’ psychology. Psychology, he says, is a science, but he discusses almost no scientific questions. His movements are merely (so many) attempts to extricate himself from the cobwebs of metaphysics in which he is caught. He cannot yet walk, or fly at all he only wriggles. Not that that isn’t interesting. Only it is not a scientific activity. (MS 165, 150-1, quoted in Hilmy 1987, 196-7).

But why, I want to ask Wittgenstein, must scientists not wriggle (Sutton 1998, 25-26)? Someone who thinks that William James discusses no scientific questions has an unusually pure vision of what science is and ought to be. Many sciences, including those in the social, human, and cognitive realms, now

study, probe, model, and theorize fuzzy, fluid, volatile, and complex features of reality.

Some of Wittgenstein's followers, both in the 1970s and 1980s and today, share his wish to isolate and insulate a purer realm of genuine scientific accounts of general, observable empirical phenomena both from the messy, particular, context-specific cultural and human realms, and from what he saw as the metaphysically-tainted and prejudice-driven speculation which results when science is illegitimately extended into and projected onto those realms. Seeing themselves as marginalized radicals bravely resisting the imperialistic encroachment of a ubiquitous, domineering reductionist and scientific worldview, they have sometimes taken Wittgenstein's anti-psychological polemic too thoroughly on board. Recent Wittgensteinian scholars rightly aim, however, to move decisively beyond such divisive attitudes. In integrative spirit, this paper assesses their success in doing so, and seeks to nudge the Wittgensteinian enactivists further towards the distributed cognitive ecologies framework.

So in this context I set aside more extreme isolationist views of the relation between philosophy and science, pointing to careful critiques of radically quietist readings of Wittgenstein by Hutto (2013) and Moyal-Sharrock (2013a). But philosophical engagement with the cognitive sciences can take dramatically different forms. One possibility is that philosophy should engage with the sciences because it is incompatible with at least some scientific projects and concepts. For Hacker, for example, philosophy can sometimes

set straight the conceptual confusions and incoherences of scientific theories. For philosophy is neither the Queen of the sciences nor their conceptual scullery-maid, but rather a tribunal before which scientific theory may be arraigned when it trespasses beyond the bounds of sense. (Hacker 2006, 236 quoted in Moyal-Sharrock 2013a, 378).

An alternative form of engagement would see philosophy and the sciences – and their various diverse allies and sub-disciplines – productively engaging with each other, to the extent of seeking integration of concepts, theories, and even methods on certain specific questions. On this optimistic picture, which I defend, 'philosophy becomes a full-fledged member of a cooperative disciplinary matrix, taking information from the empirical disciplines and contributing to them' (Christensen & Sutton 2012, 326).

The difference between engagement as conflict and correction of conceptual confusion, and engagement as cooperation and integration, will not always be sharp: the choice of approach depends on the specific issues at stake. It may be perfectly sensible to try in some contexts an active collaboration, while in other contexts or on other topics seeking instead a new arrangement of scien-

tific descriptions which might ‘give a new direction to scientific investigation’, in ‘saying “Look at it like *this*” in a way ‘that may have advantages and consequences of various kinds’ (Wittgenstein RPP 1.950). This is also a matter of emphasis and style: readers have had dramatically distinct judgements on whether Bennett and Hacker’s constructive program for understanding perception and memory, for example, appropriately balances the weight of their many complaints about the ‘conceptual confusions’ of science (2001, 499 and *passim*).

I argue that even in novel and subtle recent reinterpretations of Wittgenstein in the context of enactivist philosophy, the kinds of engagement with science on show are too heavily weighted towards a critical mode. When cognitive science is discussed primarily to correct its conceptual confusions, those younger philosophers of mind who are committed to more constructive interdisciplinary engagement end up too easily neglecting Wittgenstein’s work. Wittgenstein’s later philosophy offers wonderful, rich resources for making central conceptual contributions to live topics and debates of intense cross-disciplinary interest, across many diverse areas from colour and pain to attention and sensation, language and emotion, mathematics and imagination as well as memory. But this has been obscured by the dominance of polemic in the field, leading in some quarters to unfortunate indifference to and ignorance of Wittgenstein. I argue for an interpretation of Wittgenstein’s remarks on memory and remembering which supports a strongly integrative, cooperative version of the engagement model. Philosophy and the sciences of memory – the social sciences as well as the cognitive sciences – can operate together in complementary projects within common frameworks.

In 1991, David Stern took the following passage as inspiration for a thorough reconsideration of Wittgenstein’s remarks on memory:

Memory can be compared with a storehouse only so far as it fulfils the same purpose. Where it doesn’t, we couldn’t say whether the things stored up may not constantly change their nature and so couldn’t be stored at all. (Wittgenstein 1935-6, p.17, quoted by Stern 1991, 204)

Stern argued that, read one way, the later Wittgenstein’s scattered remarks on memory seem to deny the very possibility of scientific study of learning and remembering. But, he thought, if interpreted more accurately Wittgenstein’s ideas could be fruitfully used for the restricted purpose of rejecting classical symbol-systems views in cognitive science, such as Jerry Fodor’s Language of Thought hypothesis (Fodor 1975). In integrative spirit, pointing the way towards a contextualised science of memory, Stern suggested that Wittgenstein ‘fore-

shadows some of the most promising contemporary work' in connectionist cognitive science (1991, 203).

I had started work in 1990 on a PhD thesis addressing the history, philosophy, and sciences of memory, and I read Stern's paper with pleasure and relief. Connectionism had shown that by the mid- to late 1980s the Language of Thought was not 'the only game in town' in cognitive theory. In particular it had offered the beginnings of a mechanistic alternative to the idea of atomic, independently-stored, localist representations (Clark 1989). Connectionism thus seemed, to me as to Stern, 'a striking fulfilment' of Wittgenstein's prediction 'that people some day will come to the definite opinion that there is no copy in either the physiological or nervous systems which corresponds to a *particular* thought, or a *particular* idea, or memory' (LWP 1.504; Stern 1991, 208). While I disagreed with Stern on some points of detail, his paper seemed to me not only unusually polite and integrative in style, in a literature which at that time often dealt in somewhat brusque and humourless critique, but also to offer an exciting sense of a new era of collaboration between the new cognitive sciences and this rich and subtle philosophical tradition (compare Mills 1993). This seemed like a move towards engagement rather than conflict or isolation.

So I borrowed Stern's tactics in the final chapter of my thesis (Sutton 1993), to set out in detail the central elements of the widespread extreme reading of Wittgenstein on memory, and contrast it with a subtler moderate reading which could sharpen the developing post-connectionist philosophy of mind and memory. I offered a historical analysis of Wittgenstein's targets, suggesting that his more extreme remarks derived from a tendency to collapse all psychological sciences of memory into either Cartesianism or unacceptable behaviouristic versions of associationism, so that the urge to avoid these erroneous views turned into the urge to avoid psychology (compare ter Hark 1995 on Wittgenstein's responses to ideas about memory in Gestalt psychology). This chapter on Wittgenstein did not make it into *Philosophy and Memory Traces*, the much-revised book derived from my thesis, which was focussed primarily on earlier historical periods (Sutton 1998): both my interpretation of Wittgenstein and his followers and the links back to my alternative account of the history of associationism remained unpublished. Here I revisit and update my arguments: though I abstract away from the historical detail about Wittgenstein's context and reading, and from the scholarship on the gradual development of his own views (Stern 1995), I do try out a new big-picture account of the history of cognitive theory and the philosophy of cognitive science since the 1980s.

As it turned out, and for significant reasons, connectionism did not on its own provide sufficient tools for thoroughgoing revision of the broader conceptions of agency, individuality, and mind employed in mainstream classical cog-

nitivism. Connectionism's alternative accounts of cognitive neurodynamics, though already enough to confirm that remembering is a constructive, furiously active process, had to be supplemented both by more direct critique of the individualism of classical cognitivism, and by stronger, more integrative and practice-oriented views of the situated or distributed mind (Hutchins 1995; Clark 1997, 2001; Rowlands 1999; Sutton 1999). These views have developed into the framework of distributed cognitive ecologies which I introduced briefly above, and which I will argue offers both the most fruitful current integrative approach to the interdisciplinary study of memory, and the most productive contemporary framework with which to connect Wittgenstein's remarks on remembering.

And as it turned out, the engagement model of the relation between philosophy and the sciences did not get a firm grip in Wittgenstein studies. In the same period, as cognitive theory and practice has opened up dramatically, a number of other theoretical frameworks in which powerful attacks on both the localism and the individualism of classical cognitivism had been developed have shifted ground. Phenomenology and ecological psychology, for example, now often operate productively as natural if often still critical allies of research in situated, embodied, and distributed cognition, rather than continuing to stake out distinct territories as glowering antagonists. But at least one important strand of Wittgenstein scholarship has gone a different way. Danièle Moyal-Sharrock has rightly sought to introduce a more productive dialectic to the debate, arguing that 'Wittgenstein's reconceptions [of memory] can be seen at work in [the] leading practitioners' of 'neuropsychology' (2009, 213). But she has recently allied her interpretation of Wittgenstein with one contemporary version of 'enactivist' theory (Moyal-Sharrock 2013b). I will argue that this is not quite the right move.

Although 'enactivism' is a very broad church, in this paper I follow Moyal-Sharrock in discussing only the version developed by Daniel Hutto and colleagues as 'radical enactive cognition' (Hutto 2013, 2014; Hutto & Myin 2013; Hutto, Kirchhoff, & Myin forthcoming; Moyal-Sharrock 2013b; Myin & Zahidi 2014). I focus here on these forms of Wittgensteinian enactivism because much of what these philosophers say about remembering is interesting and reasonable. Where they go astray is partly in their in their claims about what psychologists and cognitive scientists do and believe, and partly in their choice of criticisms, or their sense of which issues matter most.

In section 3, I argue that the issues about mental representation and content on which these enactivists focus are quite distinct from the issues about individualism which lie at the heart of the major revisionary movements in contemporary cognitive theory in which both enactivism and the distributed cognitive ecologies framework have arisen. After going back to work through the key

critical themes of Wittgenstein's remarks on memory in section 4, I then survey the recent history and contemporary landscape of the sciences of memory. Here, in clearing the ground for a direct evaluation of Wittgensteinian enactivism and the distributed cognitive ecologies framework, I set both against truly opposing views in classical cognitivism and reductionist neuroscience, but I complicate the enactivists' critical assessment of the broader psychology and cognitive science of memory. Both because they focus so exclusively on problems about representation, and because they mischaracterize some of the 'mainstream' views under attack, Wittgensteinian enactivists maintain an unnecessarily divisive attitude towards the sciences of memory in general, and as a result tend to overemphasise the revolutionary novelty of their critiques. I argue instead that on many key theoretical points, both Wittgensteinian and enactivist accounts of memory are compatible with large swathes of mainstream work in philosophy and cognitive science. But once we focus more productively on questions about individualism rather than exclusively on problems of content, Wittgensteinian themes can indeed usefully redirect, temper, or illumine certain residual and significant challenges in the interdisciplinary study of memory (section 6). As yet, though, as I argue in the concluding section 7, Wittgensteinian enactivists still set unnecessary limits to constructive theory-development.

This recent tradition of Wittgensteinian enactivism affords opportunities to reclaim and enliven Wittgenstein's legacy. But these accounts could better be productively integrated with the specific approaches to mind and memory which I introduced above as the study of 'distributed cognitive ecologies', and to which I provide extensive references below so that those interested can easily access work on memory in these burgeoning traditions. My aim is ecumenical. The potential points of contact between enactivist Wittgenstein and cognitive-ecological Wittgenstein have been under-emphasised, as theorists have focused on residual differences. In what follows, I do not neglect those points of difference: but I do offer a new diagnosis of the landscape of problems, and of which issues provide the barriers to integration and cooperative engagement between philosophy and the sciences of remembering.

3 Two distinct Issues: representations and individualism

I mentioned above the revolutionary fervour with which connectionist philosophers and cognitive scientists alike hoped in the 1980s and 1990s not only to overturn classical cognitivism but also to develop rich and novel post-Cartesian

alternative pictures of agency, embodiment, control, identity, and temporality. Seeking ‘a revolutionary change in the intellectual culture of cognitive science’ (van Gelder & Port 1997, 139), theorists from a range of distinct disciplines and backgrounds came together to build thoroughly decentralized pictures of cognition which take temporality, body, and world seriously. Sharing an opposition to the ‘generically Cartesian picture of the nature of mind’ which they saw still dominating classical cognitivism, they attacked not only Descartes’ dated dualism and his apparent division of cognition from affect, but his deeper picture of cognitive processes as cut off from the physical environment and the social world, in ‘a realm whose essence owes nothing to the accidents of body and surroundings’ (van Gelder 1995, 379; Clark 1997, xi).

This was the primary route from within the cognitive sciences towards the radical forms of anti-individualism which have since come to prominence in various forms as embodied, enactive, situated, extended, and distributed cognition (Robbins & Aydede 2009). The individualist claim which was seen as common to Descartes, Herbert Simon, and Jerry Fodor alike was that cognitive states and processes are wholly internal. On Fodor’s methodological solipsism, for example, both world and body can be practically discounted in cognitive science. The former is merely a source of input to the true cognitive system in the head, and the latter merely a courier system for sensory and motor messages (Fodor 1980). In place of the resulting classical cognitivist assumption that ‘perception, thought, and action must be temporally distinct and theoretically separable’ (Wheeler 1995, 67), the new anti-individualists wanted us both to ‘think of cognition as essentially a matter of change in time’ and to acknowledge the spread or distribution of cognitive states and processes across the porous and metaphysically insignificant boundaries of brain, body, and world (van Gelder & Port 1997, 135; Clark 1997, 214; Wilson 1994). In van Gelder’s terms, cognitive systems are ‘complexes of continuous, simultaneous, and mutually determining change’:

the cognitive system is not just the encapsulated brain; rather, since the nervous system, body, and environment are all constantly changing and simultaneously influencing each other, the true cognitive system is a single unified system embracing all three ... interaction between the inner and the outer is ... a matter of coupling, such that both sets of processes continually influence each other’s direction of change. (1995: 373)

The unit of analysis for cognitive science would thus have to expand, potentially including not only the individual brain and body, but other people and groups, the physical environment, social interaction, cultural norms, artifacts and technologies, thus bringing these new anti-individualist movements into close contact with relatively independent anti-individualist traditions in cogni-

tive anthropology, ecological psychology, educational and social theory, science studies, robotics, developmental and cultural psychology, and phenomenological philosophy (Donald 1991; Hutchins 1995; Clark 1997; Lave 1998; Latour 1999; Robbins & Aydede 2009; Sutton 2010; Michaelian & Sutton 2013).

In this potted history of the early anti-individualist situated cognition movements, I have not mentioned issues about either the existence or the nature of mental representations, memory traces, or internal content. This is no accident. It has perhaps taken some hindsight to see it, and I for one have not always been clear on this point: but questions about mental representation are independent of or orthogonal to questions about individualism. No view about the existence or nature of mental representation entails or dictates any specific position in debates on whether or not cognition is entirely internal; and both individualism and anti-individualism are compatible with a wide range of views on mental representation.

Connectionism was still a central part of the new frameworks developed by most of these anti-individualists in the 1990s: it was to provide the neural wing of the intended multidimensional analyses of heterogeneous but complementary resources. But connectionism didn't deliver the whole package, because even understood as spanning or dissolving the alleged gap between personal and subpersonal processes, and as seeking a general framework for thinking of mental life (Smolensky 1988) it was not quite pitched at the right level. Even though anti-individualist connectionists were clear that the brain was not to have any general explanatory priority in their explanatory frameworks (while its unique contributions would still be acknowledged), connectionism alone was silent about the bodily, social, and environmental resources which enter into more or less rich and intensive couplings with the embodied brain, about the nature of the interfaces, and about the forms and varieties of interactive relations between brains, bodies, and world.

So in both rejecting and offering detailed alternatives to the atomistic and localist accounts of mental representation defended by Fodor and other classical cognitivists, connectionism remained primarily a new approach to issues about mental representation rather than a broader vision of agency and self. There were tempting and plausible lines of thought which argued from connectionism to anti-individualism, for sure. If our neural processes were more volatile, fleeting, distributed, or chaotic than the orderly transitions of structured representations postulated in the Language of Thought hypothesis, then perhaps whatever systematicity and stability our memory and thinking do achieve is supported more by external cultural and enacted scaffolding than by any recognizable, transparent order in the brain (Rumelhart et al 1986; Clark 1997; Menary 2007; Sutton 2009a). So paths away from individualism were easier to

find once Fodor's discrete semantic atoms had been rejected. But the rejection of Fodor's kind of representational and computational theory of mind did not *entail* anti-individualism. On the one hand, classical computationalism itself could (and on some views should) adopt an anti-individualist stance (Wilson 1994). On the other hand, there remained many who had entirely rejected classical cognitivism's semantic atoms but still saw cognition as occurring in the head (Churchland & Churchland 1997; O'Brien 1998).

The failure to understand that issues about mental representation simply cross-cut or cross-classify issues about individualism, and the consequent confusion between these two sets of issues, has been a pervasive feature of debate in the philosophy of cognitive science in recent years. There is a looseness of fit or a many-many relationship between views about mental representation and views about individualism. Nothing about the truth or falsity of individualism, or about precisely what kind of anti-individualist alternative is to be preferred, is settled simply by adopting a particular view about mental representation. Whether you stuck, in the debate about representation, with classical cognitivism; accepted connectionism in more moderate form, as a revised kind of computational theory of mind; offered a more revisionary take on connectionism in which the form and dynamics of systems of distributed representation was entirely unlike that of the Language of Thought; or rejected connectionism entirely, you still needed (and still need) distinct reasons to adopt any specific view about individualism.

It is true that from the start of the situated cognition movement, some theorists combined anti-individualist conclusions with a blanket rejection of mental representations (Varela, Thompson, & Rosch 1991; van Gelder & Port 1995). But no argument effectively brought these two issues together. In particular, it was not and has not been shown how a refusal to countenance mental content or to posit memory traces or other kinds of mental representation automatically brings any reason to reject internalism about the mental. Neither, contrariwise, does any specific *positive* view of mental representations decide the issue about individualism. The two sets of issues, each encompassing a range of subtly varying options, are independent.

If this claim that issues about representation and issues about individualism are orthogonal is correct, it means that decisions about which set of issues to focus on are pragmatic and context-dependent. Both issues are of great theoretical significance, and in an ideal world we would have settled answers to and consensus on both. But in the real world's messy marketplace of contested philosophical and cognitive theories, we need to specify separately and explicitly which set of issues is in question in any particular context, and to motivate and defend views on each set of issues independently. The Wittgensteinian enactiv-

ists are, as we will see in section 4 below, faithful to Wittgenstein in focussing far more extensively and remorselessly on the critique of mental representations, and saying much less about the individualism issue. My primary concern as a theorist of distributed cognitive ecologies, in contrast, is with individualism. But – whatever Wittgenstein’s views on individualism – the enactivists claim to be defending an anti-individualist position as well as their anti-representationism (Hutto & Myin 2013; Hutto, Kirchoff, & Myin forthcoming). Once we have firmly distinguished these two sets of issues, I will then show in section 5, we achieve greater analytical clarity in assessing the current state of the sciences of memory in the light of Wittgensteinian critique.

4 Wittgenstein on Memory: critical themes

The core features of Wittgenstein’s attack on the scientific psychology of his day are his rejection of traces and representations; his apparent denial of memory processes or experiences, which goes alongside his privileging of the deed; a set of views about explanation and causation; and a cautious or conservative view about conceptual change in psychology. Contemporary enactivism explicitly highlights the former two points: but I will suggest that the latter two points are implicitly steering its direction.

When I recognize a man and remember his name, Wittgenstein suggests, this does not mean that there has to be ‘a cause of this remembering in my nervous system’: we are wrong to think that ‘a trace’ *must* have been left behind, that ‘something or other’ must ‘be stored up there *in any form*’ (Zettel 610 = RPP 1.905). The apparent denial that experience changes the brain in any ways that influence our psychology over time is couched in powerful rhetoric. It is marvellous, notes Wittgenstein, that I can answer a question about what I did this morning ‘without looking up historical traces of activity or the like’ (RPP 1.106). Whatever order exists in our thinking, talking, and writing need not derive from the *structure* of any neural centre, but ‘might come into being out of something quite amorphous, as it were causelessly’ (Z 608 = RPP 1.903). More generally, we should avoid ‘thinking in physiological hypotheses’.

Passages like these have given rise to some more extreme interpretations. For some readers, Wittgenstein is here rejecting the supervenience of the mental on the physical (McGinn 1984, 112-116; Budd 1989, 30ff). Malcolm claims to be following Wittgenstein in seeing memory traces as magical as well as comical, providing theorists with ‘the thrill of the incomprehensible’ (1986, 184, 200).

Bursen claims that trace theories require the brain to have supernatural powers (1978, xii).

But at other points Wittgenstein's rhetoric is less extreme. In saying that 'whatever the event does leave behind it in the organism, it isn't the memory' (RPP 1.220), Wittgenstein is not denying that something is left behind, but reminding us that nothing in the brain on its own is or determines either the occurrent act of remembering, or the enduring dispositional 'memory' which the person retains so long as she has the capacity to remember. So as Moyal-Sharrock argues, Wittgenstein is rejecting only stronger views of psychophysical isomorphism, correspondence, or parallelism, but not 'the *merely* physiological correlation' (2013b, 270). On her more moderate interpretation, Wittgenstein's point is that while 'neuronal changes in the brain may be necessary ... they are not sufficient for memory' (2013b, 271; cf ter Hark 1995). Even though the 'jottings' made by a man who has taken note of a text in order to repeat it later do not 'render' or 'translate' that text 'into another symbolism', so that the text is not 'stored up in the jottings', he still *needs* the jottings, and his performance changes if they are altered or destroyed (Z 612 = RPP 1.908). While the remembered *text* itself is not stored up in either jottings or nervous system, such passages leave open the possibility of experience-dependent changes in the brain, as long as we do not model or imagine such processes by projected familiar structured actions onto an imagined inner world, and as long as we remember that such neural processes may 'constantly change their nature'. After all, 'nothing is less static than the nervous system' (Wilkes 1980, 115).

Wittgenstein's attack hits its mark against a static or structural conception of the memory trace, by which stable, semantically discrete individual memories are independently stored at distinct locations. Just as the brain is not 'a writing', memory itself is not like a notebook, and remembering does not involve 'looking things up in a notebook in spirit' (LWP 1.806; PG 131, pp.181-2). Stern suggests that we could 'regard the jottings and the memory they prompt as analogous to the initial state of a connectionist network and the output it leads to. While the memory has a linguistic form, the jottings do not; they are not strings of symbols with an articulated structure' (1991, 214).

There is reasonable disagreement about whether these same worries also hit the mark against the radically revised notions of the internal memory trace defended in some quarters of post-connectionist philosophy of mind, mainstream cognitive psychology, and dynamical and systems neuroscience. There are unresolved issues here about just how transformed a notion of the memory trace can be while fulfilling the roles for which it was posited, or on the question of whether there is anything *psychological* about the enduring disposition to

respond in appropriate, memory-like ways in certain settings (Matthen 2010; Sutton & Windhorst 2009; Vosgerau 2010). But these issues are orthogonal to the concerns of this paper. While questions about the existence and nature of traces, and about mental content, are important in other contexts, they are not directly relevant for the study of remembering as public practice. In particular, not only the bulk of contemporary research in the philosophy of memory, but also all the interdisciplinary projects informed by the sciences of memory with which I am concerned here can proceed with no commitment to brain traces that *correspond* to particular memories. Whether or not we ultimately take the much more radical step of restricting the vocabulary of cognitive neuroscience and restricting to the kinds of ‘merely physiological correlation’ to which Moyal-Sharrock refers, such a restriction is fine for the purposes of the partial, incomplete enquiries into remembering as public practice which are my topic here. We can definitively reject the key errors which are rightly under Wittgensteinian suspicion. For the purposes of this paper, we can agree to dispense with traces, since this does not influence the other key issues at stake here. Whether there are (inner) traces or not, the trace is not the memory.

Secondly, to shift from physical mechanisms of memory to putative mental mechanisms, Wittgenstein mockingly notes that, in answering that question about his past activities, he ‘wouldn’t even know that this was possible through a special mental process, remembering, if I were not told so’ (RPP 1.106). Memory is often in use when not explicitly in question: we just talk or think about the past directly, without pausing to engage a special memory system to do so. In a number of remarks, Wittgenstein addresses the question ‘is memory an experience?’ (RPP 1.110-119; PI 305-8; PI II.xiii, p.231). There is no two-step process, first an inner experience of remembering and then its expression. Rather, remembering is just something we do, across a range of activities or practices.

In a particularly intense passage, Wittgenstein compares the easy mistakes we make about remembering, in seeking an inner experience *behind* our expressions of memory, with similar tendencies with regard to love and to philosophy. We are ‘using a picture: we test love for its *inner* character, which the immediate feeling does not discover’ (RPP 1.115). When someone makes a memory claim, Wittgenstein enjoins, we must resist the temptation to ask ‘what fact, what process is he remembering?’. That is an error because what he is remembering ‘has already been stipulated’: the only relevant questions are about the purpose and the use of this language of memory (RPP 1.716).

Enactivists about memory rightly stress the practical nature of remembering (Moyal-Sharrock 2013). Wittgenstein notes that ‘If I say, rightly, “I remember it”, the most *varied* things may happen; perhaps even just that I say it’ (PG 42). Remembering is in general, in most of its forms, an activity, something that we

do. Even though involuntary remembering is surprisingly pervasive in everyday life (Berntsen 2009), what happens even in such cases is in principle public and ‘isn’t at all the mental process that one imagines’ (PG 42). This is perhaps the closest Wittgenstein gets to an explicitly anti-individualist line of thought.

Thirdly, Wittgenstein wants us ‘not to explain, but to accept’ psychological phenomena: though it is difficult to renounce ‘all theory’, we should leave psychological phenomena ‘enigmatic’ (RPP 1.509, 1.723, 1.963, 1.1063). Even though Hutto argues that Wittgensteinian philosophy does not leave us ‘utterly mute’, he claims in Wittgensteinian spirit that ‘even if all of the relevant details [of how cognition and intersubjectivity emerge in interaction] are provided, such still remain, at best, a description and not an explanation’ (Hutto 2013). Wittgenstein applies his general view that causal and conceptual accounts of a phenomenon are incompatible (PI II.xi, p.203) to the specific case of remembering. The causal picture allegedly revealed by scientific psychology ‘stands in the way of our seeing the use of the word [‘to remember’] as it is’ (PI 305). His defence of ‘a causality between psychological phenomena, which is not mediated physiologically’ (Z 611 = RPP 1.906) is developed, in Malcolm’s and Ginet’s discussions of memory, into wholehearted support for action at a temporal distance, with no intervening causal processes or ‘continuous specific causal connections’ (Ginet 1975, 168; Malcolm 1977, 1986; McGinn 1984, 113 finds this ‘intolerable’).

Finally, Wittgenstein’s general reluctance to permit or sanction criticism of practices or beliefs by those who do not share the relevant form of life is applied to mind and memory. He refuses to admit new empirical facts as a legitimate motivation for revising our understanding of our own psychological nature. If psychoanalysis is successful in practice, for example, it is not because new facts about the analysand have been discovered, but because persuasive or charming ‘explanations’ have been offered (LC, 23-27). To attempt any scientifically-motivated revisions of common sense is not to give way to the pressures of empirical discovery, but to switch language games: ‘what a Copernicus or a Darwin really achieved was not the discovery of a true theory but of a fertile new point of view’ (CV, 18). Wittgenstein’s followers object in similar spirit to the adopting and adapting of ordinary psychological terms by practitioners of ‘so-called cognitive science’ (Hacker 1990, 147). There are no discoveries to be made about human psychology: nothing is hidden from the pre-philosophical user of ordinary language. Not only is revisionary ‘neurophilosophy’ simply ‘daft’ (Harré 1988, 110; Sharpe 1987; Haldane 1988): any attempt to explain or investigate the ‘enigmatic’ mind by experimental methods is as hopeless, as bedevilled with category mistakes, as is trying to ‘determine what matter and spirit are by chemical means’ (RPP 1.1093). As Moyal-Sharrock sees it, ‘it is scientists, not

philosophers that base their claims on evidence. What philosophers do is work on more perspicuous conceptual presentations of how things are' (2013c, 10).

Because of this conceptual conservatism, Wittgenstein answers his own question 'Why can't we imagine a machine with memory?' (MS 110, p.35, Feb 1931) with the flat response that 'it is only of a living human being and what resembles (behaves like) a living human being' that psychological words can be predicated (PI 281, cf PI 359-360). It is on conceptual or (better) 'grammatical' grounds that machines cannot be ascribed thoughts or memories. Strangely, Wittgensteinian philosophers have not sought to explore more thoroughly the rich range of ordinary psychological terms for memory and remembering, their scope and uses, as have others in the course of developing a causal theory of memory (Deutscher 1989), a phenomenological approach (Casey 1987), or cross-linguistic investigations (Amberber 2007; Sutton 2007; Wierzbicka 2007).

5 Contemporary sciences of memory: history and targets

This powerful, four-pronged Wittgensteinian critique, stated bluntly in my brief summary, has had considerable influence, at least with regard to its critical treatment of traces and representation.

Firstly, as Stern rightly argued, Wittgenstein's remarks clearly hit the mark against classical versions of the computational and representational theory of mind. These theories take the serial digital computer as model for the human mind, as in Newell and Simon's Physical Symbol Systems hypothesis and Fodor's Language of Thought hypothesis. Among the key points of conflict are the commitment, in such classical cognitivist theories, to *local* representation in the mind-brain, to the *discrete* storage or archiving of separable or atomic contents; and the consequent sharp separation in such approaches of memory (or 'data') from ongoing processing. Our memories, on these views, have no intrinsic dynamics, and are insulated and isolated from the other ongoing influences of the weave of our life. Classical models take it as a virtue that the identity and integrity of memories is 'unmodified by their neighbours ... like beads on a string', rather than fusing, interfering, and blending as in a compost heap or a connectionist system (Hampshire 1989, 121; Sutton 1998, 225-247). But as a theory of memory in living systems like us, they therefore run counter to the fact that, as Oliver Sacks put it, 'it is characteristic of a creature, in contrast to a computer, that nothing is ever precisely repeated or reproduced' (1990, 49).

Secondly, Wittgenstein's remarks also hit home against the neurocentric excesses of some strands of popular science and neuroscience. The idea of unique, discrete neural states which 'store' single psychological items may still have a grip in some quarters of the popular imagination. Some critics still catastrophize the current state of the scientific field too. Jens Brockmeier, looking forward to a period 'after the archive', sees archival accounts of memory storage as still ubiquitous, and as taken by psychologists and in popular culture alike to support 'the idea of memory's continuity, stability, coherence' (2010, 10). For Brockmeier, it is 'astonishing' that cognitive science has not yet realized that the archive view of memory is 'about to be dismantled' (2010, 20; compare Danziger 2008). This is at best too quick. It is harder than this blunt judgement to assess the ongoing grip on scientific thought of correspondence-style beliefs about discrete memory traces. Mere references to memory traces do not demonstrate that scientists accept strong views of psychophysical isomorphism between specific thoughts or memories and particular discrete brain states: as dominant interpretations of superpositional connectionism show, there are many ways of thinking of traces as radically dynamic and distributed which precisely show that and how the things 'stored up' may 'constantly change their nature'. Likewise, the bare use of the terms 'encoding' and 'retrieval' does not carry any commitment to the claim that particular ideas or memories are *copied* in the nervous system. In those senses, the 'search for the engram' really is off in cognitive psychology, not just because of the history of failures to find it since Lashley (1950), but because of the pervasive influence of Bartlett's radical constructivism (1932; Sutton 2004).

But when we turn from considering the complex range of views about mental representation to addressing the distinct issue of individualism, we find much clearer genuine targets. The Language of Thought hypothesis is itself at odds with neurocentric reductionism on many points: but common to both is a form of individualism or internalism about mind and memory, by which remembering only occurs 'intracranially', within the skull. This is clear for example in the 'ruthlessly reductionist' rhetoric of certain interpretations of neuroscience, by which body, context, situation, and activity can be simply screened off while the real memory processes in the brain are studied (Bickle 2008). In criticising this kind of view, enactivism and the distributed cognitive ecologies framework are entirely at one. On the latter approach, the human brain is unusually open and incomplete: it thus does not constitute or exhaust our mental life, which is rather distributed across brain, body, and world in heterogeneous and dynamic cognitive ecologies (Haugeland 1998; Clark 2003; Hutchins 2011). While in popular science the idea that memory 'resides in' the brain is still often simply assumed, the advent of alternative theories of distributed memory (Clark

& Chalmers 1998; Sutton 2010) has changed the theoretical landscape dramatically (Menary 2010; Sutton, Harris, Keil, & Barnier 2010). When Moyal-Sharrock delineates her target as ‘the predominant view ... that human meaning and emotion ultimately reside in, and can be reduced to, encoded traces in the brain’ (2013c, 1), anti-individualist views cannot be the subject of the critique. It is harder, however, to assess just how broadly the individualist consensus still holds.

Certainly, individualism is more widespread in the sciences of memory than any full isomorphism thesis about specific mind-brain correspondences. Many psychologists who are remorselessly constructivist and have no interest at all in searching for unique neural engrams nevertheless retain the default assumption that memory and mind are still internal, and see strong claims that cognition is distributed or spread across brain, body, and world as highly suspect. But after 30 years of post-connectionist theory in which anti-individualist lines of thought from a range of philosophical traditions have increasingly found themselves at the heart of cognitive scientific debate (Michaelian & Sutton 2013), it is no longer legitimate to characterize *all* the sciences of memory as inevitably dominated by forms of individualism.

The cognitive sciences of memory have for many years opened up to more situated accounts of remembering as public practice occurring in rich contexts and settings. If Ulric Neisser’s lament that ‘if X is an interesting or socially significant aspect of memory, then psychologists have hardly ever studied X’ was true in 1978 (Neisser 1978/ 2000, 4), things changed quickly and for a range of independent reasons. The influences of Bartlett and Vygotsky intensified over the 1980s and 1990s across a variety of traditions and sub-disciplines, with new methods emerging in each area to adapt to the challenges posed when remembering is not isolated from its environments and contexts. These shifts can be traced, for example, in ecological and practical memory movements (Neisser 1997), in the expansion of applied memory research in real-world settings (Rubin 1995; Saito 2000), in the extraordinary efflorescence of rigorous work on the socio-cultural interactions at the heart of the development of autobiographical memory in young children (Fivush & Haden 2003; Nelson & Fivush 2004), in the rebirth of the scientific study of autobiographical remembering after nearly a century of neglect (Conway 1990), and in waves of psychological work on social, shared, collaborative, and transactive memory (Hirst & Manier 2008; Michaelian & Sutton 2013; Wegner 1986; Weldon 2001). These are now entirely mainstream research traditions. Because they are far less vulnerable to Wittgensteinian critique, and open to integration with and influences from philosophical ideas, these are the theories and projects with which Wittgensteinians need to engage. Otherwise they are both missing the target and losing the opportu-

nity of productive collaborations which might take our understanding of memory forward.

To summarise and simplify, the alternative themes on which there is significant agreement with the Wittgensteinian views across these domains of memory science include the following claims, which are all independent of any particular ideas about traces and representation. Remembering is an active process which occurs in time and over time. Our memory abilities in a sense soak in from the sociocultural world in which we develop, rather than unfolding in any biologically-determined maturational pattern: in specific (and culturally variable) narrative environments, caregivers and children gradually establish abilities for joint attention to past events, in ways which profoundly sculpt the child's later capacities for spontaneous recall (Sutton 2002; Reese 2013; Wang 2013). Remembering is a constructive process through and through: just as perception and attention are selective and salience-driven, so our capacities to recall, recollect, and re-evaluate past events are substantially context-dependent, drawing on the fly on heterogeneous resources rather than extracting fully-formed materials from a static store (Sutton 1998; Michaelian 2011; Goldie 2012). Remembering has many functions besides tracking the truth, which often take precedence over any demand for precision or completeness in recall: we construct and maintain identity in part by thinking through and sharing our accounts of past events, we try out and guide possible future actions and decisions by working through relevant past experiences, and we promote or reassess our social and intimate relationships through joint reconsideration of significant or shared histories (Bluck et al 2005; Harris, Rasmussen, & Berntsen 2014). The neural resources which play unique but partial roles in supporting complex and diverse acts of remembering are themselves highly dynamic and distributed: as cultural neuroscientists, philosophers, and neuroanthropologists alike increasingly demonstrate, the human brain's plasticity affords extraordinary scope for us to inhabit wildly varying forms of life (Lende & Downey 2012; Menary 2013).

Contemporary sciences of memory, therefore, are neither scientific nor reductionist in the ways which have standardly and rightly worried philosophers influenced by the later Wittgenstein. Corollaries of the positive characterizations I have just offered include the following mainstream views. No single, static content is 'encoded' at the time of experience, or subsequently preserved in isolation from ongoing influence. No single internal copy corresponds to or encodes a particular past event. No memory trace determines either what is recalled or the memory expression: rather, remembering is a constructive process involving indefinitely many and various contextual factors. There is no

scanning of stored records by some homuncular internal executive to check or match against a present stimulus.

When Moyal-Sharrock claims that ‘as regards memory, Wittgenstein debunks our preconceptions about it residing in the brain – in storage as it were’ (2013b, 269), she does not explain whose preconceptions are in question. There is certainly no universal, transhistorical, cross-cultural such preconception, and Moyal-Sharrock seems primarily to have a kind of reductionist neuroscientific target in mind rather than any common sense view. After quoting Bennett and Hacker on the point that a ‘neural configuration’ is not a memory, she goes on to criticize ‘our’ view of the trace ‘as having an *activating* function ... so that every time we remember an event, besides representing it, the trace is also supposed to select, decode and activate the memory’ (2013b, 271). The views under attack here are not recognizable in the sciences of memory I have described.

Likewise, Myin and Zahidi attack what they call a ‘traditional view, accepted by mainstream cognitive scientists and philosophers’ that access to information concerning one’s past is sufficient ‘for recollecting events in one’s past’ (2014, 8-9). But they do not distinguish experiential or personal memory from merely factual or semantic memory, or acknowledge that on mainstream views, mere information processing is *not* taken to be sufficient for experiential or episodic memory. So when they give an example of a person who merely has access to factual information about an event in her past, yet clearly does not experientially remember that event, they misleadingly claim that this refutes ‘the standard view’ of memory *tout court*. They make sensible remarks about the context-sensitive nature of experiential or personal memory, as past events recalled are integrated or embedded in the person’s web of habits, personal history, motivations, and anticipations. But in light of my review of contemporary work, we can see that these are not such novel claims: in addition to parallel discussions across memory theory of the embodied and world-involving nature of remembering, and the importance of the resulting ‘feeling of “fitting”’ (Myin & Zahidi 2014, 10), their specific claim that a genuinely remembered personal event must be available to be situated ‘in a diachronic sequence of events’, with a ‘sense of what led up to it, or what further events followed it’ (2014, 9) is not a dramatic denial of mainstream accounts, but echoes central themes of both philosophical and psychological views on memory and self (Campbell 1997; Hoerl 1999; Conway 2005; Sutton 2009b).

Finally, Moyal-Sharrock rightly underlines Wittgenstein’s stress on ‘memory as a way of acting’, in that words or gestures can *constitute* remembering (2009, 217-8; 2013b, 272-3). This takes us closer to anti-individualism, is indeed less commonly noted in other strands of the science and philosophy of memory, and needs further development and exploration. But again it is not entirely

alien to mainstream traditions. Perhaps the clearest evidence lies in the rich work of Martin and Deutscher at the outset of the causal theory of memory, a firmly mainstream approach which has often been taken as a target for vitriolic attack by Wittgensteinian philosophers (Squires 1969; Malcolm 1977; Deutscher 1989). Martin and Deutscher's original paper (1966, 161-2) began by outlining a striking case in which remembering a particular event is constituted by certain bodily movements. Consider, they asked us,

the case where some swimming is an example of remembering and not, as is usual, an example of remembering how. Suppose that someone has never dog-paddled. He is not good at visualization and has never learned any words which would describe swimming. His method of representing the one time at which he saw a man dog-paddle is his actually doing the dog-paddle stroke. We can imagine him trying to remember the curious action that the man went through in the water. He cannot describe it, and cannot form any picture of it. He cannot bring it back. He gets into the water, experimenting a little until suddenly he gets it right and exclaims, "Aha, that's it!".

Here embodied action just is remembering. This bare insight certainly requires further attention (Deutscher 1989): enactivists and phenomenologists can work together with those who think in terms of distributed cognitive ecologies to make sense of the public, embodied, and kinesthetic dimensions of personal memory (Behnke 1997; Koch et al 2012; Sutton & Williamson 2014). But on this as on all the key issues about how to conceive positively of remembering as public practice, an accurate history of the recent philosophy and sciences of memory confirms that not only is there no necessary conflict with Wittgenstein, but there is no bar towards further and richer engagement.

6 Wittgensteinian Challenges for the New Sciences of Memory

I have painted a rosy picture: once we focus on questions about individualism and put aside the independent issues about traces and representations, Wittgensteinian philosophy can interact productively with the contemporary sciences of memory, both with certain strands of mainstream psychology and with the more specific ideas of distributed cognitive ecologies which I defend. I motivate such an integrative vision further below. Of course not everything is conclusively resolved, and there remain challenges to this happily united interdisciplinary approach to remembering as public practice. But, I argue in this

section, the distributed cognitive ecologies framework can meet these challenges, ward off critiques, and set new agendas.

There are indeed subtle ways in which latent individualist assumptions can easily creep back. For example, we can examine critically the pervasive metaphor of scaffolding used in many psychological and philosophical studies of memory and development (Wood, Bruner, & Ross 1976; Clark 1997; Sutton 2002; Caporael, Griesemer, & Wimsatt 2013). The notion of scaffolding may appropriately mark the many dimensions and timescales of rich sociotechnical interaction in learning and apprenticeship, and motivate research on the uptake of cultural or otherwise context-specific features of the learning environment in spontaneous later memory practice. But some references to the internalization of the once-scaffolded capacities are in danger of over-emphasising the dismantling or ‘fading’ of adult or expert assistance (Collins, Brown, & Newman 1989; Pea 2004). This can give rise to a kind of ‘deficit model’ of cognitive capacities. A building which *continues* to rely or lean on scaffolding may seem incomplete or deficient: but on the model of socially distributed cognitive ecologies human memory *remains* thoroughly hybrid and ‘scaffolded’ even (or especially) in its mature operation (Sutton forthcoming). This is one point at which cognitive and developmental psychology really must be wary of a residual individualism, as if a prior biological locus of genuine cognition could be divided from merely temporary external supplements. Social interactionist work on memory in developmental psychology needs to be even more firmly integrated into the methods and assumptions of cognitive research on remembering: we do not stop relying on other people, and distributing our memory resources across heterogeneous social, material, and technological systems, in our adult life.

Enactivists have criticized ideas about extended and distributed cognition on precisely these grounds (Hutto & Myin 2013; Myin & Zahidi 2014). It is true that the word ‘extended’ can easily be misread as assuming a more basic inner cognitive system which only spreads later in development. For this reason, the well-established pre-existing label ‘distributed cognition’ should be preferred (Hutchins 2014): there is no need for the awkward enactivist coinage ‘extensive mind’. It is true that Hutchins sets up distributed cognition as a more general ‘perspective’ or, as I would say, a framework rather than directly as a metaphysical claim. Hutto, Kirchhoff, and Myin (forthcoming) think that this invalidates my case, since distributed cognition ‘makes no claims about the nature of cognition’ and is merely a pragmatic stance. But this rests on a mistaken reading of Hutchins, who does make many specific claims about the nature of cognition in particular settings. The *general* distributed cognition perspective is a broader framework which on its own does not make empirical predictions, but this is no blanket retreat from ontological commitment: ‘it is possible to pose many em-

pirical hypotheses within this perspective' (Hutchins 2014). As I have argued in detail previously, theorists of distributed cognition do (rightly) focus on encouraging methodological and pragmatic change to scientific practice, and tend to see metaphysical claims about the general nature of mind as having to arise from scientific work (Sutton et al 2010). By developing multidimensional frameworks, we can then understand many distinct particular cases in which there are variations in the resources of distributed cognitive systems and the nature of their interactions. Far from dispensing with empirical claims about the nature of cognition, as Hutto and colleagues charge, the distributed cognition framework thus clears the ground to turn metaphysical distinctions into tractable, context-specific empirical inquiries.

Having explained why it is more fruitful to retain the established label 'distributed cognition' rather than talking in terms of 'extensive' mind, I return to show that theories of distributed cognition properly understood include no commitment to the idea 'that in standard cases of remembering, the mental process of remembering is wholly internal' (Myin & Zahidi 2014, 6). Likewise, distributed cognition is explicitly set against what Hutto and Myin call the 'Default Internal Mind' principle, the idea that 'in their basic state, minds are unextended and brain-bound' (2013, 137): to the contrary, minds are distributed, hybrid, and culturally-scaffolded by nature and from the start. Certainly, there can be (contingent, partial) shielding from context, and cognitive processes are not always equally distributed, or (better) not always distributed in the same ways. By establishing multidimensional frameworks through which to study a whole range of cases, we can empirically identify ways in which some people, on some occasions, in some settings, more or less successfully insulate their cognitive processes from current context: but this is a rarer and more culturally-scaffolded achievement, not at all the 'basic state' of human minds (Sterelny 2010; Sutton et al 2010). As I noted above, the grip of the Default Internal Mind principle is still apparent more widely across strands of the cognitive sciences of memory which have otherwise shifted significantly away from classical cognitivism: but on this point, enactivism and distributed cognitive ecologies are in sync.

Further, distributed cognition also explicitly rejects the 'Senior Partner Principle', the idea that the brain should be given any general explanatory priority (Hutto & Myin 2013, 137). The contribution of neural resources and processes may *sometimes* be of considerable interest in the study of memory in creatures with brains, but it in no way overrides or rules out the study of the many other dimensions of remembering, of the 'mutual dependence among the elements of a cognitive ecosystem' (Hutchins 2010), including affective, kinesthetic, phenomenological, technological, social, and institutional resources which

can be more or less coordinated and differentially integrated across distinctive contexts and settings. Indeed, understanding of the diverse ways in which neural processes are transformed at different timescales in and by our embodied engagements with disparate material and cultural resources is likely in turn to generate a richer, contextualized picture of the dynamic operations of brains themselves. So as Steven Brown puts it, the neuroscience of remembering is ‘identifying the neurological mediators of an activity that is fundamentally not in itself a neurological matter’ (2008, 269; Sutton 2009b, 2011).

Building on this discussion of potential dangers of the scaffolding metaphor, we could easily move on to diagnose related – and often more explicit – potential reappearances of individualist assumptions in false memory research and some strands of work on social remembering. But I have written extensively before about these topics, and the search for better theoretical and empirical ways to think about and study what happens when we remember the past in the company of other people has motivated one of our major research programs for some years now (Barnier, Sutton, Harris, & Wilson 2008; Sutton 2008). In this work, we reject the related ideas that constructive processes in memory must bring distortion or error, and that the influence of other people on individual memory inevitably results in contagion, misinformation, conformity, or inhibition. Our mixed-method empirical research in philosophically-informed cognitive psychology addresses a range of cases of social or shared remembering, taking quantitative methods out of the lab and integrating them with qualitative analyses to study collaborative recall among siblings and families, sports teams and work groups, and long-term couples (Sutton et al 2010; Harris et al 2011, 2014). These methods are now being used in studies of the social dimensions of remembering for older adults with subjective memory complaints, or diagnosed with mild cognitive impairment or early stage dementia. Real people suffering from the early stages of dementia are not condemned to isolated interactions with their notebooks alone like Clark and Chalmers’ Otto (1998): rather they are typically embedded in vast and uneven networks of people (partners, families, carers, friends, support staff), places, material objects, and memory technologies, in differently-balanced and dynamic responses to the challenges of recalibrating established distributed or transactive memory systems. Such people and processes can be studied (Wu et al 2008; Dahlbäck, Kristiansson & Stjernberg 2013; Schrauf & Müller 2013; Hydén 2014; Drayson & Clark forthcoming). Instead of addressing the details of these research programs again, here I conclude by asking how Wittgensteinian philosophy is to be assessed as a driver of productive work on remembering as public practice, and the extent to which it is or can be integrated with the kind of interdisciplinary sciences of memory I have discussed.

7 Limits on Enactivist Enquiry

As Wittgenstein claimed, the neural processes correlated with any order in our memory practices that emerges in our practices may be ‘quite amorphous’, or even ‘chaos’. What multifarious other processes, then, in the natural history of the embedded organism, in the weave of our life, might variously support remembering and related activities? It is just because there is no inner copy or rendering of the past that we rely so pervasively on ecological, cultural, and institutional routines, norms, and symbols. How then are we to describe and study these diverse practices, these complex interactions between embodied creatures, the affectively-saturated dynamics of human sociality in physical and technological settings which we ourselves have substantially constructed?

To answer these questions, those of us who defend the idea of distributed cognitive ecologies can draw on mature research traditions for interaction studies in the humanities and social sciences as well as the cognitive sciences: cognitive anthropology (Hutchins 2005; Lave 1998; Rogoff 1991) and cognitive archaeology (Malafouris 2013; Malafouris & Renfrew 2010), science studies (Bowker 2006; Suchman 1987), cognitive history (Tribble 2011; Tribble & Keene 2011), conversation analysis and discourse analysis (Goodwin 1994; Middleton & Brown 2005; Murakami 2012), ethnomethodology and studies of multimodal communication (Enfield & Levinson 2006; Murphy 2012; Streeck, LeBaron, & Goodwin 2012). The methods in play in these studies have their home in qualitative traditions of empirical social science, more than laboratory-based cognitive psychology: but as I have argued, these barriers are increasingly porous. It is challenging and arduous work to apply these frameworks and their methods to the case of memory. But alongside cases where social theorists do engage directly and constructively with the cognitive sciences of memory (Bloch 2012; Connerton 1989; Erll & Nunning 2008; Wagoner 2012), interdisciplinary memory studies can now seek to merge ideas about distributed cognitive ecologies with these methods, concepts, and frameworks from the empirical social sciences (Bietti 2012, 2014; Harris et al 2011, 2014; Monchamp 2014; Sutton & Tribble 2014). Of course the background commitments across these traditions differ and do not always sit together neatly: but together they afford rich resources for getting on and studying the multiple forms of remembering in the weave of people’s lives in diverse cultural contexts.

Wittgensteinian philosophers, in contrast, have in general been strangely reluctant to engage with (let alone contribute to) any such studies of actual practices of remembering. Perhaps this is due in some cases to principled views about the division of intellectual labour, about the separation of conceptual

from empirical questions, or about the impossibility of objective analysis of practices alien to one's own form of life: there is certainly much more to say here about Wittgenstein's complex attitudes to conceptual change (Sutton 1993). But to conclude I venture a (compatible but) different diagnosis of the typical lack of interest shown by Wittgensteinian and enactivist philosophers in studies of particular practices of remembering. I introduce this final theme with a contested story of a remembered event (with my version subject of course to all the vagaries, schema-dependencies, and salience judgements which characterize such reports): then I finish with some examples of the unnecessarily early end to enquiry with which Wittgensteinians sometimes seem to be satisfied.

Moyal-Sharrock writes that she was asked 'an odd question' when she spoke on Wittgenstein at the International Conference on Memory in 2011: she says 'the main question put to me was: what, if not engrams ... would neuropsychologists working on memory be left to work with?' (2013, 15). I have a very different recollection of this discussion. Though Moyal-Sharrock's version is in print, it would be less fruitful and less consistent for me to insist on the veracity of my alternate recollection than to note that the mnemonic conflict underscores the different starting-points and schemas of the participants. Our different narratives reflect not only the reconstructive nature of remembering but also what we think about the various positions these distinct scholarly projects have charted. Most generally, I do not recall any mention of engrams or memory traces by the psychologists asking questions: the only references to engrams and traces in this session came from the Wittgensteinian philosophers, who in general adopted a critical tone in their discussions of scientific work on memory. The memory psychologists who responded are committed Bartlettians, and strongly deny any thesis of correspondence between brain traces and what is remembered. Where Moyal-Sharrock interpreted and remembers her audience stating concerns that Wittgensteinians wanted to take the brain away from memory research, I recall a group of psychologists rather puzzled because their diverse and mature research projects do not involve or rely in any way on a search for the engram as a copy of a particular thought, idea, or memory.

Whatever happened at that event, it remains the case that cognitive psychologists and scientists or memory have already for many years been studying remembering as public practice, or public practices, on a vast range of particular topics from conversation to dementia, from keeping track of appointments to recollecting shared trauma, across folk tales, memorials, and rituals, assessing public processes of transmission, mediation, or transformation. Can Wittgensteinian enactivists contribute to or even support such projects?

Remembering, argue Myin and Zahidi, is 'a capacity to show behavior in certain contexts in which the influence of previous interactions with the envi-

ronment can be discerned' (2014, 16): it is an embodied, temporally distributed process which is '*always* situated and contextualised' (2014, 19). It is unimportant whether, in any specific context, I am interacting directly with some external environmental element such as a configuration of stones, or I happen to be imagining that worldly element: the boundaries of skin and skull are not theoretically significant (2014, 18-19). These constructive characterizations, which are not intended to offer definitions, can be held in common for Wittgensteinian enactivists and distributed cognition theorists alike. Only two words stand out as controversial in what Myin and Zahidi say next:

External elements, like stones in the sand, or notes in a notebook, can in certain circumstances be essential for a process of remembering, just like an imagined stone or an emerging thought could be. Both the real and the imaginary stone are *nothing but* elements in a process in which the occurrence or non-occurrence of remembering depends on a large number of additional factors. (Myin & Zahidi 2014, 19, my emphasis).

Why are the real and imaginary stones 'nothing but' elements in these complex processes? Surely it is precisely at this point that a large array of new and interesting questions come into view. Why can't we also study all these 'additional factors' which influence the context-dependent outcome? In order to understand those additional factors, might we not legitimately want to find out more about each *particular* set of 'elements in a process', and the ways they differ in terms of their dynamics and activities from other such sets of elements?

In turn, Moyal-Sharrock argues that 'memory is **nothing but** an ability (which, of course, is – as are all our abilities – physiologically supported by the brain) and that, in some contexts, remembering amounts to a way of acting' (2013, 272, my emphasis). Certainly, in addition to the occurrent processes, practices, and activities of remembering, we also retain various distinctive abilities, capacities, or dispositions to remember. But why is memory 'nothing but' an ability (or, perhaps, a set of abilities)? This wish to rule out of court other, further enquiries is peculiar, an unmotivated kind of anti-pluralism. Such 'nothing-but-ism' is even more pronounced in Hutto and Myin's statement of enactivism. In their view (2013, 8), 'mentality-constituting interactions are grounded in, shaped by, and explained by **nothing more, or other, than** the history of an organism's previous interactions'. What 'determines which aspects of the world are significant', for organisms capable of learning, are 'repeated processes of organismic engagement with environmental offerings ... **and nothing else**'. Still in the same paragraph, at the outset of their book, they reiterate that '**nothing other than** the history of active engaging structures or explains an organism's current interactive tendencies' (2013, 8, my emphases throughout). Admittedly, their book is explicitly pitched in a radically critical mode: but it is not enough

to refer continually to the organismic history of worldly engagements and interactions without providing some clue as to a positive research program. Why discourage pluralist enquiries into all of the various elements, processes, and resources which may contribute to and shape our activities of remembering, whether they happen to be neural, bodily, technological, social, or environmental?

If there are residual obstacles to establishing links between philosophy and science which go beyond isolation or primarily critical engagement, I suggest they lie in this tendency to call a halt to enquiry at a much earlier stage. Once we identify a plausible description of certain forms of remembering, it would be more productive to work out how to study the relevant practices more fully than to restrict enquiry by announcing what memory is ‘nothing but’. We need to understand the many quite *different* ways in which history operates, in which the influences of previous interactions with the environment can be discerned, and the many distinctive kinds of abilities and capacities which constitute human memory in real-time, dynamic, socially-embedded, affectively-charged environments. There are always different, specific, context-sensitive balances of resources in play in distinct cases of remembering across domains or cognitive tasks, across cultures or groups, and across individuals in richly structured cognitive ecologies. What are the diverse ways, at many distinct but interacting timescales, that worldly organismic engagements and interactions ground our cognitive capacities and drive their occurrent actualizations across practices and settings? Such enquiries into the ways that history animates dynamical systems like us are precisely the task of mixed-method collaborative interdisciplinary sciences of memory. There is no reason that enactivist Wittgensteinians could not accept and promote such engagements. By hesitating or resisting to do so, by insisting that nothing but the descriptions they already offer are legitimate, they cut philosophy off not only from the cognitive sciences, but also equally damagingly from the relevant social sciences of memory. As a result, at present they tend to under-specify or fail to initiate sufficiently positive lines of research. To arrest the decline in influence of Wittgenstein’s work in philosophy of mind and cognition, and to engender new integrative relations between science and philosophy, Wittgensteinian philosophers should engage with the theory and practice of existing studies of distributed cognitive ecologies.

Acknowledgements

Many thanks first to those who taught me Wittgenstein, in Stirling, Oxford, and Sydney: John Campbell, Antony Duff, Sandra Marshall, and Lloyd Reinhardt. The earlier work on which this paper draws was assisted immensely by Keith Campbell, Max Deutscher, Frank Jackson, Stephen Gaukroger, Doris McIlwain, and John Yolton. I presented talks based on that work in 1991 and 1992 at the University of Sydney, Macquarie University, and the Australian National University. Special thanks to Danièle Moyal-Sharrock for inviting me to Kirchberg for the wonderful August 2013 symposium, providing the occasion to revisit these topics, and to all those with whom I enjoyed ongoing and engaging discussions there, including David Bakhurst, Louise Barrett, Sven Bernecker, Shaun Gallagher, Peter Henzi, Jennifer Hornsby, John Michael, Erik Myin, and David Stern. For help of other forms that has contributed substantially, I thank Amanda Barnier, Andy Clark, Celia Harris, Doris McIlwain, Nina McIlwain, David Rubin, and Kellie Williamson. Detailed comments on earlier drafts of this paper from Mirko Farina, Bill Hirst, Chris McCarroll, Danièle Moyal-Sharrock, and Lyn Tribble have helped me greatly in shaping the argument and are much appreciated.

Literature

Works by Wittgenstein

- CV - *Culture and Value*, ed. G.H. von Wright in collaboration with H. Nyman, tr. P. Winch. Amended 2nd ed. (Oxford, Blackwell, 1980).
- LC - *Lectures and Conversations on Aesthetics, Psychology, and Religious Belief*, C. Barrett (ed.), 1966.
- LWP - *Last Writings on the Philosophy of Psychology*. Edited by G. H. von Wright and H. Nyman. Trans. C. G. Luckhardt and M. A. E. Aue. Oxford: Blackwell, 1982, 1992.
- PG - *Philosophical Grammar*, ed. R. Rhees, tr. A. Kenny. Oxford: Blackwell, 1974.
- PI - *Philosophical Investigations*. Trans. G.E.M. Anscombe. 2nd Ed. Oxford: Blackwell, 1997.
- RPP - *Remarks On The Philosophy of Psychology*, ed. G.E.M. Anscombe and G.H. von Wright, trans. G.E.M. Anscombe, Oxford: Blackwell, 1980.
- Z - *Zettel*, G.E.M. Anscombe and G.H. von Wright (eds). Trans. G.E.M. Anscombe. Berkeley: University of California Press, 1970.

Works by other authors

- Amberber, M. (ed.) 2007 *The Language of Memory from a Cross-Linguistic Perspective*. Amsterdam: John Benjamins.
- Anderson, B. 2004 "Recorded Music and Practices of Remembering", *Social & Cultural Geography* 5 (1), 3-20.
- Barnier, A. J., Sutton, J., Harris, C. B., and Wilson, R. A. 2008 "A Conceptual and Empirical Framework for the Social Distribution of Cognition: the case of memory", *Cognitive Systems Research* 9 (1), 33-51.
- Bartlett, F. C. 1932 *Remembering: a study in experimental and social psychology*, Cambridge: Cambridge University Press.
- Behnke, E. A. 1997 "Ghost Gestures: phenomenological investigations of bodily micromovements and their intercorporeal implications", *Human Studies* 20 (2), 181-201.
- Bennett, M. R. and Hacker, P.M.S. 2001 "Perception and Memory in Neuroscience: a conceptual analysis", *Progress in Neurobiology* 65, 499-543.
- Berntsen, D. 2009 *Involuntary Autobiographical Memories: an introduction to the unbidden past*, Cambridge: Cambridge University Press.
- Bickle, J. 2008 "The Molecules of Social Recognition Memory: implications for social cognition, extended mind, and neuroethics", *Consciousness and Cognition* 17 (2), 468-474.
- Bietti, L. 2012 "Towards a Cognitive Pragmatics of Collective Remembering", *Pragmatics & Cognition* 20 (1), 32-61.
- Bietti, L. 2014 *Discursive Remembering: individual and collective remembering as a discursive, cognitive, and historical process*, Berlin: de Gruyter.
- Bloch, M. 2012 *Anthropology and the Cognitive Challenge*, Cambridge: Cambridge University Press.
- Bluck, S., Alea, N., Habermas, T. and Rubin, D. C. 2005 "A Tale of Three Functions: the self-reported uses of autobiographical memory", *Social Cognition* 23 (1), 91-117.
- Bowker, G. 2006 *Memory Practices in the Sciences*, Cambridge, MA: MIT Press.
- Brockmeier, J.s 2010 "After the Archive: remapping memory", *Culture & Psychology* 16 (1), 5-35.
- Brown, S. D. 2008 "The Quotation Marks have a Certain Importance: prospects for a 'memory studies'", *Memory Studies* 1 (3), 261-271.
- Budd, M. 1989 *Wittgenstein's Philosophy of Psychology*, London: Routledge.
- Bursen, H. A. 1978 *Dismantling the Memory Machine: a philosophical investigation of machine theories of memory*. Dordrecht: Reidel.
- Campbell, J. 1997 "The Structure of Time in Autobiographical Memory", *European Journal of Philosophy* 5 (2), 105-118.
- Caporael, L., Griesemer, J. R., and Wimsatt, W. C. 2013 *Developing Scaffolds in Evolution, Culture, and Cognition*, Cambridge, MA: MIT Press.
- Casey, E. S. 1987 *Remembering: a phenomenological study*. Bloomington: Indiana University Press.
- Christensen, W. and Sutton, J. 2012 "Reflections on Emotions, Imagination and Moral Reasoning: towards an integrated, multidisciplinary approach to moral cognition", in Robyn Langdon & Catriona Mackenzie (eds.), *Emotions, Imagination, and Moral Reasoning* (pp.327-347). London: Psychology Press.
- Churchland, P. and Churchland, P. 1997 *On the Contrary: critical essays, 1987-1997*, Cambridge, MA: MIT Press.

- Clark, A. 1989 *Microcognition: philosophy, cognitive science, and parallel distributed processing*, Cambridge, MA: MIT Press.
- Clark, A. 1997 *Being There: putting brain, body, and world together again*, Cambridge, MA: MIT Press.
- Clark, A. 2001 *Mindware*, Oxford: Oxford University Press.
- Clark, A. 2003 *Natural-Born Cyborgs*, Oxford: Oxford University Press.
- Clark, A. and Chalmers, D. 1998 "The Extended Mind", *Analysis* 58, 7-19.
- Collins, A., Brown, J. S., and Newman, S. E. 1989 "Cognitive Apprenticeship: teaching the crafts of reading, writing, and mathematics", in *Knowing, learning, and instruction: essays in honor of Robert Glaser*, Hillsdale, NJ: Lawrence Erlbaum.
- Connerton, P. 1989 *How Societies Remember*. Cambridge: Cambridge University Press.
- Conway, M. A. 1990 *Autobiographical Memory*, Open University Press.
- Conway, M. A. 2005 "Memory and the Self", *Journal of Memory and Language* 53 (4), 594-628.
- Dahlbäck, N., Kristiansson, M. and Stjernberg, F. 2013 "Distributed Remembering through Active Structuring of Activities and Environments", *Review of Philosophy and Psychology* 4 (1), 153-165.
- Danziger, K. 2008 *Marking the Mind: a history of memory*, Cambridge: Cambridge University Press.
- Deutscher, M. 1989 "Remembering 'Remembering'", in J. Heil (ed.), *Cause, Mind, and Reality*, 53-72. Amsterdam: Springer.
- Donald, M. 1991 *Origins of the Modern Mind*, Cambridge, MA: Harvard University Press.
- Drayson, Z. and Clark, A. forthcoming "Augmentation, Agency, and the Spreading of the Mental State", *Consciousness and Cognition*.
- Enfield, N. J. and Levinson, S. C. (eds.) 2006 *Roots of Human Sociality: culture, cognition and interaction*, Oxford: Berg.
- Erl, A. and Nunning, A. (eds.), *Cultural Memory Studies: an international and interdisciplinary handbook*. Berlin: de Gruyter.
- Fivush, R. and Haden, C. A. (eds.) 2003 *Autobiographical Memory and the Construction of a Narrative Self: developmental and cultural perspectives*. London: Psychology Press.
- Fodor, J. A. 1975 *The Language of Thought*, New York: Thomas Crowell.
- Fodor, J. A. 1980 "Methodological Solipsism Considered as a Research Strategy in Cognitive Psychology", *Behavioral and Brain Sciences* 3, 63-109.
- Ginet, C. 1975 *Knowledge, Perception, and Memory*, Dordrecht: Reidel.
- Goldie, P. 2012 *The Mess Inside: narrative, emotion, and the mind*, Oxford: Oxford University Press.
- Goodwin, C. 1994 "Professional Vision", *American Anthropologist* 96 (3), 606-633.
- Hacker, P.M.S. 1990 *Wittgenstein on Meaning and Mind: an analytical commentary on the Philosophical Investigations*, volume 3, Oxford: Blackwell.
- Hacker, P.M.S. 2006 "Passing by the naturalistic turn: on Quine's cul-de-sac", *Philosophy* 81, 231-256.
- Haldane, J. 1988 "Understanding Folk", *Proceedings of the Aristotelian Society*, supplement volume 62.
- Hampshire, S. 1989 *Innocence and Experience*, Cambridge, MA: Harvard University Press.
- Harré, R. 1988 "Wittgenstein and Artificial Intelligence", *Philosophical Psychology* 1, 105-115.
- Harris, C. B., Keil, P. G., Sutton, J., Barnier, A. J., & McIlwain, D. J.F. 2011 "'We remember, we forget': collaborative remembering in older couples" *Discourse Processes* 48 (4), 267-303.

- Harris, C. B., Rasmussen, A. S. and Berntsen, D. (2014) "The Functions of Autobiographical Memory: an integrative approach", *Memory* 22 (5), 559-581.
- Harris, C. B., Barnier, A. J., Sutton, J., and Keil, P. G. 2014 "Couples as Socially Distributed Cognitive Systems: remembering in everyday social and material contexts", *Memory Studies* 7 (3).
- Haugeland, J. 1998 "Mind Embodied and Embedded", in Haugeland, *Having Thought*, Cambridge, MA: Harvard University Press.
- Hilmy, S. S. 1987 *The Later Wittgenstein: the emergence of a new philosophical method*, Oxford: Blackwell.
- Hirst, W. and Manier, D. 2008 "Towards a Psychology of Collective Memory", *Memory* 16 (3), 183-200.
- Hoerl, C. 1999 "Memory, Amnesia and the Past", *Mind & Language* 14 (2), 227-251.
- Hutchins, E. 1995 *Cognition in the Wild*, Cambridge, MA: MIT Press.
- Hutchins, E. 2005 "Material Anchors for Conceptual Blends", *Journal of Pragmatics* 37 (10), 1555-1577.
- Hutchins, E. 2010 "Cognitive Ecology", *Topics in Cognitive Science* 2, 705-15.
- Hutchins, E. 2011 "Enculturating the Supersized Mind", *Philosophical Studies* 152 (3), 437-446.
- Hutchins, E. 2014 "The Cultural Ecosystem of Human Cognition", *Philosophical Psychology* 27, (1), 34-49.
- Hutto, D. D. 2013 "Enactivism, from a Wittgensteinian Point of View". *American Philosophical Quarterly* 50 (3), 281-302.
- Hutto, D. D. forthcoming "Remembering without Stored Contents: a philosophical reflection on memory". https://www.academia.edu/6799100/Remembering_without_Stored_Contents_A_Philosophical_Reflection_on_Memory
- Hutto, D. D., Kirchhoff, M., and Myin, E. forthcoming "Extensive Enactivism: why keep it all in?". https://www.academia.edu/7093891/Extensive_Enactivism_Why_Keep_it_All_in
- Hutto, D. D. and Myin, E. 2013 *Radicalizing Enactivism: basic minds without content*. Cambridge, MA: MIT Press.
- Hydén, L-C 2014 "Cutting Brussels Sprouts: collaboration involving persons with dementia", *Journal of Aging Studies* 29, 115-123.
- Koch, S. C., Fuchs, T., Summa, M., and Müller, C. (eds) 2012 *Body Memory, Metaphor and Movement*. Amsterdam: John Benjamins
- Lashley, K. S. 1950 "In Search of the Engram", *Symposia of the Society for Experimental Biology* 4, 454-482.
- Latour, B. 1999 "A Collective of Humans and Nonhumans", in Latour, *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press, 174-215.
- Lave, J. 1988 *Cognition in Practice: mind, mathematics, and culture in everyday life*. Cambridge: Cambridge University Press.
- Lende, D. H. and Downey, G. (eds.) 2012 *The Encultured Brain: an introduction to neuroanthropology*, Cambridge, MA: MIT Press.
- Malafouris, L. 2013 *How Things Shape the Mind: a theory of material engagement*, Cambridge, MA: MIT Press.
- Malafouris, L. and Renfrew, C. (eds.) 2010 *The Cognitive Life of Things: recasting the boundaries of the mind*, Cambridge: McDonald Institute for Archaeological Research.
- Malcolm, N. 1977 *Memory and Mind*, Ithaca: Cornell University Press.
- Malcolm, N. 1986 *Nothing is Hidden: Wittgenstein's criticism of his early thought*, Oxford: Blackwell.

- Martin, C. B. and Deutscher, M. 1966 "Remembering", *Philosophical Review* 75 (2), 161-196.
- Matthen, M. 2010 "Is Memory Preservation?", *Philosophical Studies* 148 (1), 3-14.
- McGinn, C. 1984 *Wittgenstein on Meaning: an interpretation and evaluation*, Oxford: Blackwell.
- Menary, R. 2007 *Cognitive Integration: mind and cognition unbounded*. London: Palgrave.
- Menary, R. 2013 "Cognitive Integration, Enculturated Cognition and the Socially Extended Mind", *Cognitive Systems Research* 25, 26-34.
- Michaelian, K. 2011 "Generative Memory", *Philosophical Psychology* 24 (3), 323-342.
- Michaelian, K. and Sutton, J. 2013 "Distributed Cognition and Memory Research: history and current directions", *Review of Philosophy and Psychology* 4 (1), 1-24.
- Middleton, D. and Brown, S. D. 2005 *The Social Psychology of Experience: studies in remembering and forgetting*. London: Sage.
- Mills, S. L. 1993 "Wittgenstein and Connectionism: a significant complementarity?", *Philosophy* 34, 137-157.
- Monchamp, A. 2014 *Autobiographical Memory in an Aboriginal Australian Community: culture, place, and narrative*, London: Palgrave.
- Moyal-Sharrock, D. 2009 "Wittgenstein and the Memory Debate", *New Ideas in Psychology* 27, 213-227.
- Moyal-Sharrock, D. 2013a "Beyond Hacker's Wittgenstein", *Philosophical Investigations* 36 (4), 355-380.
- Moyal-Sharrock, D. 2013b "Wittgenstein's Razor: the cutting edge of enactivism", *American Philosophical Quarterly* 50 (3), 263-279.
- Moyal-Sharrock, D. 2013c "Wittgenstein Today". Talk presented at International Conference on Wittgenstein and Contemporary Philosophy and the Inaugural Meeting of the Chinese Wittgenstein Society, Beijing Normal University 12-13 October 2013. Forthcoming in *Conference Proceedings*.
- Murakami, K. 2001 "Revisiting the Past: social organization of remembering and reconciliation". PhD thesis, Loughborough University.
- Murakami, K. 2012 *Discursive Psychology of Remembering and Reconciliation*, New York: Nova Science.
- Murphy, K. 2012 "Transmodality and Temporality in Design Interactions", *Journal of Pragmatics* 44, 1966-1981.
- Myin, E. and Zahidi, K. 2014 "The Extent of Memory: from extended to extensive mind", *Mind, Language and Action: proceedings of the 36th international Wittgenstein symposium*. [NB page references quoted from online draft]
- Neisser, U. 1978/ 2000 "Memory: what are the important questions?", reprinted in U. Neisser & I.E. Hyman Jr. (eds.), *Memory Observed: remembering in natural contexts* (2nd ed.). New York: Worth, 3-18.
- Neisser, U. 1997 "The Ecological Study of Memory", *Philosophical Transactions of the Royal Society B: Biological Sciences* 352, 1697-1701.
- Nelson, K. and Fivush, R. 2004 "The Emergence of Autobiographical Memory: a social cultural developmental theory", *Psychological Review* 111 (2), 486-511.
- O'Brien, G. 1998 Review symposium: *Being There*. *Metascience* 7, 78-83.
- Pea, R. D. 2004 "The Social and Technological Dimensions of Scaffolding and Related Theoretical Concepts for Learning, Education, and Human Activity", *Journal of the Learning Sciences* 13 (3), 423-451.
- Reese, E. 2013 *Tell Me A Story*, Oxford: Oxford University Press.

- Robbins, P. and Aydede, M. 2009 *The Cambridge Handbook of Situated Cognition*, Cambridge: Cambridge University Press.
- Rogoff, B. 1991 *Apprenticeship in Thinking: cognitive development in social context*, Oxford: Oxford University Press.
- Rowlands, M. 1999 *The Body in Mind: understanding cognitive processes*, Cambridge: Cambridge University Press.
- Rubin, D. C. 1995 *Memory in Oral Traditions: the cognitive psychology of epic, ballads, and counting-out rhymes*, Oxford: Oxford University Press.
- Rumelhart, D. E., Smolensky, P. McClelland, J. L. and Hinton, G. E. 1986 "Schemata and Sequential Thought Processes", in J.L. McClelland and D.E. Rumelhart (eds.), *Parallel Distributed Processing: Explorations in the Microstructure of Cognition*, vol.II: Psychological and Biological Models, Cambridge, MA: MIT Press, 7-57.
- Sacks, O. 1990 "Neurology and the Soul", *New York Review of Books*, 22 November, 44-50.
- Saito, A. (ed.) 2000 *Bartlett, Culture and Cognition*. London: Routledge.
- Schrauf, R. W. and Müller, N. (eds.) 2013 *Dialogue and Dementia: cognitive and communicative resources for engagement*. London: Psychology Press.
- Sharpe, R.A. 1987 "The Very Idea of a Folk Psychology", *Inquiry* 30, 381-393.
- Smolensky, P. 1988 "On the Proper Treatment of Connectionism" *Behavioral and Brain Sciences* 11, 1-73.
- Squires, R. 1969 "Memory Unchained", *Philosophical Review* 78 (2), 178-196.
- Sterelny, K. 2010 "Minds: extended or scaffolded?", *Phenomenology and the Cognitive Sciences* 9 (4), 465-481.
- Stern, D. G. 1991 "Models of Memory: Wittgenstein and cognitive science", *Philosophical Psychology* 4, 203-218.
- Stern, D. G. 1995 *Wittgenstein on Mind and Language*, Oxford: Oxford University Press.
- Streeck, J., LeBaron, C., and c, C. (eds.) 2012 *Embodied Interaction: language and body in the material world*. Cambridge: Cambridge University Press.
- Suchman, L. 1987 *Plans and Situated Actions*, Cambridge: Cambridge University Press.
- Sutton, J. 1993 "Wittgenstein, Memory, and Neurophilosophy", chapter 8 of Sutton, *Connecting Memory Traces: studies of neurophilosophical theories of memory, mental representation, and personal identity from Descartes to new connectionism*, PhD thesis, University of Sydney. URL: http://johnsutton.net/1993_Sutton_PhD_Wittgenstein.pdf.
- Sutton, J. 1998 *Philosophy and Memory Traces: Descartes to connectionism*, Cambridge: Cambridge University Press.
- Sutton, J. 1999 "Distributed Memory, Coupling, and History", in R. Heath, B. Hayes, A. Heathcote, and C. Hooker (eds.), *Dynamical Cognitive Science: proceedings of the Fourth Australasian Cognitive Science Conference (1997)*. CD-ROM, Newcastle, NSW: University of Newcastle. URL: <http://www.johnsutton.net/SuttonDistributedCognition.pdf>.
- Sutton, J. 2002 "Cognitive Conceptions of Language and the Development of Autobiographical Memory", *Language and Communication* 22, 375-390.
- Sutton, J. 2004 "Representation, Reduction, and Interdisciplinarity in the Sciences of Memory", in H. Clapin, P. Staines, & P. Slezak (eds.), *Representation in Mind* Amsterdam: Elsevier, 187-216.
- Sutton, J. 2007 "Language, Memory, and Concepts of Memory: semantic diversity and scientific Psychology", in Mengistu, A. (ed.), *The Language of Memory from a Cross-Linguistic Perspective*. Amsterdam: John Benjamins, 41-65.

- Sutton, J. 2008 "Between Individual and Collective Memory: coordination, interaction, distribution", *Social Research* 75 (1), 23-48.
- Sutton, J. 2009a "Remembering", in M. Aydede & P. Robbins (eds.), *The Cambridge Handbook of Situated Cognition* (pp.217-235). Cambridge: Cambridge University Press.
- Sutton, J. 2009b "'The feel of the world': exograms, habits, and the confusion of types of memory", in Andrew Kania (ed.), *Memento: philosophers on film* (pp.65-86). London: Routledge.
- Sutton, J. 2009c "Looking Beyond Memory Studies: comparisons and integrations", *Memory Studies* 2 (3), 299-302.
- Sutton, J. 2010 "Exograms and Interdisciplinarity: history, the extended mind, and the civilizing Process", in R. Menary (ed.), *The Extended Mind* (pp.189-225). Cambridge, MA: MIT Press.
- Sutton, J. 2011 "Influences on Memory", *Memory Studies* 4 (4), 355-359.
- Sutton, J. forthcoming "Scaffolding Memory: themes, concepts, and theories", in L. Bietti and C. B. Stone (eds.), *Contextualising Human Memory: an interdisciplinary approach to understanding how individuals and groups remember the past*, London: Psychology Press, 2015.
- Sutton, J., Harris, C. B., Keil, P. G., & Barnier, A. J. 2010 "The Psychology of Memory, Extended Cognition, and Socially Distributed Remembering", *Phenomenology and the Cognitive Sciences* 9 (4), 521-560.
- Sutton, J. and Tribble, E. B. 2014 "The Creation of Space: narrative strategies, group agency, and skill in Lloyd Jones's *The Book of Fame*", in C. Danta and H. Groth (eds), *Mindful Aesthetics: literature and the sciences of mind*. London: Bloomsbury/ Continuum, 141-60.
- Sutton, J. and Williamson, K. 2014 "Embodied Remembering", in L. Shapiro (ed.), *The Routledge Handbook of Embodied Cognition*. London: Routledge, 315-25.
- Sutton, J. and Windhorst, C. 2009 "Extended and Constructive Remembering: two notes on Martin and Deutscher", *Crossroads: an interdisciplinary journal for the study of history, philosophy, religion, and classics* 4 (1), 79-91. URL: <http://www.uq.edu.au/crossroads/Archives/Vol%204/Issue%201%202009/Vol4Iss109%20-%2014.Sutton%20and%20Windhorst%20%28p.79-91%29.pdf>
- ter Hark, M. 1995 "Electric Brain Fields and Memory Traces: Wittgenstein and Gestalt Psychology", *Philosophical Investigations* 18, 113-138.
- Tribble, E. B. 2011 *Cognition in the Globe: attention and memory in Shakespeare's theatre*. London: Palgrave.
- Tribble, E. B. and Keene, N. 2011 *Cognitive Ecologies and the History of Remembering: religion, education and memory in early modern England*. London: Palgrave Macmillan.
- Tribble, E. B. and Sutton, J. 2011 "Cognitive Ecology as a Framework for Shakespearean Studies" *Shakespeare Studies* 39, 94-103.
- van Gelder, Tim 1995 "What Could Cognition Be, If Not Computation?", *Journal of Philosophy* 91, 345-381.
- van Gelder, Tim and Port, Robert F. 1995 "It's About Time: an overview of the dynamical approach to cognition", in Port & van Gelder (Eds.), *Mind as Motion: explorations in the dynamics of cognition*. Cambridge, MA: MIT Press.
- van Gelder, Tim and Port, Robert F. 1997 "Authors' Response: symposium on Mind as Motion", *Metascience* 11, 134-140.
- Varela, F. J., Thompson, E., and Rosch, E. 1991 *The Embodied Mind: cognitive science and human experiences*. Cambridge, MA: MIT Press.

- Vosgerau, G. 2010 "Memory and Content", *Consciousness and Cognition* 19 (3), 838-846.
- Wagoner, B. 2012 "Culture in Collective Remembering" in J. Valsiner (ed.), *The Oxford Handbook of Culture and Psychology*, Oxford: Oxford University Press, 1034-1055.
- Wang, Q. 2013 *The Autobiographical Self in Time and Culture*, Oxford: Oxford University Press.
- Wegner, D. 1986 "Transactive Memory: a contemporary analysis of the group mind", in B. Mullen & G. Goethals (eds.), *Theories of Group Behavior*. Berlin: Springer-Verlag, 185–208.
- Weldon, M. S. 2001 "Remembering as a Social Process" in D.L. Medin (ed.), *The Psychology of Learning and Motivation* 40. Amsterdam: Elsevier, 67–120.
- Wierzbicka, A. 2007 "Is 'Remember' a Universal Human Concept? 'Memory' and culture", in Mengistu Amberber (ed.), *The Language of Memory from a Cross-Linguistic Perspective*. Amsterdam: John Benjamins, 13-39.
- Wilkes, K. V. 1980 "Brain States", *British Journal for the Philosophy of Science* 31, 111-129.
- Wilson, Robert A. 1994 "Wide Computationalism", *Mind* 103, 351-372.
- Wood, D., Bruner, J. S. and Ross, G. 1976 "The Role of Tutoring in Problem Solving", *Journal of Child Psychology and Psychiatry* 17 (2), 89-100.
- Wu, M., Birnholtz, J., Richards, B., Baecker, R., and Massimi, M. 2008 "Collaborating to Remember: a distributed cognition account of families coping with memory impairments", *Proceedings of ACM CHI 2008 conference on human factors in computer systems*, 825–834.

