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# Memory development: New questions and old

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## Abstract

There is no unique offset of infantile amnesia, no single developmental moment at which memory-relevant encoding begins. Whether a childhood experience is later remembered (in some sense) depends on both the nature of the experience itself and the paradigm being used to determine whether it is in fact remembered. The papers in this issue of *Developmental Review* illustrate that point for various ingenious non-verbal memory paradigms, but the same principle applies to explicit verbal recall.

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It all began with what Freud called “infantile amnesia.” Why, he wondered, can’t people remember their own childhood experiences? His own explanation now seems very odd, partly because he took memory for granted and regarded failure to remember as the only interesting theoretical problem! (His solution was to postulate a global process of repression.) Schachtel (1947) took a more positive step with his insight that the mental lives of young children are quite different from those of adults. He was surely right about that, even though the particular difference he postulated—young children happily adventurous, adults painfully conventional—no longer seems plausible. Anyway, many of us including me (Neisser, 1962) were persuaded that some sort of discontinuity between children and adults makes early memories inaccessible. There may still be something useful in that idea, but “inaccessible” no longer seems quite right. It seems more likely that earlier memories just don’t exist, never having been well established in the first place. Because young children are less skilled

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and less knowledgeable than adults, they generally do not structure their experience in memorable ways.

Times have changed in another respect too. The articulate autobiographical memory in which so many of us have been so interested is no longer the only game in town. The papers in this issue of *Developmental Review* (Hayne, 2003; Rose, Feldman, & Jankowski, 2003) make that very clear. Many ingenious non-verbal and non-autobiographical research paradigms have been devised and are being energetically explored; habituation, visual paired comparison, operant conditioning, re-enactment, deferred imitation and still others. There are even research methods that may help us understand traumatic memories (Cordon, Pipe, Sayfan, Milinder, & Goodman, 2003), though I cannot address that question here.

All these paradigms are interesting, and each one has essentially opened up a whole new field of research. At what age does the (memory-related) behavior first appear? How long do the memories persist? How widely do they generalize? Do they benefit from reminders? Does the behavior predict later IQ scores? Is it a possible index of previous trauma? How is it related to different aspects of adult memory? Can it be shown in non-human primates? What parts of the brain are involved? Whatever the answers to these questions turn out to be, it is already clear that various forms of memory occur even in children who are too young to talk and quite unable to provide autobiographical recall.

These paradigms pose so many research questions—each with preliminary answers already in place—that I will not try to review them all here. Nevertheless, I will venture one prediction. Many of the upcoming research efforts in this area will surely involve hypotheses about the brain, and therefore they will benefit from the ideas presented here by Munakata (2003). Her paper offers two major insights, one empirical and the other theoretical. The empirical claim is surprisingly concrete; Munakata points to three specific brain regions that are related to three equally specific forms of memory. To put it briefly: the hippocampal regions support episodic memory, the posterior cortex supports semantic memory, and the prefrontal cortex is essential for working memory. Future research will probably modify these assignments and reveal other important regions, but this is an impressive start. Even more impressive, at least to me, is Munakata's theoretical insight. There *must* be more than one region of the brain specialized for memory, simply because a single neural network cannot be responsible for both slow learning and fast learning! It is not surprising, then, that a number of different memory regions are now being identified. But what is the relation between these brain areas on the one hand and the expanding array of new non-verbal memory paradigms on the other? I would suppose that each of the paradigms draws on a number of different memory systems in its own way, and that the next research task will be to examine those ways in detail.

Having said that much about the new paradigms, let me return to the old one. Childhood amnesia is often defined as an inability to recall anything that happened before a certain age. But what is that age, exactly? In my view, this turns out to be a poor question. There is no single developmental moment at which memory-relevant encoding begins: instead, different criteria produce critical ages.

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