CHAPTER 13

Remembering

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1. Introduction: The Interdisciplinary Framework

The case of remembering poses a particular challenge to theories of situated cognition, and its successful treatment within this framework will require a more dramatic integration of levels, fields, and methods than has yet been achieved. The challenge arises from the fact that memory often takes us *out* of the current situation: in remembering episodes or experiences in my personal past, for example, I am mentally transported *away* from the social and physical setting in which I am currently embedded. Our ability to make psychological contact with events and experiences in the past was one motivation, in classical cognitive science and cognitive psychology, for postulating inner mental representations to hold information across the temporal gap. Theorists of situated cognition thus have to show how such an apparently representation-hungry and decoupled high-level cognitive process may nonetheless be fruitfully understood as embodied, contextualized, and distributed (cf. Clark, 2005a).

Critics of classical cognitive science often painted mainstream theories of memory as rigidly mechanistic and individualist, offering disparate phenomenological, Wittgensteinian, or direct realist alternatives (Ben-Zeev, 1986; Bursen, 1978; Casey, 1987; Krell, 1990; Malcolm, 1977; Sanders, 1985; Stern, 1991; ter Hark, 1995; Turvey & Shaw, 1979; Wilcox & Katz, 1981). Although the more recent work on memory in situated cognition and related (dynamical, distributed, enactive, and embodied) traditions described in this chapter has drawn substantially on these positive alternatives, the oppositional nature of the earlier debates has dissipated somewhat. Indeed the modern history of memory research across the disciplines undermines that easy stereotype of the cognitive sciences as monolithically logicist and internalist. Not only had key precursors of situated cognition long been points of reference in particular subdomains of memory theory, such as the developmental psychology of autobiographical memory (Vygotsky, 1930/1978); through independent internal movements within computational, cognitive, and social

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psychology alike over twenty-five years or more, situated or ecological approaches to memory have come themselves to occupy the mainstream.[1] Although their integration with traditional laboratory methods did not always come easily, the pluralism of contemporary memory studies is reasonably happy; ambitious recent syntheses deliberately triangulate robust data and constraints from distinct sources, incorporating as appropriate evidence from phenomenology; from neuroimaging and neuropsychology; and from cognitive, affective, developmental, social, and personality psychology all at once (Conway & Pleydell-Pearce, 2000; Siegel, 2001; Welzer & Markowitsch, 2005).

The sciences of memory have occasionally seemed somewhat isolated from broader shifts in cognitive science. But their more direct integration with the ideas discussed throughout this volume is now leading both to reevaluations of the relevance of other harbingers of the modern constructivist psychological and social sciences of memory, such as Bartlett (1932) and Halbwachs (1925/1992, 1950/1980), and to explicitly situated or distributed theories that see the vehicles of representation in memory, as well as the processes of remembering, as potentially spreading across world and body as well as the brain (Clancey, 1997, 1999; Donald, 1991; Rowlands, 1999; Sutton, 2003, 2004; Tribble, 2005; Wilson, 2004, 2005). This chapter offers a synoptic overview of situated work on memory and remembering, skating fast and light over vast and disparate literatures to sketch a positive synthesis of the field. It covers, in turn, relevant movements in cognitive psychology (section 2), developmental psychology (section 3), the social sciences and social philosophy (section 4), and distributed cognition (section 5). Conceptual tools from all of these fields are required to address the challenge of situating memory. The aim is an account of memory in general, or of the varieties and forms of memory in general, which can then be applied to diverse case studies across the disciplines to suggest just how in practice various coordinated contexts – neural, bodily, affective, technological, institutional, and so on – shape, constrain, and enable practices and activities of remembering. The case of memory should ideally fit David Kirsh's (2006) description of the general study of distributed cognition as "the study of the variety and subtlety of coordination . . . how the elements and components in a distributed system – people, tools, forms, equipment, maps and less obvious resources – can be coordinated well enough to allow the system to accomplish its tasks" (p. 258; cf. Wilson & Clark, this volume).[2]

2. Remembering as Constructive Activity and Interpersonal Skill

Remembering is an activity that takes place in and over time. Neither the form of that activity nor the detailed nature of what is remembered is straightforwardly or monocausally determined by any internally stored information. Inner memory traces – whatever they may be – are merely potential contributors to recollection, conspiring with current cues in rich contexts (Schacter, 1996, pp. 56–71; Tulving, 1983, pp. 12–14). But a focus on this occurrent activity, which is always situated in a range of contexts, does not on its own ground a situated approach to memory. Individualists, too, can acknowledge the existence of a range of contexts; so talk of (for example) the external or cultural or social context of remembering is not sufficient to give us a substantial situated view. Remembering itself, after all, might still be firmly contained within the bounds of the skull. On stronger situated theories, presumably, our understanding of the memory to which modifiers like *extended* or *distributed* are applied should itself be significantly revised (Wertsch, 1999). This means, further, that no neat division of labor between the cognitive and the social sciences of memory can be maintained, because the domain is not neatly sliced into distinct psychological and public aspects that may or may not interact (Sutton, 2004).

In "A Theory of Remembering," the central chapter of his great work *Remembering:*

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A Study in Experimental and Social Psychology, Bartlett (1932) wrote:

> *Suppose I am making a stroke in a quick game, such as tennis or cricket. . . . When I make the stroke I do not, as a matter of fact, produce something absolutely new, and I never merely repeat something old. The stroke is literally manufactured out of the living visual and postural "schemata" of the moment and their interrelations. I may say, I may think that I reproduce exactly a series of text-book movements, but demonstrably I do not; just as, under other circumstances, I may say and think that I reproduce exactly some isolated event which I want to remember, and again demonstrably I do not. (pp. 201–202)*

For Bartlett, explicit remembering is a skill, with just the same peculiar features – combining the familiar and the unique – as complex embodied skills. There are a range of intriguing and relevant questions, which I cannot address here, about skill and habit, two key varieties of what psychologists label "procedural memory," and about how these forms of remembering relate to more explicit and consciously accessible memory (Sheets-Johnstone, 2003); but in this chapter, I describe situated accounts of the declarative forms of memory, with a focus on personal or recollective or autobiographical memory, which is both theoretically and personally important because of its emotional and moral significance and its role in temporally extended agency.[3] As background to the general consensus in situated cognitive psychology on constructivism, the most celebrated of Bartlett's theses, we examine the related ideas of remembering as skilled activity, and of the dynamic nature of the enduring states that ground that activity.

2.1. *Representations and Storage*

Situated approaches to memory not only depart from the internalism or methodological solipsism of the way internal representations were evoked in classical cognitive science but also, in general, reject the distinct idea that individual representations are independent from one another, stored at separate locations in some memory system. It is this localist picture of memory storage, which allows for no integration of enduring data with ongoing processing, that makes it difficult to update relevant background knowledge without explicit search (Copeland, 1993). This is why alternative models of memory were at the forefront of the revival of connectionism in the 1980s and have continued to play a central role in attempts to align neural network modeling with neuropsychology (Churchland & Sejnowski, 1992; Gluck & Myers, 2000).

Occurrent remembering in connectionist cognitive science is the temporary reactivation of a particular pattern or vector across the units of a network. This reconstruction is possible because of the conspiring influences of current input and the history of the network, as sedimented in the connection weights between units. So memory traces are not stored separately between experience and remembering but are piled together or "superposed" in the same set of weights. In fully distributed representation, the same resources or vehicles are thus used to carry many different contents (Clark, 1989; van Gelder, 1991). As McClelland and Rumelhart (1986) put it:

> *We see the traces laid down by the processing of each input as contributing to the composite, superimposed memory representation. Each time a stimulus is processed, it gives rise to a slightly different memory trace – either because the item itself is different or because it occurs in a different context that conditions its representation – the traces are not kept separate. Each trace contributes to the composite, but the characteristics of particular experiences tend nevertheless to be preserved, at least until they are overridden by canceling characteristics of other traces. Also, the traces of one stimulus pattern can coexist with the traces of other stimuli, within the same composite memory trace. (p. 193)*

Connectionist remembering is thus an inferential process, constructive not reproductive. Information survives only in dispositional form: "the data persist only

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implicitly by virtue of the effect they have on what the system knows" (Elman, 1993, p. 89). In this dynamic vision of representations, connectionism is clearly heir to Bartlett's (1932) vision:

> *Though we may still talk of traces, there is no reason in the world for regarding these as made complete at one moment, stored up somewhere, and then re-excited at some much later moment. The traces that our evidence allows us to speak of are interest-determined, interest-carried traces. They live with our interests and with them they change. (pp. 211–212)*

Neither this point that traces are plastic and malleable nor the more general constructivist movement in the cognitive psychology of memory directly entails a situated approach. But there is one natural link (Clark, 1997): stability over time in connectionist representational systems is maintained not through permanent storage, but through context-dependent reconstruction. Sometimes, then, remembering requires the interaction or coupling of complementary biological and external resources into temporarily extended cognitive systems. On this view, brains like ours need media, objects, and other people to function fully as minds. Seeing the brain as a leaky associative engine (Clark, 1993), its contents flickering and unstable rather than mirroring the world in full, forces attention to the diverse formats of external representations in the technological and social wild. If biological "engrams" are typically integrative and active in the way connectionism suggests, perhaps it is natural for creatures like us in using them to hook up with more enduring and transmissible "exograms," in Merlin Donald's coinage (1991, pp. 308–333). We compile memories (whether in thought or in public expression) on the fly, working them up or improvising them out of whatever materials we have: the vivid sensory detail that comes to mind in episodic fragments and the resources provided by external symbol systems, as well as the multiple influences of knowledge about the self and the world; of goals, motivations, and moods; and of the current interpersonal context. As the developmental psychologist Susan Engel (1999) argues, often "one creates the memory at the moment one needs it, rather than pulling out an intact item, image, or story" (p. 6). So memory's temporal cross-referencing does not run only between present recall and past experience, because remembering also has a raft of distinctive forward-looking or anticipatory features and functions.

2.2. *Constructivism and Relational Remembering*

A situated approach to memory, then, is one that treats this multifarious range of materials as potentially integral, complementary aspects of a cognitive system and its processes of remembering. Such an approach can thus fruitfully draw on the resources of personality and social psychology, as well as on cognitive psychology. Attention to social scaffolding and to technological mediations of memory is entirely compatible with an interest in individual differences in memory. Just because remembering is selective in this way, peculiarities of affective style or self-conception directly shape the way memory narratives condense, summarize, and edit past experiences for present purposes (McIlwain, 2006). Bartlett had explicitly argued that temperament, history, belief, and expectation should be incorporated within theories of memory when he adapted the term *schema* to refer to "an active organization of past reactions, or of past experiences" that act together "as constituents of living, momentary settings" (1932, p. 201; also pp. 308–314).[4] His interest was in the pervasive effects of preexisting beliefs and attitudes, or of an idiosyncratic personal history acting as a mass in filtering recall. But the constructivist consensus in the modern subdisciplines of psychology, which developed independently of connectionist computational modeling, has in some respects remained narrower in focus. Research on suggestibility and the effects of misinformation on memory, developed initially in the context of eyewitness testimony, was dramatically extended in the 1990s to the

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heart of personal memory (Hyman & Loftus, 1998; Loftus, 2003; Roediger, 1996) – "a variety of conditions exist," wrote Daniel Schacter (1995), "in which subjectively compelling memories are grossly inaccurate" (p. 22). Mainstream psychology of autobiographical memory has continued to treat the ongoing, interpersonally anchored revision and remolding of the remembered past as the ordinary means by which narratives of the self develop (Conway, Singer, & Tagini, 2004; Ross, 1989); these views are thus entirely compatible with situated cognition. But much work on 'false memory' has focused on more malign forms of influence, on specific distortions or misleading additions inserted into the individual's mind by some external source.

This strand of constructivist memory theory tends thus to remain individualistic in orientation (cf. Campbell, 2004; Haaken, 1998). First, construction tends to be simply equated with distortion, thus neglecting the adaptability of memory's intrinsic dynamics, by which the very mechanisms that underlie generalization can in certain circumstances lead us astray (McClelland, 1995; Schacter, 1999). Second, influence is characterized as essentially or primarily negative, the relentless intrusion of the social into malleable individual memory. Questions about truth in memory do take on a new urgency within a constructivist framework, but the point need not be either that reliability is impossible or that interpersonal memory dynamics must bring error and confusion. Truth and related values like accuracy and fidelity in memory need be neither simple nor singular. In legal contexts, for example, concerns about contamination and conformity in witnesses' memories may be appropriate. But elsewhere, ordinary and successful remembering may be relational (Campbell, 2003), depending directly on the support and involvement of other people and on our abilities to create more or less enduring memory systems that transcend the capacities of the brain alone. One example comes from false memory research itself; after showing that misleading visual or verbal information, when presented in certain ways, may be incorporated into many people's personal memories of childhood experiences, Strange, Gerrie, and Garry (2005) discuss further similar experiments in which subjects exposed to false information about their past were encouraged to discuss their memories with a sibling. Acknowledging that in real settings, "when confronted with a difficult to remember narrative about [their] childhood, people are likely to rely on others to verify their memories" (p. 241), these researchers found that after discussion with a sibling the proportion of false memories dropped dramatically.

Of course, such negotiations about the past do not always bring either agreement or truth; but the forthcoming examination of the development of autobiographical memory will suggest that we also learn to deal with disagreement about the past most directly and effectively through early memory-sharing practices. And in adult life, as Sue Campbell (2006) argues, our attempts to be faithful to the past are often supported and positively guided by listeners or by joint participants in shared memory activities. Both ordinary memory narratives and more public testimonial expressions of memory can be co-constructed without other people's role bringing corruption. Campbell argues, in particular, that locating appropriate emotion in remembering activities can be a significant component of recollective accuracy, where accuracy in understood in a context-dependent way; representational success in memory is rarely a simple matter of matching an isolated present item to a single past event (cf. Schechtman, 1994). Remembered events, after all, especially ones that matter, are themselves complex and structured. We often find ourselves striving for the needed affective shifts in relation to particular memories through renegotiating in company the meanings of the personal past. These commonplace ways of sharing memories, in co-constructing, jointly reevaluating, or just actively listening, bring obligations and accountability with them; and when the negotiations concern experiences that were themselves shared, the epistemic, affective,

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and mnemonic interdependence is magnified further.

So, one respect in which a thoroughly situated approach to memory can push the existing ecological focus on real-life or everyday memory phenomena further is in presenting constructive processes in remembering – and, more generally, memory's openness to various forms of influence – as more mundane or natural than inevitably dangerous. In the remaining sections, I try to merge these ideas about interpersonal memory dynamics with the postconnectionist picture of human beings as essentially incomplete machines, apt to incorporate what has – in the course of evolutionary, cultural, and developmental history – become apt for incorporation (cf. Clark, 2006).

3. Remembering as Social Interaction and Joint Attention to the Past

Children start talking about the past pretty much as soon as they start talking, but their initial references are fleeting and fragmentary, and the capacity to refer to specific events in the personal past develops only gradually. A situated approach to the development of autobiographical memory needs to characterize the explanatory target richly, and then seek to extend dynamical models from more basic domains to capture these high-level cognitive phenomena. The child's emerging ability to think about experiences at particular past times is more than the capacity to understand sequences of events or intervals between events and more than general knowledge of how things usually go. A sociocultural developmental theory must address multiply interactive developmental systems spanning the child's brain and local narrative environment. Nelson and Fivush (2004), building on a twenty-year tradition of social interactionist work, characterize the emergence of autobiographical memory as "the outcome of a social cultural cognitive *system*, wherein different components are being opened to experiences over time, wherein experiences vary over time and context, and wherein individual histories determine how social and cognitive sources are combined in varying ways" (p. 487).

Robust experimental data in this tradition addresses the shaping of the child's developing memory by parental and cultural styles or models for the recounting of past events. In general, for example, the spontaneous later memory activity of children whose parents talk about the past more elaborate and rich, or more emotional, is itself more elaborative or emotional (Reese, Haden, & Fivush, 1993); and in general, both mothers and fathers talk more richly and more emotionally about the past with girls than with boys (Fivush, 1994). A range of cultural differences track these interactions, so that, for example, Caucasian American children's spontaneous memories highlight the self more, in general, than do those of Korean children (Mullen & Yi, 1995; cf. Leichtman, Wang, & Pillemer, 2003).

Some presentations of these results suggest that parental influence – in particular maternal reminiscence style – is the primary driving force behind the emergence of autobiographical memory; the structure and content of the child's early thought and talk about the past is provided to a large degree by adults, whose communicative actions construct the scaffolding for such early memories. The idea that the direction of influence is from social and narrative context to autobiographical memory is perhaps encouraged by some uses of the Vygotskian scaffolding metaphor.

But it seems likely that elaborative parental talk, commonly defined as adding details or richness about a particular aspect of a past event, is not as vital as the related but distinct feature of contingency in conversation; a contingent utterance is related in content to the conversational partner's prior utterance, whereas some elaborations may not be relevant to the specific conversational context and thus not genuinely dialogical (Petra, Benga, & Tincas, 2005). Here, a better metaphor is that of a spiral process, in which the child's changing competence in dialogue about the past itself in turn directly influences the parent's reminiscence style, encouraging the dynamic co-construction of

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richer narratives (Haden, Haine, & Fivush 1997). On a thoroughly situated perspective, we should reconstruct the difference between scaffolding and spiral models not as a theoretical choice with only one right answer but as an empirical spectrum of possibilities. This requires a developmental systems framework in which the relative influence of multiple concurrent processes can vary across cases (cf. Griffiths & Stotz, 2000; Smith & Thelen, 2003). So, recent presentations of the social-interactionist theory address not only the roles of language and the local narrative environment but also the neural and psychological development of other memory systems, the development of a self-schema and of theory of mind, the emergence of a concept of the past, and the role of affective factors such as motivation and attachment security (Nelson & Fivush, 2004; Reese, 2002). Autobiographical memory development can thus be highly buffered in that different factors play different roles at different stages for different children. For example, children with weaker linguistic skills but stronger early self-recognition skills, Elaine Reese (2002) has shown, "enter the system through a less verbal and more autonomous route" (p. 252) than children who engage in highly elaborative conversations about the past. And when dealing with such highly history-dependent developmental processes, in which social and neural influences are "bidirectionally and fundamentally interactive at all levels of organization" (Bjorklund, 2004, p. 344), we would also expect the degree of significant individual variability that requires substantial longitudinal study (Harley & Reese, 1999; Reese, 2002).

In an exemplary cross-disciplinary collaboration, philosopher Christoph Hoerl and psychologist Teresa McCormack have investigated more precisely the role of the joint reminiscing activities studied in this social-interactionist tradition. Building on John Campbell's (1997) point that mature autobiographical memory requires us to coordinate and align egocentric and objective conceptions of time, Hoerl and McCormack suggest that children need to grasp that both the world and the self are causally connected over time. Their idea is that the memory sharing in which parents and children engage can best be understood as a peculiar form of joint attention, directed – unlike other forms of joint attention – at the past. To grasp "the causal significance of the order in which sequences of events unfold," the child needs to understand that "later events in the sequence can obliterate or change the effect of earlier ones," so that the state of the world and of the child's current feelings depends on this independently ordered history (Hoerl & McCormack, 2005, pp. 267–270).

Using a delayed video-feedback technique in which children are shown two games in different orders, Povinelli, Landry, Theall, Clark, and Castille (1999) demonstrated that three-year-olds could not use information about which of two events happened more recently to update their model of the world as a series of causally related events unfolds, but that with clear instructions, five-year-olds could do so. Building on these methods in ingenious experiments that examine not only temporal updating but also the ability to make temporal-causal inferences, McCormack and Hoerl (2005) have shown that children under age five and some five-year-olds who can successfully engage in simple updating of their knowledge base when they observe or infer the world being modified have serious difficulty in making these more sophisticated temporal-causal inferences in which they must grasp the objective sequence of events.

They suggest that this kind of temporal-causal reasoning is just what conversations about past events elicit or jointly generate, as parent and child together construct a temporally structured narrative that explains the influence of the past on the present. In joint reminiscence, a parent is often not merely modeling these narrative abilities but also directly exerting an influence on the child by encouraging the child to see that things are not now as they once were. The context is very often directly affective; the sore finger that caused the child's past sadness and pain is no longer sore, because since then

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Daddy came and made it better (Hoerl & McCormack, 2005, p. 275, quoting Fivush, 1994, p. 149). The shared outlook on the past that emerges is thus also evaluative, and in turn grounds other ongoing collaborative activities; children then come to value memories of particular past events for themselves, "because the sharing of such memories is a way of establishing, maintaining, or negotiating a distinctively social relationship with others" (Hoerl & McCormack, 2005, p. 283).

So, this may be how the local narrative practices studied by the social interactionists, with all their cultural idiosyncrasies, themselves put the child in touch with an objective conception of time and causation. The practical engagement involved in jointly attending to past events and sharing memories helps the child understand that there can be different perspectives on the same once-occupied time; and thus such shared, co-constructed narratives shape the child's initial grasp of the causal connectedness of self and world. The acquisition of competence in these shared narratives is, inextricably, cognitive and social development at once.

4. Shared Remembering

4.1. *Halbwachs on Collective Memory*

Maurice Halbwachs is not often explicitly recognized as a forerunner of situated cognition, but in fact his conceptual contributions are as relevant as those of Bartlett or Vygotsky. In *The Social Frameworks of Memory* (1925) and the posthumous *The Collective Memory* (1950/1980), Halbwachs developed striking views about shared remembering and applied them in studies of family memory, religious memory, memory and place, and musicians' memory. Halbwachs's influence has been felt much less in the psychology of memory than in history and the social sciences (Hutton, 1994; Misztal, 2003; Olick & Robbins, 1998), where many have criticized the vagueness of invocations of collective memory and social memory in contemporary social theory (Berliner, 2005; Gedi & Elam, 1996; Kansteiner, 2002; Klein, 2000). This situation exemplifies the ongoing and damaging lack of contact between the cognitive and the social sciences; in this case it is partly because the only English translation of Halbwachs's 1925 book simply omits most of the relevant material (the first four chapters, which cover 145 pages in the second French edition of 1952, are condensed into 13 pages in the 1992 translation), and partly because relevant ideas in situated or distributed cognition remain inaccessible to those social theorists who are keen to forge links with psychology (Bloch, 1998; Middleton & Brown, 2005; Olick, 1999; Winter & Sivan, 1999). The time is ripe for integrative work to close these gaps (Nelson, 2003; Rubin, 1995; Sutton, 2004; Wertsch, 2002; Wilson, 2005).

Halbwachs argues that what individuals retain of the past, if considered outside of their ordinary social context as (for example) in dreaming, is often incomplete or shrouded, based only on "the disordered play of corporal modifications" (1992, pp. 41–42; 1980, pp. 71–76). My memory traces are not "fully formed in the unconscious mind like so many printed pages of books that could be opened, even though they no longer are," a view Halbwachs attributes both to Freud and to his own teacher Bergson (1980, p. 75). In remembering and reconstructing the past, we normally draw not just on such episodic fragments as we hold on our own but also on the vast and uneven resources of our multiple social groups, material symbols, and social practices with which we have surrounded ourselves. This is so not only when actually remembering in company but also by way of the virtual groups we turn toward affectively when we revivify experiences; ways of thinking and feeling that did not originate with me stay with me as the influences of various groups and continue to animate the explicit memories I draw from my world (1980, p. 24; on the necessity of an affective community, see also pp. 30–33). I do have my own unique memories, as a result of my idiosyncratic history, but this is just a contingent fact about the complexity of the particular intersection of

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social groups and influences at which they lie (1980, pp. 44–49).

Robert Wilson (2005), arguing that Halbwachs anticipates "something like an extended mind view of memory" (pp. 229–231), suggests that slightly different theses are defended at different points in Halbwachs's works. On the one hand, "it is individuals as group members who remember" (Halbwachs, 1980, p. 48), but memory is always and constitutively socially manifested. On the other hand, "it is only natural that we consider the group in itself as having the capacity to remember" (Halbwachs, 1992, p. 54). Wilson sees some tension between these claims, characterizing the latter as an application to memory of a more general thesis about group-level cognition, which is also found in ideas about superorganisms and swarm intelligence in biology (Wilson, 2004, pp. 265–307). But Halbwachs himself saw the two claims as not just compatible but complementary: "One may say that the individual remembers by placing himself in the perspective of the group, but one may also affirm that the memory of the group realizes and manifests itself in individual memories" (1992, p. 40). Neither individual nor shared memory has ontological priority. Methodologically, as David Velleman (1997) argues for the case of shared intention, before we rule out the possibility of shared cognitive states on the ground that there are no group minds to have them, we should first offer independent characterizations of the cognitive states in question and investigate whether they can be held in common (cf. Clark, Austen, 1994; Gilbert, 1989, pp. 432–434).

4.2. *The Plural Subject of Memories*

Indeed it is far from clear that proponents of socially situated cognition in general need the idea of collective minds; mind is a much trickier concept than (for example) memory, intention, belief, or action, and is much less entrenched in ordinary usage and perhaps far more culturally and historically variable (MacDonald, 2003; Wierzbicka, 1992). What is arguably required, though, to ground the stronger idea we found in Halbwachs that a group itself can remember is some alternative way of characterizing the kind of more or less transient, socially extended cognitive systems that can have distributed memories or intentions or beliefs, or can engage in genuinely joint action. This demand might be met by applying to memory the notions of mutual knowledge and of the plural subject developed in the field of social ontology, as a way of taking ordinary "We remember" statements seriously.

Some people who happen to have shared experiences clearly do not have a shared or collective memory; even if each of them separately retains information about the same event, and even though their distinct memories could in principle be aggregated, the social dimension of memory in this case is in an obvious sense accidental or superficial. In contrast, think of the way certain ordinary small groups – friends, partners, or a family, for example – may continue to revisit their shared experiences, when the events they remember together may have a distinct interpersonal and affective significance alongside their personal significance. Perhaps they reevaluate parts of their lives, in part, on the basis of – or just by way of – retelling and reinterpreting some of these earlier shared experiences. Occasionally, in a long-standing close network, significant renegotiation of relationships and plans may be partly enacted through this ongoing joint reinterpretation of the still-live shared past. Clearly, there are many intermediate cases; but it is only in the latter kind of case that the commonplace notion of a group being partly held together by, or identified with, some of its memories has a grip.

The sharing of memories in this stronger sense is a pervasive social phenomenon, built in to the interpersonal fabric of human life in significant ways. How should it be understood? The plural-subject analysis developed in other contexts by Margaret Gilbert (1989, 2003, 2004) may capture features of this kind of shared remembering that cannot be accounted for so easily in alternative theoretical models. For example,

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collective-memory phenomena could be treated as the aggregate of many individual memories. This kind of summative approach is exemplified, in the social sciences of memory, by survey-based studies of what and how the members of groups or generations remember about some set of events. Schwartz and Schuman (2005), for example, react against models that exclude the individual by surveying what many individual Americans of different generations remember about Abraham Lincoln. Whether examining memories of historical and public events or of more personal experiences, this collected memory approach – to use Olick's (1999) useful label – does not directly address the active interpersonal dynamics of memory sharing; it might be merely accidental that the aggregated individual memories converge to whatever extent they do.

So, a fuller account of genuinely shared memory must allow for it to be common knowledge among the members of the group that they all share the memories in question. In the strongest cases, this common knowledge must not itself be accidental but must result from and involve the members' open expressions of willingness to remember jointly and to remain jointly ready and committed to the shared remembering. By thus pooling their wills, the members of a group become for these purposes a plural subject, the subject of the "we remember" thoughts and claims. This kind of analysis, here very roughly adapted from Gilbert's (1989, pp. 154–167, 288–314) treatments of shared action and collective belief, could potentially cover both occurrent joint activities of remembering and the standing shared memories to which groups retain a joint commitment over time. It should also begin to explain the characteristic structure of obligations, commitments, and expectations that participation in a community of memory brings. This, of course, is compatible with the fact that there is always room for disagreement and renegotiation over the details and meaning of shared memories. And, further, the problematic but pervasive notions of collective and shared responsibility and regret might be partly illuminated by such an analysis of shared memory, as there is plausibly some link between responsibility and memory (on the ethics of memory, see, e.g., Margalit, 2002).

4.3. *Collaborative Recall*

To this kind of conceptual analysis of shared memory phenomena, we can add the experimental dimension provided by psychological studies of collaborative recall. Some of this work shares the individualistic orientation of false memory research as mentioned previously, focusing for example on memory contagion and memory conformity in groups (Gabbert, Memon, & Allan, 2003; Roediger, Bergman, & Meade, 2001); but the methods developed in these paradigms do not inevitably rely on the assumption that external influence necessarily distorts individual memory. Studies of transactive memory, for example, treat the emergent and often implicit structures of memory organization in small groups, families, or couples as key components of shared expertise in successfully negotiating a complex shared environment (Moreland, Argote, & Krishnan, 1996; Wegner, Erber, & Raymond, 1991). And in collaborative recall paradigms, groups working together typically remember more than individuals recalling alone but less than the nominal pooled sum of the individual memories (Basden, Basden, & Henry, 2000; Weldon & Bellinger, 1997). The causes of this collaborative inhibition effect, in which individuals' retrieval strategies are somehow disrupted in the collaborative process, are far from clear, and little work in the area has dealt with emotional or autobiographical memories (Yaron-Antar & Nachson, 2006). Further investigations of the cognitive, social, and motivational parameters of group influence are needed, as of the impact of subtle differences in the mechanisms of collaboration and in the specific nature and history of the groups in question.

In one suggestive line of research, William Hirst and his colleagues (Hirst & Manier, 1996; Hirst, Manier, & Apetroaia, 1997; Hirst, Manier, & Cuc, 2003) examine the way in

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which specific group dynamics and processes can influence individual members' subsequent enduring memories. In the basic design, each individual first gives his or her memories of an event that the whole group has seen or lived through. After various delays, the group as a whole is then asked to recall what happened; after a further manipulable delay, each member again offers his or her own memory. Hirst is particularly interested in cases in which a dominant individual or narrator – such as one parent in a family group – has a disproportionate influence on the content (or emotional tone, or narrative structure) of both the group's consensual account (where one emerges) and members' subsequent individual recollections. Memory contents migrate in the process of shared remembering, so that sometimes each member's later recall incorporates, without his or her awareness, elements that were only offered by the dominant narrator in the group phase. Basic cognitive-affective processes and subtle situational factors operate together both in the group's production of a shared or social memory and in the effect of collaboration on subsequent individual memories.

5. Distributed Cognition and Exograms

Most socially distributed transactive memory systems are not, in fact, exclusively social in that the spread of resources drawn on in complex activities of remembering may include material, symbolic, technological, and cultural artifacts and objects as well as other people. It is not enough to see external resources or representational systems as merely adding supplementary storage capacity; again, the most trenchant individualist could accept this.

Again, we can draw on Halbwachs's direct anticipation of distributed cognition. In *The Collective Memory of Musicians*,[5] Halbwachs asks how classical musicians reliably remember how to play such an enormous array of pieces of music. He denies both that musical sounds are fixed in memory as specific auditory reminiscences and that our untrained natural memory for sounds is sufficient to explain the expert's competence. But because musicians have wholly assimilated the conventional system of musical notation, they do not need to conserve all relevant combinations distinctly in their brains. External representations can then be used to preserve the complex combinations: "the score in this case functions exactly as a material substitute for the brain" (1980, p. 162). In the long process of acquiring musical skills, musicians not only have learned how to read these external symbols but also have artificially remolded their onboard representational apparatus, and they come to rely on these new mechanisms in their musical habits and thinking whether or not they are actually using a score.

In our terms, Halbwachs is arguing that onboard biological memory is transformed rather than simply augmented. He imagines an alien neurophysiologist ignorant of human musical culture and notation. The alien might, Halbwachs suggests, come to understand the basic representational workings of the human auditory system as it responds to natural sound. But it could not make sense of the traces connected to musical characters. These culturally laden traces "reveal the action exerted on the human brain by . . . a system or colony of other human brains" (1980, p. 163), and the musical system with which they operate is shared across the entire musical world of a culture. So, for Halbwachs, in these entirely typical respects, the human brain "cannot be considered in isolation" (p. 164); or, as we might put it, the musical mind extends beyond the brain. The external symbol system of musical notation has been annexed, exploited, and assimilated "deep into our mental profiles" (Clark, 2003, p. 198; Wilson & Clark, this volume).[6]

5.1. *The Cognitive Life of Things*

So, where classical cognitivists projected stability in information storage onto our internal psychological economy, situated

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approaches to memory see it as an emergent product of organisms' meeting, within specific cognitive niches, with external symbol systems and other resources. As Clark (1997) puts it in his account of Hutchins's case study of expert navigation, "the computational power and expertise is spread across a *heterogeneous* assembly of brains, bodies, artifacts, and other external structures" (p. 77; Hutchins, 1995, 2006). The point is not that the external resources do the cognitive work on their own; it is no argument against a situated approach to emotion, for example, to complain that "the black tie I wear at the funeral isn't doing my grieving for me" (Harris, 2004, p. 729). Neither, after all, do brains tend to perform their cognitive functions in isolation.

Studies of such cases as the sketch pads without which artists cannot iteratively reimagine and successfully create an abstract artwork (van Leeuwen, Verstijnen, & Hekkert, 1999) can be characterized as investigations of 'the cognitive life of things' (Sutton, 2002, extending Appadurai, 1986). In his initial discussion of the changes to human memory that resulted from the spread of external representations, Merlin Donald (1991, pp. 315–316) focused on typical differences between engrams and exograms; the latter, in general, last longer, have greater capacity, are more easily transmissible across media and context, and can be retrieved and manipulated by a wider variety of means. Hooking up with such systems of exograms in more or less transient networks for particular purposes, we can – collectively and individually – dramatically transform our cognitive profile and hold information more securely over time than our fragile biological memory allows.[7] But, of course, not all external representations need be permanent or endlessly reformattable. Some of the liveliest recent applications of situated cognition to the case of memory show that systems of exograms are not necessarily meant to be permanent or limitlessly transmissible, or turn out to be less stable in practice than in intention. Art historians and theorists (Forty, 1999; Klein, 1997; Kwint, 1999), cognitive archaeologists (Knappett, 2005; Renfrew & Scarre, 1999), and sociologists of science (Bowker, 2005) offer rich studies of cases in which external resources are less passive and medium- independent than on Donald's basic scheme. So, as Clark (2002) writes, the urgent task for a science of biotechnological memory systems is to understand "the range and variety of types of cognitive scaffolding," by constructing "a taxonomy of different types of external prop, and . . . of how they help (and hinder) human performance" (p. 29; see also Susi, 2005).

In addition to this direct mediation of memory by the use of cognitive artifacts, however, humans also characteristically learn, in some circumstances, to drop the real external object and thereby create an inner surrogate for it. The requisite auxiliary stimuli are "emancipated from primary external forms" when we internally reconstruct the familiar active operations and means of recall (Vygotsky, 1930/1978, p. 45; cf. pp. 52–57). So, not all cognitive technologies must in fact be outside the skin. Among the many resources we use to think about the past are a range of internalized representations, symbol systems, and habits of thought, which we learn (historically and developmentally) to manage with both idiosyncratic and culturally specified strategies. We are not untouched by our ongoing interaction with different media and symbolic technologies; even language, as used cognitively, provides us with more memorable, context-resistant mental objects to carry around with us and take as objects of thought in their own right (Clark, 1997, p. 210; 2006). Lasting changes in our minds result from internalizing the mediating function of artifacts. For instance, we become capable of self-scaffolding, engaging in various forms of virtuoso artificial self-manipulation by way of words, tags, and maxims that can freeze, counteract, recalibrate, or buffer us against our ordinary cognitive-affective flow (Clark, 2005b; Hutchins, 2005).

So, it is one natural tendency of socialized brains like ours to co-opt cultural and moral, as well as linguistic, inner prostheses,

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altering our own cognitive machinery by exploiting and importing whatever tools and labels we can. Questions about the location of memory processes may no longer seem so important; rather, we are studying the transformation and propagation of representational states "across a set of malleable media," whether inside or outside the skin (Hutchins, 1995, p. 312; Latour, 1996, 1999). We can acknowledge that embodied organisms bring something specific to the interface, underpinning their enduring individual histories and idiosyncratic styles of planning and remembering, without assuming distinct inner and outer realms of engrams and exograms, the natural and the artificial, each with its own inevitable proprietary characteristics (Sutton, in press).

6. Conclusion

The challenge set by the nature of human memory to theories of situated cognition, as I mentioned at the outset of this chapter, is to see how social or material resources outside the brain could possibly be an integral or constitutive feature of memory states or processes, when the events or episodes remembered are long gone. We now have the elements of a response in place – as on many issues in inchoate research programs these are not so much arguments as sets of attitudes or possible ways of approaching difficult topics. We retain the invocation of representations while departing from classical cognitivism in two ways: by treating inner representations and traces as often incomplete, partial, and context-sensitive, to be reconstructed rather than reproduced, and by widening the representational realm outside the organismic boundary (Wilson, 2004). This leads to the expectation that mnemonic stability is often supported by heterogeneous external resources as well as, and in complementary interaction with, neural resources. I examined the social nature of human memory in its development, suggesting that joint attention to the past is integral to the cognitive shift by which children come to grasp the specificity of particular past experiences. I offered an integrative picture of shared memory and social memory, triangulating a rereading of Halbwachs with a new social ontology of memory and a sketch of ongoing experimental investigations of collaborative recall. And finally I rehearsed some central ideas in the situated and distributed cognition movements about the role of material and technological artifacts in complex cognitive and mnemonic practices.

The last point here about the internalization of memory prostheses is crucial for the overall response to the challenge. The world may be 'an outside memory' in the context of visual processing, in that the detail of the visual scene is all out there and potentially available to the viewer (Myin & O'Regan, this volume), but it would seem that the present world cannot function as an outside memory in support of memory itself, because the detail of the past simply is not always recoverable from the current situation. Even when there are interpersonal or material supports to remembering, they still need the embodied remembering agent to bring considerable history to bear in the memory process; and often, in any case, there simply are not any relevant external triggers or cues in the present environment.

But our assessment of the role of situations in driving and shaping memory need not be restricted to the role of contextual features that happen to be outside the skin: that might be a relatively superficial characteristic. In even the most abstruse and detached activities of autobiographical remembering, our memory processes still lean and operate on the internal wing of the vast, extended system of cultural and personal habits, hints, and patterns through which the inner representational regime has been sculpted and disciplined (cf. Clark, 2005b, p. 264). Again, adding a genuinely diachronic dimension to our picture of the neuroscience and psychology of memory means that we do not have to see the temporarily isolated brain as fundamentally or intrinsically alone, having to revert to some purely biological starting state whenever the trappings of culture are not around. For,

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again, in our unusual case, the biological brain is itself incomplete and always already permeated by structures and history that take it out of itself.

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Notes

1 In 1978, for example, Ulric Neisser could fairly lament, "If X is an interesting or socially significant aspect of memory, then psychologists have hardly ever studied X" (1978/2000, p. 4). But by the time of the second edition of *Memory Observed: Remembering in Natural Contexts*, Neisser and Hyman could afford understatement in noting that the study of everyday or real-world memory "has now become an influential and widely accepted research tradition" (2000, p. xiii; see also Neisser, 1997).

2 Situated approaches are potentially relevant to a number of further topics in the interdisciplinary study of memory, which I do not discuss in this chapter. As well as issues about memory systems, amnesia, and localization, I should particularly mention questions about reduction and interlevel relations in the sciences of memory, with which the integrative version of a situated approach to memory which I sketch here needs to engage (see, e.g., Craver, 2002).

3 However, one plausible lesson of the constructivist research in cognitive psychology described in this section is that the processes and contents of personal memory are thoroughly entangled with factual or semantic memory, the other central form of declarative memory. Indeed, some situated approaches threaten the idea of firm conceptual and psychological distinctions between these autobiographical and semantic memory systems, and between memory and other psychological capacities (Toth & Hunt, 1999).

4 There is ongoing controversy – both conceptual and empirical – over Bartlett's account of schemas and conventionalization (Brewer, 2000; Roediger et al., 2000); but the recent history of the schema concept is an intriguing illustration of the potential links between cognitive-connectionist computational theories of memory and more obviously situated approaches (Rumelhart, Smolensky, McClelland, & Hinton, 1986, Strauss & Quinn, 1997).

5 First published as a separate case study in 1939, translated in 1980, pp. 158–186.

6 For an intriguing historical study in distributed cognition, see Tribble (2005), which in impressive detail applies Hutchins's framework in *Cognition in the Wild* to a historical puzzle about how Shakespearean actors remembered a staggering number of plays without fixed scripts or extended rehearsal periods.

7 Even such comparatively simple operations as tying a knot or marking a stick as a reminder change the psychological structure of the memory process. They extend the operation of memory beyond the biological dimensions of the human nervous system and permit it to incorporate artificial, or self-generated, stimuli, which we call "signs" (Vygotsky, 1930/1978, p. 39).

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