The Development of Autobiographical Memory

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Abstract

Autobiographical memory is a uniquely human system that integrates memories of past experiences into an overarching life narrative. In this review, I extend social-cultural models of autobiographical memory development and present theory and research that demonstrates that (a) autobiographical memory is a gradually developing system across childhood and adolescence that depends on the development of a sense of subjective self as continuous in time; (b) autobiographical memory develops within specific social and cultural contexts that relate to individual, gendered, and cultural differences in adults’ autobiographical memories, and, more specifically, (c) mothers who reminisce with their young children in elaborated and evaluative ways have children who develop more detailed, coherent, and evaluative autobiographical memories.
## INTRODUCTION

Autobiographical memory is that uniquely human form of memory that moves beyond recall of experienced events to integrate perspective, interpretation, and evaluation across self, other, and time to create a personal history. To put it succinctly, autobiographical memory is memory of the self interacting with others in the service of both short-term and long-term goals that define our being and our purpose in the world (Conway et al. 2004; Fivush 1988, 2008; McAdams 1992, 2001; Pillemer 1998). Whereas previous research has not always clearly differentiated between episodic memory and autobiographical memory, in this review I argue that making this distinction allows for a more complete understanding of the development of episodic and autobiographical memory both across species and across human development. According to Tulving’s (2002) definition, episodic memory includes two separable components: the first is memory of the specific what, where, and when of an experience; the second involves autonoetic consciousness, the awareness of self having experienced the event in the past, which involves mental time travel. I argue that these components are indeed separable and that the first comprises a form of episodic memory that appears to be available across species and across human development and does not necessitate autonoetic awareness. In contrast, autobiographical memory builds on episodic representations in at least three ways. First, whereas episodic memory is recall of a specific event that occurred in the past, autobiographical memory goes beyond the episodic memory function of guiding current...

In support of a distinction between episodic and autobiographical memory, I describe a developmental social-cultural model of autobiographical memory. The basic premise is that autobiographical memory is a form of cultural activity and as such is individually and culturally specific to the local and cultural forms of social interaction from which it is shaped. Moreover, autobiographical memory is a complex ability with a long developmental history. Not only is autobiographical memory late in phylogenetic history, being unique to humans, but it is also late in ontogenetic history. The ability to create an autobiography, a personal history of self that is continuous in time, with specific events experienced at particular points and linked both to each other and the present, is a complex human skill that relies on multiple component developmental skills, including the development of subjective consciousness, the developing ability to link past self to present self, and the developing ability to construct a personal time. As described here, each of these is, in turn, a complex cognitive achievement that occurs over substantial developmental time. Thus, the question is not when children “achieve” autobiographical memory, but rather, how these sets of complex skills develop across age and become integrated into an emerging autobiographical memory system that continues to develop and evolve across the lifespan (for related arguments, see Nelson & Fivush 2004).

To frame these arguments, I first briefly describe current views of human memory and where autobiographical memory fits in this larger perspective. I then turn to an explanation of social-cultural theory and the role of language and narratives in autobiographical memory. I use this framework in the following sections to interpret the empirical behavioral research (see Bauer 2007a,b for a description of the neurocognitive development of autobiographical memory). I end with a discussion of the functions of autobiographical memory. If autobiographical memory is indeed a uniquely human ability, why has it developed at all?

DEFINING AUTOBIOGRAPHICAL MEMORY

Memory Systems

In the past two decades, with the expanding ability to study both typical and atypical brains in relation to memory behaviors, there is growing consensus that memory is not a unified ability but rather a set of dynamic, integrated systems (Eichenbaum & Cohen 2001, Schacter et al. 2000, Squire 2004). The broad strokes of how memory systems are organized are reasonably well agreed upon, although, of course, the nuances continue to be debated. For the purposes of this review, memory can be broadly conceptualized as consisting of two major systems, declarative and nondeclarative memory. Nondeclarative memory theoretically includes multiple systems including procedural knowledge, such as knowledge of how to do things, skills, and actions that are well-practiced and done with little to no conscious awareness, as well as most forms of conditioning and priming (Schacter et al. 2000, Squire 2004).

Declarative memory, in contrast, is assumed to be explicit and available to consciousness. This is the form of memory that most of us are referring to when we talk about memory in everyday life. It is explicit representations of past experiences. In 1972, Tulving made a distinction between semantic and episodic declarative memory (Tulving 1972). Semantic memory is explicit knowledge about the world. Although we no longer recall when or where we learned it, we know that Paris is the capital of France and George Washington was the first president of the United States. Episodic memories, in contrast, are specific memories tied to space and time (e.g., the time I visited the Eiffel Tower during my honeymoon in Paris, or the time I saw the portrait of George Washington on my senior high school trip to Washington, D.C.). In this conceptualization,
episodic memories and autobiographical memories are not differentiated. Episodic memories include all memories of specific past events.

**Distinguishing Episodic and Autobiographical Memory**

A problem in Tulving’s (2002) definition of episodic memory is that it conflates two separable components. One component is the idea that the memory is specific to what, when, and where, (i.e., that the memory is of a specific event that happened at a particular time and place in the past). The second component is that episodic memory entails the awareness of self as the experiencer of the event in the past and the rememberer of the event in the present, which in turn implies conscious awareness of a personal past, a timeline on which the individual can place past events in sequence, creating a sense of a personal history (for discussions, see Nelson & Fivush 2004, Roberts 2002). I argue here that these two components—the specific what, when, and where, and mental time travel and autonoetic consciousness—can be differentiated and that the episodic ability to recall the specific what, when, and where of an event is available across species and human development, but autonoetic awareness is a late-developing human ability.

Based on Tulving’s (2002) definition, debate flourished on whether nonhuman animals were capable of episodic memory (for reviews, see Dere et al. 2006, Roberts 2002). There is now compelling evidence that nonhuman animals can base current actions on past experiences in situations that require remembering specific what, when, and where information (Clayton & Dickinson 1998, Clayton et al. 2003). There is also a small but intriguing set of studies that suggests nonhuman primates may be able to reflect on their state of knowledge, at least under some circumstances. Monkeys seem capable of choosing specific rewards based on what they think their current state of memory is (Hampton 2009). What these experiments clearly demonstrate is that animals can recall specific experiences that occurred in the past and can use these experiences to guide their current and future behavior.

Similarly, even in the first year of life, human infants demonstrate the ability to remember specific past experiences. For example, Rovee-Collier & Hayne (2000) have shown that after pairing foot kicking with a much-desired moving crib mobile, infants as young as 3 months old will kick their feet upon seeing the mobile again, even when this action is no longer tied to the desired goal. Some argue that, as this is a form of conditioning, it does not require explicit or episodic memory (Bauer 2007a). More compelling evidence of episodic memory in the first year of life comes from work by Bauer and colleagues (Bauer et al. 2000; for a review, see Bauer 2007a) that demonstrates that, at least by 9-months of age, infants shown a specific series of actions performed on a set of novel objects will reliably imitate those actions when presented with those objects weeks later. Although the complexity of sequences recalled, and the duration and retention of those sequences, increases dramatically and linearly across the first two year of life, these findings demonstrate that even very early in development, infants are able to recall a single experience. Thus, research with nonhuman animals and human infants clearly indicates that the ability to recall a specific episode is part of the cognitive repertoire across species and age. But one does not need autonoetic awareness to recall a specific past episode in the service of guiding current behavior. All that is needed to guide current behavior based on the past is a representation of what happened under these conditions, with no necessary representation of the self having experienced this event before (for similar arguments, see Nelson 2001, Roberts 2002).

**The role of the self in autobiographical memory.** The issue of autonoetic awareness confronts the long, difficult, and tangled question of consciousness. To move beyond representing what happened (i.e., episodic memory)
to what happened to me (i.e., autobiographical memory), the individual must have at least two additional layers of representation (for similar arguments, see Fivush 2001, Fivush & Nelson 2006, Nelson 1996, Tomasello 1999). First, the individual must have a subjective sense of self who experienced the event; the representation must move from a representation of what happens (pushing the red button releases the desired food) to what I did and thought in the past (I remember seeing this before; I pushed the red button and I got the food I like the best). To paraphrase William James (1890), when I wake up in the morning, I do not question whether I am Peter or Paul; I know I am Peter because I still have Peter’s thoughts and emotions; it is not that I have thoughts, but that these thoughts are mine, they are owned. Second, these thoughts have a personal history. I can represent not just what happened but also how I thought and felt about it then and how I think and feel about it now, and how these two events are connected through time. Thus, one must be able to represent one self in the past, and, critically, one must also be able to connect that past self to the current self as a continuous being with a past, present, and future that links specific episodic representations into a meaningful sequence of events that define a person and a life, is a uniquely human ability, and this is the crux of autobiographical memory. It is, as labeled, a biography of self (Barnes 1998, Conway et al. 2004, Pillemer 1998). And it is uniquely human precisely because it is not possible to create an autobiography outside of a social-cultural group (Donald 2001; Nelson 1993, 1996).

THE SOCIAL-CULTURAL DEVELOPMENTAL THEORY

In 2004, Nelson and Fivush explicated a social-cultural developmental model of autobiographical memory (Nelson & Fivush 2004). Here, I expand on many of the arguments made in that paper. At its most basic, social-cultural models explain human activity within cultural models that specify what it is to be a person (Rogoff 1990, Vygotsky 1978). Cultures define canonical forms of social interactions and activity, such that individuals within a culture develop a shared representation of reality that guides what are considered appropriate and inappropriate behaviors and interactions. Cultures are organized in such a way that infants and children are introduced into appropriate forms of behavior through participating in adult structured activities. Cultures define what are considered the critical skills needed to be a competent member of that culture and organize activities such that children are drawn into participating in these sets of skills through guided practice.

For example, in industrialized Western cultures, literacy is considered a critical skill. Walk into virtually any home with an infant or toddler in these cultures and there will be magnetic letters and numbers on the refrigerator. These materials are available well before the infant is capable of learning their labels, let alone their significance for literate activities. Yet from the first days of life, infants are brought into contact and invited into activities with objects that will become the cornerstones of necessary adult
skills. In this way, cultural interactions are organized around materials and ideas with which children will be expected to become familiar and skilled.

**Autobiographical Memory is a Social-Cultural Skill**

While it is the case that all normally functioning human individuals are capable of recalling past experiences, the forms and functions of autobiographical memory are socially and culturally variable. For example, again in industrialized Western cultures, it is expected for adults to have a coherent set of connected memories that describe who they are as a person (McAdams 2001, Wang & Ross 2007). This story of self is based on cultural assumptions that a self is an autonomous being and that past experiences create and cause future experiences. This is not a set of beliefs that is necessarily shared in other historical or cultural contexts (Fivush & Haden 2003, Oyserman & Markus 1993, Triandis 1989).

For example, from an historical perspective, several theorists have suggested that current conceptualizations of autobiography are based on modern industrialized notions of self and memory. In preindustrial cultures, memories of one’s past were not individualized but rather were contextualized and communal, and it is possible that the idea that one’s internal subjective experience as a critical part of creating a sense of coherence and consistency over time did not emerge in human culture until the mid-eighteenth century, when the first truly autobiographical writings of Rousseau (1782/1954) appeared (McAdams 1992, Nelson 2001). It is certainly the case empirically that the content and functions of autobiographical memory vary by cultures in today’s world (for overviews, see Fivush & Haden 2003, Pillemer 1998, Wang & Ross 2007). Moreover, this variability can be predicted by specific forms of social-cultural interaction embedded within these cultures.

The cultural importance of autobiographical memory, especially in industrialized Western cultures, can be seen in the kinds of activities that adults organize for young children and which they expect young children to engage in. Think about a 2-year-old called upon to “tell Daddy what we did in the park today” over dinner, or to “tell Grandma what happened to your new red dress” over the telephone. In preschool, children participate in “sharing” or “show and tell” around a circle, in which each child takes a turn to tell what he or she did over the weekend or brings in a new object and tells the story of where it came from. As early as grade school, children are expected to write essays of what they did over their summer vacation and to write their autobiography. Being a person means having a story to tell about your experiences, and these stories help constitute who you are (Barnes 1998, McAdams 2001).

**Language and Narratives in the Construction of Autobiographical Memory**

From this perspective, language and narrative are critical in the development of autobiographical memory. From a social-cultural perspective, language is one of the most basic tools that cultures provide for organizing experience (Bruner 1990, Fivush 2008, Nelson 1996, Vygotsky 1978). Although language clearly does not determine thought, it facilitates certain forms of thought over others. In particular, for autobiographical memory, language provides narrative organization. Narratives are canonical linguistic forms that specify a sequence of actions and the links between them. Coherent narratives move beyond a simple sequence to provide an explanatory framework for understanding how and why events unfolded as they did. The framework includes intentions, motivations, thoughts, and emotions that create a human texture and context for events (Chafe 1990, Labov 1982, Linde 1993). Whereas a chronology specifies a temporally organized sequence, a coherent narrative explains why this sequence unfolded as it did and why it matters for understanding of self and other in the context of a social cultural world.
This is not to argue that autobiographical memory is linguistically based; it is not. Like all memory, autobiographical memory is composed of multiple sensory components that are stored and retrieved across multiple brain areas (Conway & Pleydall-Pearce 2000, Rubin 2006). In recalling an autobiographical memory, these bits and pieces are retrieved and reconstructed using canonical narrative forms as an organizational guide (Rubin 2006). Thus, the argument is that culturally defined narratives, linguistic forms that provide schemes and guidelines for understanding how human events occur (Mandler 1983), help shape the way in which individuals come to recall their personal past.

In addition to providing these forms, language allows individuals to share their past with others, and through this to create both shared and independent understandings of the past (Cuc et al. 2006, Fivush 2001, Fivush & Haden 2005, Reese & Fivush 2008). More specifically, it is through language that we can express to others our thoughts and emotions about what happened, and they can share theirs with us. In this way, narratives move from what Bruner (1990) has called the “landscape of actions” to the “landscape of consciousness.” Narratives provide individuals with a way to share another’s perspective on a past event. Through sharing the events of our lives with others, we develop a more nuanced understanding of these events and of ourselves. Through understanding how others think and feel about the past, the ways in which it is the same as and different from our own thoughts and feelings, we develop a sense of subjective perspective on the past. Thus, it is through narrating the past with others, through joint reminiscing, that we come to have a sense of ourselves through time (Fivush & Nelson 2006).

Following from these arguments, the development of autonoetic consciousness, or the sense of a subjective self as an experiencer of events, depends on participating in socially and culturally organized reminiscing in which one’s own memories of a past event can be compared to another’s. Further, through shared reminiscing, children learn the skills for creating more coherent and connected narratives that allow for the construction of a personal timeline that links past experiences together into a life narrative that serves to define self and social relations through time. I now turn to the empirical evidence that supports this model, examining first the emergence of autobiographical memory during the preschool years and then the construction of an overarching life narrative, a true autobiography, which develops through adolescence and early adulthood.

THE EMERGENCE OF AUTOBIOGRAPHICAL MEMORY

Memory in Infancy

Memory, broadly conceived, begins even before birth. Newborn human infants are able to make distinctions between novel sounds and sounds familiar from in utero, such as their mother’s voice (De Casper & Spence 1986), an ability that seems to rely at least partly on the ability to represent previous experiences. Over the course of the first year of life, memory, especially recognition memory, becomes more reliable and more durable (for a full review, see Bauer 2007b). By the middle of the first year of life, infants can discriminate familiar from novel sights and sounds for up to several weeks (Fagan 1973), and by 9 months of age, infants demonstrate recall of previously seen sequences of actions through deferred imitation, a methodology in which infants are “asked” to recall previously experienced events through action (Bauer 2004, Bauer et al. 2000; for a review, see Bauer 2007a). By the end of the first year, infants can reliably recall complex sequences seen only once before even after delays of up to several weeks. Thus, by 12 to 18 months of age, typically developing infants possess complex memories of even quite novel experiences and can reliably demonstrate recall of these experiences over substantial delays. Certainly, some of these developments rely on the development of the underlying neurological substrates of memory, especially the hippocampus, but these neurological developments only set the stage...
for the ensuing behavioral developments; many of the neurological substrates for memory are in place long before children are able to engage in autobiographical memory behaviors (for a full review and discussion, see Bauer 2007b).

The Development of Verbal Recall

The growing memorial capacities of infants are also expressed in language. Virtually as soon as infants are able to put two words together, at about 16 to 18 months of age (Bloom 1991), they spontaneously refer to past experiences. Most often, these references are fleeting and are to experiences that occurred relatively recently, such as the berries eaten at breakfast earlier that day or noting that they went to the park yesterday (Reese 2002a). These references indicate the developing ability to retrieve past personal events as well as the spontaneous interest that infants have in sharing their experiences with others (Eisenberg 1985, Hudson 1990, Tomasello 1999). Still, at this early point in development, infants rely on adults to help structure, or scaffold, their burgeoning ability to talk about the past. Infants may provide a word or two, but it is adults who take these references and put them into a more coherent narrative form. For example, a young child looks up from playing with kitchen toys, says “berries,” and the mother says, “That’s right, we had strawberries for breakfast, didn’t we? They were delicious.” This pattern raises the question of whether adults simply reframe children’s developing ability to recall experiences into language, or whether the language adults use actually modulates children’s developing autobiographical memory. Social-cultural theory would argue the latter, that the forms in which adults recast children’s memories into language actually facilitate the developing form of the memory. Thus, individual differences in the ways in which adults structure verbal reminiscing with their young children should be related to individual differences in children’s developing autobiographical memories.

Maternal Reminiscing Style

Two decades of research have now confirmed that there are profound and enduring individual differences in how mothers reminisce about shared past experiences with their preschool children and that these differences are clearly related to children’s developing autobiographical memory skills (e.g., Bauer & Burch 2004; Farrant & Reese 2000; Fivush & Vasudeva 2002; Flanagan et al. 1995; Haden 1998; Harley & Reese 1999; Hudson 1990; McCabe & Peterson 1992; Peterson et al. 1999; Welch-Ross, 1997, 2001; for reviews, see Bauer 2007a; Fivush et al. 2006). Note that for a variety of theoretical and pragmatic reasons, the overwhelming majority of research on this topic has examined mothers; the more limited research on fathers is discussed below. Research indicates that mothers systematically vary along a dimension of elaboration, with some mothers showing a highly elaborative reminiscing style characterized by long and detailed conversations about the past, replete with description and evaluation, whereas other mothers show a less elaborative style, talking less frequently and in less detail about the shared past (Fivush & Fromhoff 1988, Hudson 1990, Peterson & McCabe 1992).

More specifically, maternal elaborative reminiscing style during the preschool years is defined and measured as comprising several particular utterance types (for a full description and review, see Fivush et al. 2006). First, elaborative mothers ask many open-ended questions that both provide some information for the child and encourage the child to recall additional information (e.g., “What did we do in the park today?”). Second, elaborative mothers integrate their children’s responses into the ongoing narrative to weave together a story that includes multiple narrative components such as the who, what, when, and where of the event (e.g., “That’s right, we went on the swings. Who else was with us?”) as well as narrative evaluation (“Was that fun?”). When the child does not recall, a highly elaborative mother provides the next piece of the story, integrating
details already recalled, combining the contributions of mother and child into a coherent story of what occurred (e.g., if the child did not recall anything about the park, asking “Do you remember going on the swings in the park today?”) and continuing to provide bits and pieces of information to invite the child to participate in the joint reminiscing (e.g., “Remember Johnny was on the swings with us? Remember how much fun you and Johnny had swinging so high?”). In contrast, mothers with a low elaborative style focus in on single bits of information, asking the child to recall specific details often in the form of yes-no questions (e.g., “Did we go on the swings?”); when the child does not respond, the mother simply repeats her question. Low elaborative mothers frequently prompt the child to remember but provide little additional information to move the story forward (e.g., “Remember? Do you remember?”). Thus, an elaborative reminiscing style is composed of several elements, although the critical element seems to be maternal use of open-ended elaborative questions (Farrant & Reese 2000, Harley & Reese 1999; for reviews, see Fivush et al. 2006, Reese 2002b).

Subsequent research established several key additions to these initial findings. First, maternal reminiscing style is consistent over time. Mothers who are highly elaborative with their young preschoolers continue to be highly elaborative across childhood (Reese 2002b, Reese et al. 1993). Second, maternal reminiscing style does not simply reflect maternal talkativeness. Mothers who are highly elaborative during reminiscing are not necessarily those mothers who talk more in other conversational contexts, such as book reading, free play, and caregiving activities (Haden & Fivush 1996, Lucariello & Nelson 1987). Third, mothers who are highly elaborative with one child are highly elaborative with their other children, and this does not seem to be reducible to children’s developing language skills (Haden 1998). Thus, it seems that maternal reminiscing style is a consistent maternal behavior across child age and siblings, but it reflects a specificity of conversational strategy such that reminiscing seems to be a unique discourse context.

Correlational Studies of Child Memory Outcome

Several longitudinal investigations have now examined naturally occurring individual differences in maternal reminiscing style early in the preschool years as related to children’s developing abilities to recount detailed and coherent personal narratives later in the preschool years. In many of the longitudinal correlational studies, multiple additional variables were measured, including child age, language, temperament, self-concept, and attachment status, variables that theoretically could be linked to the level of maternal elaboration. Although across these studies these variables predict some aspects of child autobiographical memory outcome, the major and highly robust finding is that maternal reminiscing style predicts a high proportion of variance even controlling for these other factors (for detailed reviews, see Fivush et al. 2006; Reese 2002a,b). Essentially, mothers who are more elaborative early in the preschool years have children who come to report more detailed and more coherent narratives about their own personal experiences by the end of the preschool years, both in reminiscing with their mothers and recalling their past to an unfamiliar adult interviewer. Importantly, there is now evidence that the effects of maternal reminiscing style emerge over time; mothers who are highly elaborative in reminiscing with their young preschool children uniquely predict the development of autobiographical memory skills in childhood and adolescence, even controlling for concurrent maternal reminiscing style (Reese 2002a, Reese et al. 1993), indicating both the importance of early experience and the gradual development of key skills for the development of autobiographical memory.
Experimental Studies of Child Memory Outcome

In addition to correlational studies, a few studies have now experimentally manipulated reminiscing style to examine its effect on subsequent recall. This has been done in two ways. In one set of studies, mothers were trained to be more elaborative in their everyday reminiscing with their preschool children. The training involves showing mothers some videos of highly elaborative mothers and talking to mothers about using open-ended questions that incorporate details of the event under discussion. Relatively brief training of a few hours over the course of a few days indicated both that mothers maintained this reminiscing style over multiple months and that children increased in their ability to recall events in detailed coherent ways in direct proportion to the extent that their mothers adopted a more elaborative style (Boland et al. 2003, Peterson et al. 1999).

In another set of studies, experimenters interviewed children about specific novel events they had experienced using either a highly elaborative or a low elaborative style of questioning. Intriguingly, in this line of research, across a series of studies, the experimenters questioned children before the event (e.g., to prepare them for what they would experience), during the event (e.g., to help them encode the event as it was happening), or after the event (e.g., reminiscing). Across studies, the children who were exposed to a more elaborative style recalled more information and recalled it more coherently, but, critically, children who were interviewed after the event in an elaborative style recalled more than did children in either the before or during condition. Thus, elaborative reminiscing seems to help children consolidate their event memories such that they can subsequently provide a coherent detailed account of the experience (Conroy 2006; Mcguigan & Salmon 2004, 2005; Tessler & Nelson 1994).

Enduring Effects of Maternal Reminiscing Style

Perhaps most intriguing, longitudinal correlational research has now followed some of the preschool samples into adolescence and finds that 12-year-old adolescents whose mothers displayed a highly elaborative reminiscing style when the children were preschoolers now have an earlier age of first memory (Jack et al. 2009, Larkina et al. 2009). Thus, it seems clear that children whose mothers are highly elaborative during reminiscing early in development, when children are first learning the skills for recalling their personal past, develop autobiographical memory skills that persist through childhood and into adolescence.

GENDER AND CULTURE

Findings relating individual differences in maternal reminiscing to child autobiographical memory outcome raise the question of why some mothers may be more elaborative when reminiscing than other mothers. It should be noted here that the vast majority of the foundational research on maternal reminiscing style was conducted with broadly defined middle class Western cultures. From the perspective of social-cultural theory, differences in maternal reminiscing style should relate in systematic ways to social and cultural frames. If cultures define what it means to be a competent member of that culture and structure activities in ways that help develop the appropriate skills in children, then differences in maternal reminiscing style should be related to differences in social and cultural norms. In the domain of autobiographical memory, where the critical concepts center on the construction of a story of the self, gendered and cultural construals of self should be critical; indeed, substantial research now demonstrates individual differences in both maternal reminiscing style and autobiographical memory related to gender and culture (for reviews, see Fivush & Haden 2003, Fivush & Nelson 2004, Wang & Ross 2007).

Gender and Autobiographical Memory

Self-concept (Markus & Oyserman 1989) and gender identity theories (Gilligan 1982) have proposed gender differences in the ways in which females and males conceptualize their
identity. Findings indicate that females, at least in industrialized Western cultures, are more emotionally and relationally oriented. Theories vary in the extent to which they offer essentialist versus socialization explanations of these differences, but by adulthood, females report thinking about emotions more frequently and intensely than do males and thinking about relationships more than do males; in behavior, females express more emotions than do males, decode and interpret others emotions more accurately than do males, and talk more about people and relationships (for a detailed review, see Cross & Madson 1997). In terms of autobiographical memory, as adults, females recount longer, more detailed, more vivid, more emotionally laden, and more relationally oriented narratives about their personal experiences than do males (Bauer et al. 2003, Davis 1999, Fivush & Buckner 2003, Pohl et al. 2005, Thorne & McLean 2002).

From a social-cultural perspective, these adult differences in autobiographical memory should be related to specific socially organized activities earlier in development. Indeed, although not all studies find gender differences, when gender differences are obtained, they are always in the direction that mothers and fathers are more elaborative when reminiscing with their preschool daughters than with their preschool sons (Adams et al. 1995, Fivush et al. 2003, Kuebli & Fivush 1992, Reese & Fivush 1993, Reese et al. 1996). Thus, it might be the case that gender is being displayed in parent-child reminiscing such that parents are “training” their daughters to be more elaborative because this conforms to societal expectations of female roles and behaviors, to be the keepers of family histories (Rosenthal 1985). In line with this explanation, by the end of the preschool years, girls are telling longer, more detailed, and more coherent narratives than are boys, at least in Western cultures (Bauer et al. 2007a; Buckner & Fivush 1998; Fivush et al. 1995, 2000), suggesting that these early parent-child reminiscing experiences are related to gender differences that emerge early in development and are seen throughout the lifespan.

**Culture and Autobiographical Memory**

Similar to gender, it has been theorized that there are broad differences between Western and Eastern cultures in conceptualizing the self. Western notions of self focus on the self as an autonomous self-directed entity, whereas Eastern cultures conceptualize a more relationally oriented, communal notion of self (Oyserman & Marcus 1993, Triandis 1989, Wang & Ross 2007). These differences are captured in the labels “independent” and “interdependent” self-concepts. Adults in Western cultures tell detailed, specific autobiographical narratives focused on their own activities, thoughts, and feelings, whereas adults in Eastern cultures tell autobiographical narratives that are more general, less detailed, and placed in a more communal framework, considering their own actions in relation to group norms and needs (Wang & Ross 2007). Again, these adult differences seem to be mirrored in early maternal reminiscing style. In studies directly comparing cultures, mothers from Western cultures are more elaborative and focus more on the child than on the group, whereas mothers from Eastern cultures are less elaborative and more didactic, placing the child’s individual experiences in the context of the group and moral behavior (Mullin & Yi 1995; Wang 2001, 2003; Wang & Fivush 2005).

Thus, in support of social-cultural theory, the different ways in which parents structure autobiographical reminiscing with their young children is related empirically to individual differences in autobiographical memory skills across childhood and adolescence and is theoretically related to more overarching gender and culture differences that we see in adult autobiographical memories.

**AUTOBIOGRAPHICAL MEMORY AND THE SUBJECTIVE SELF**

By the end of the preschool years, children are able to verbally report on their personal past experiences, and those children whose
mothers are more elaborate during reminiscing develop more sophisticated autobiographical memory skills, such that they tell more detailed and coherent narratives about their personal past. Further, theoretical links between early maternal reminiscing styles that vary systematically by gender and culture are linked to gender and cultural differences in adults’ autobiographical narratives, and new longitudinal data are emerging that provide empirical support for these theoretical links. However, as I argued earlier, as yet this may remain evidence of episodic memory but perhaps not autobiographical memory. Although preschoolers can report on the what, where, and when of an event, they may not yet have a subjective sense of themselves as experiencers of these events placed on a personal timeline that defines a continuous self through time.

What might be involved in these developments? First, the individual must move from remembering what happened to remembering that this happened to me. In Tulving’s (2002) terminology, the individual must develop autonoetic, or subjective, consciousness. Second, the individual must be able to link past experiences to the present; that the self that experienced events in the past is the same self that experiences events in the present (and will be the same self in the future). Note that this does not require that the self is a constant: The self can change over time, but these changes must be related in systematic ways to the personal past; it is not that one simply wakes up a different person, but rather that one has experiences that lead to change (McLean et al. 2007, Pasupathi et al. 2007). There is a “story” of how the self became who one is (McLean et al. 2007). Third, the individual must be able to create a personal timeline, to construct a coherent chronologically organized sequence of how events followed one another and are linked together in the past and to the present; essentially, the individual must have a chronological biography of self (Habermas 2007, Habermas & Bluck 2000). Each of these components is itself a complex cognitive achievement with a long developmental history.

Autobiographical memory, defined as a sense of a self as continuous in time linked across specific experiences placed on a personal timeline that stretches back into a personal past linked to the present and projected into the future, may begin to emerge by the end of the preschool years but may not be fully consolidated until adolescence and early adulthood.

Subjective Consciousness

Early ideas about memory, both historically and developmentally, conceptualized memory as a copy of reality (Donald 2001; Nelson 1996, 2001). That is, what is remembered is “objectively” what happened. Without the ability to share our memories with others through language, it is difficult to imagine how this idea of memory might change. It is only through language that we can directly compare our memory of an event with another individuals’ memory of that same event. Even more, without language it would not be possible to share our thoughts and emotions about the past with others and to compare our thoughts and emotions with theirs. It is through the ability to share representations of the past with others that children become aware that memories are representations and not copies of reality; that is, that memories are remembered differently by different people (Fivush 2001, Fivush & Haden 2005, Fivush & Nelson 2006).

In addition to providing highly detailed and coconstructed narratives of the past with their young children, mothers who are highly elaborative also reminisce more about thoughts and feelings (Fivush 2007, Fivush et al. 2000, Fivush & Haden 2005). Through reminiscing about internal states, more highly elaborative mothers are highlighting what Bruner (1990) has called “the landscape of consciousness,” underscoring the subjective nature of recall. Further, through reminiscing about thoughts and emotions, these early maternally guided conversations highlight for children that different people can have different subjective perspectives on the same objective event. We went to the
zoo, and I remember the giraffes but you do not; I remember being scared of the lion but you thought it was funny, and so on. Through reminiscing about the past with others, children move from a copy theory of memory to a perspectival theory of memory (Fivush & Nelson 2006) and begin to understand that memories are subjective representations that differ even among those who ostensibly experienced the same event.

Indeed, mothers who focus more on thoughts and emotions when reminiscing with their preschool children have children who, by the end of the preschool years, incorporate more internal state language in their personal narratives (Kuebli et al. 1995, Rudek & Haden 2005) and show higher levels of understanding of subjective perspective, the idea that others can think and feel differently about an event than the self, a concept that has been labeled “theory of mind” in the developmental literature (Bird & Reese 2006, Welch-Ross 2001). Through middle childhood and well into adolescence, children continue to increase in their inclusion of internal state language in their personal narratives, information about their own thoughts and evaluations of events, as well as others’ thoughts and evaluations (Bauer et al. 2007b, Bohanek & Fivush 2010, Fivush et al. 1995). Further, children’s use of language indicative of subjective perspective continues to be linked to maternal guidance even in middle childhood (Bauer et al. 2005). Thus, there is good evidence that children begin to develop a sense of subjective consciousness about their past experiences, as indexed by their use of internal state language in their personal narratives, by the end of the preschool years and that this is linked to engaging in specific kinds of social interactions about the past. There is also suggestive evidence that subjective perspective continues to develop throughout childhood and into adolescence. This is indeed an important question for future research: How does subjective perspective on one’s past become more differentiated and integrated into autobiographical memories across childhood and into adulthood?

**Linking the Past Self to the Present Self**

Closely related to the ability to take a subjective perspective on the past is the ability to link the past to the present. Without an understanding that the self in the past is the same self that exists in the present, there can be no sense of self as the expericer of the past. It is the ongoing sense of a subjective stream of consciousness that provides a link between our past and our present (Damasio 1999, James 1890) and allows for mental time travel; the self that had the experience in the past is the same self that is now recalling that experience. Two lines of research suggest that this is an understanding that emerges only gradually across human childhood.

First, Povinelli and associates (Povinelli 2001; Povinelli et al. 1996, 1999) examined the ability to link a past event to present self using a variation of the classic mirror task (Gallup 1970). In this task, individuals are surreptitiously marked with rouge on their nose or forehead, a mark that is not visible to them, and are then placed in front of a mirror. Self-directed behavior such as immediately touching the place on the self that has been marked is taken as evidence that there is self-recognition, the idea that the individual depicted in the mirror references one’s own body and therefore that one has a concept of one’s self (Lewis & Brooks-Gunn 1979). Few nonhuman animals show this behavior, and human children do not show this behavior much before the age of about 18 to 24 months. Povinelli adapted this task to examine the development of a temporally extended sense of self. He engaged preschool children in play and surreptitiously placed a sticker on their head during the interaction. He then showed the children a videotape of themselves in the playroom with a sticker on their head, either immediately after the play session or a few days later. Three-year-old children do not make the connection between their depiction on the videotape and the sticker at all. They simply do not reach for the sticker. Four-year-old children do reach for the sticker, but they
do so regardless of when they were in the playroom. Even a few days later, they will immediately reach for the sticker, assuming it is still on their head. Only at age 5 do children begin to understand the temporal connection between past and present self: If shown the videotape immediately after the play session, they reach to remove the sticker; if shown a few days later, they point and laugh but indicate that they are aware that it was in the past and the sticker is no longer on their head. Thus, it seems that it is only by the end of the preschool years that children are able to make temporal connections between the past and present self.

Further evidence for this comes from a clever series of studies by Lagattuta and colleagues. Whereas the Povinelli experiments indicate a late-developing ability to make temporal connections between past external states and current self, Lagattuta & Wellmen (2001, 2002) probe further into when children are able to reason about past internal states and connections to current behavior. They ask preschoolers to predict how a child might behave in a certain situation (e.g., reactions to a new dog encountered in the park) as a baseline. They then show children a series of pictures about previous experiences of particular children (e.g., this child is afraid of dogs, or this child’s dog died). They then ask children to link together these stories with predictions about behavior in the present. Children under the age of 5 have great difficulty with these tasks. Regardless of the stories told about specific previous experiences of specific children, they continue to predict that the child will eagerly approach the dog. At about age 5, children begin to link up the past and the present; they predict that this specific child will be afraid of the dog, or very sad when they see the dog, and they are able to explain their predictions by linking previous experiences to the present through mental states that persist through time. Thus, before the end of the preschool years, we do not see any evidence that children are able to connect past with present in causally connected, temporally organized sequences, nor evidence that they understand that mental states persist through time and influence current behavior.

These findings resonate with the findings on the use of internal state language to narrate the personal past and suggest that it is not until the end of the preschool years that children come to have a subjective perspective on the past, which includes persistent internal states or stream of consciousness, that creates a continuous self through time. However, an intriguing new area of research on children’s developing ability to project themselves into the future complicates this conclusion. There is a long theoretical history linking memory of the past to projection into the future in terms of planning and guiding behavior (see Schacter et al. 2008 for a review). The critical question here is the extent to which individuals rely on “scripts” to plan behavior (i.e., semantic memory of what usually happens) versus the extent to which they rely on projecting an imagined self into the future engaging in these activities. Atance & O’Neill (2005) discuss the difficulties of assessing this distinction empirically and describe a series of studies with preschool children that tries to disentangle these two strategies: reliance on scripts and projection of self into the future, for planning future behavior. In their studies, they ask children to plan for possible upcoming events and determine the extent to which the plans present scripted components of how events simply unfold as compared to more personal components of how one might feel and react in future episodes (e.g., “I will be thirsty so I’ll need to take water with me”). By age 3 to 4, children provide plans based on these kinds of self-projections into the future. This suggests that preschool children are able to link current self with an imagined future self, linking internal states and how they may change over time. Thus, it may be the case that the ability to link internal states of the current self with the future self develops earlier than the ability to link internal states of the current self with the past self.

This possibility is in accord with arguments by Nelson (2003) and Donald (2001) that
memory is first and foremost about the future and perhaps, phylogenetically, only incidentally about the past, and again raises questions of why humans may have developed such an intricate autobiographical memory system at all, a question I return to at the end of the review. However, what is also clear from these studies is the theoretical and empirical difficulty of distinguishing between action planned on the basis of scripted knowledge and action planned on the basis of projecting self into the future. Scripts, of course, are not static entities but include a great deal of generalized knowledge about possible optional and conditional pathways (Nelson 1986), and children may still be using this type of generalized knowledge to plan the future rather than an episodic representation of self in the future. Scripts, of course, are not static entities but include a great deal of generalized knowledge about possible optional and conditional pathways (Nelson 1986), and children may still be using this type of generalized knowledge to plan the future rather than an episodic representation of self in the future. Scripts, of course, are not static entities but include a great deal of generalized knowledge about possible optional and conditional pathways (Nelson 1986), and children may still be using this type of generalized knowledge to plan the future rather than an episodic representation of self in the future.

Constructing a Personal Timeline

For true autobiography, one must move beyond linking past to present to creating a fully elaborated chronological personal timeline. In addition to knowing that an event happened in the past to me and that I am the same self that experienced that event as I am now, the individual must further be able to create a personal timeline that temporally organizes the entirety of one’s life story (Habermas & Bluck 2000; McAdams 2001, 2004). We know remarkably little about the development of children’s concept of time, and recent research suggests that this is a much later-developing skill than might be surmised (Friedman 1993, 2004). Although even 2- and 3-year-old children will use temporal terms such as “yesterday” and “tomorrow,” when probed, it seems that yesterday refers to any event in the past and tomorrow refers to any event in the future (Harner 1982). Preschoolers can accurately judge which of two events occurred in the more recent or distant past, but only if these are in the relatively recent past; for events that occurred more than a few months ago, even 8-year-old children are at chance (Friedman 1992, 2003; Friedman & Kemp 1998).

Even later-developing are skills for organizing multiple life experiences along a timeline. Habermas & Bluck (2000) argued that it was not until adolescence that the social and cognitive advances undergirding a life narrative, such as perspective-taking skills and abstract reasoning, are available. Recent work is beginning to elucidate this process. Habermas & de Silveira (2008) asked participants from age 8 through 20 to narrate seven personally significant events and then to place them on a personal timeline. Although the 8-year-olds were above chance on this task, it was not until age 12 that children began to link single events together causally, and the causal and biographical reasoning used increased in complexity and coherence across age (for similar findings, see Bauer et al. 2007a). Reese and colleagues (2010) additionally found that 8-year-olds could nominate “chapters” or life periods that describe their history, but the number and complexity of these chapters increased with age. Thus, it seems that a life narrative begins to emerge in middle childhood, but the complexity and coherence of this narrative increase across adolescence.

THE FUNCTIONS OF AUTOBIOGRAPHICAL MEMORY

The empirical evidence indicates that autobiographical memory, defined as a subjective perspective on specific events experienced at particular time points linked together on a personal timeline, develops gradually across childhood and adolescence. If this is the case, then why has such a memory system developed at all? What might be the functions of autobiographical memory? Simple episodic memories allow the individual to represent specific past experiences to guide current and
future behavior. The distinguishing factor for autobiographical memory is relation to self and, in particular, a self that is continuous in time. Thus, it seems probable that autobiographical memory has developed in humans for primarily social and cultural reasons (Donald 2001; Nelson 1993, 2001, 2003; Pillemer 1998). The findings that individual autobiographical memory is socially and culturally variable and dependent on specific social-cultural interactions support such a view. More specifically, autobiographical memory serves three interrelated self functions: self-definition, self-in-relation, and self-regulation (Fivush et al. 2003; for similar arguments, see Bluck & Alea 2002, Pillemer 1998). Importantly, all three functions are related to individual well-being.

Self-Definition

Autobiographical memory is a personal history that defines who one is across time and contexts. Thus, autobiographical memories provide for a sense of continuity and coherence for the individual (Conway et al. 2004, McAdams 1992). As such, autobiographical memories are intimately linked to self-concept. The relations between autobiographical memory and self-concept are surely dialectical; memories define self, and current self defines which memories may be the most and least accessible (Conway & Pleydall-Pearce 2000). It must be emphasized that this is only one type of self-concept. Although there is debate on how best to characterize different kinds of self-knowledge (e.g., Damasio 1999, James 1890, Neisser 1988), there is agreement that one critical aspect of self-knowledge is the sense of a self temporally extended in time that provides a sense of continuity of experience. In fact, individuals with dense amnesias who are unable to recall specific past experiences self-report a keen sense of loss and that they are no longer “themselves” (Hirst 1994). Thus, although not the only form of self-definition, the sense of a self as continuous through time seems to be a critical aspect of defining who one is.

In accord with social-cultural theory, both autobiographical memory and self-definition are individually and culturally variable. Relations between gendered and cultural self-concepts and autobiographical memory have already been discussed. Parents reminisce with their young children in gender-specific ways, and children come to narrate their own personal experiences through a gendered lens. Critically, it is also the case that males and females have gendered self-concepts that are linked to these differences in reminiscing; for example, females define themselves as more emotionally and relationally oriented, and their autobiographical narratives contain more emotional and relational content. Females also report valuing and sharing their autobiographical memories with others more so than do males (Fivush & Bucker 2003). Similarly, Wang (2001, 2003) has demonstrated that mothers in Western cultures reminisce in more elaborated ways than do mothers in Eastern cultures, and these differences are linked to cultural differences in self-concept such that children in Western cultures develop a more autonomous differentiated sense of self than do children in Eastern cultures. Even within cultural groups, individual differences in maternal reminiscing style have been linked to developing self-concept. Children of mothers who reminisce in more highly elaborative ways have a more differentiated and coherent sense of self (Bird & Reese 2006). Thus, a more elaborated maternal reminiscing style is linked individually, by gender and by culture, to more elaborated personal autobiographical narratives and to a more differentiated self-concept.

Self in Relation

Autobiographical memories are framed within social-cultural narratives of a life that help define self in relation to others; in turn, autobiographical memories serve to create and maintain social and emotional bonds with others through reminiscing and through representations of relationships (Fivush 2008, Reese & Fivush 2008). At the cultural level, cultures
define the form and the shape of a life, how a life typically unfolds in terms of specified events at specified developmental points. This kind of knowledge has been called a culturally canonical biography (Habermas & Bluck 2000) or a life script (Bernsten & Rubin 2004). Recent research indicates that even children as young as 8 years know what a typical life within their culture looks like and what events are most likely to happen and when (e.g., school, graduation, marriage, children, career choices) (Bernsten & Bohn 2010). Thus, life scripts define individual lives in relation to social and cultural norms and consequently help shape individual autobiographies.

At the more local level, family stories—narratives of one’s parents and their parents before them—provide more specific frames for defining self in relation to others (Fivush et al. 2010). These kinds of intergenerational narratives serve to create a sense of connection to family as well as a sense of self in relation to specific family members, and adolescents who know more of these stories and tell these stories in more detailed and elaborated ways show higher levels of identity achievement and emotional well-being.

At the individual level, sharing the events of our lives with others is a ubiquitous and meaningful activity. Based on analyses of everyday conversation, it is estimated that references to a past event occur approximately every five minutes (Bohanek et al. 2009, Miller 1994). Self-report data indicate that sharing the events of our lives with others is a frequent and important social activity (Bluck & Alea 2002, Pillemer 1998), and a programmatic series of studies by Rime and colleagues (1998) indicates that the overwhelming majority, perhaps more then 90%, of the emotional experiences of our lives are shared with others within a few hours or days of their occurrence. Clearly, there is a human tendency to tell others about our experiences, and this kind of reminiscing serves to create and maintain social bonds through time.

In addition, relationships with others through time are represented in specific autobiographical memories. That is, having memories of engaging in experiences with others define those relationships. Within the attachment literature, which focuses on social and emotional bonds between individuals, memories of experiences with others provide a framework for interpreting current relationships (for an overview, see Cassidy & Shaver 1999), and ongoing research in our lab suggests that defining and describing relationships with others is a frequent function of recalling past experiences (Waters 2010).

Self-Regulation

Intriguingly, reminiscing is intimately related to both physical and psychological health. In terms of memories of specific autobiographical events, a substantial body of research demonstrates that the ability to create emotionally coherent narratives of specific stressful experiences is related to well-being (for reviews, see Frattaroli 2006, Pennebaker & Chung 2007). In particular, individuals who are able to construct narratives that provide explanatory frameworks and integrate and resolve emotional experiences subsequently display higher levels of self-reported well-being, better physical health as indexed by doctor visits and immune system functioning, and higher levels of constructive behavior in the world (e.g., better grades, better job performance). Emotional benefits are not limited to negative events. Individuals who share the positive events of their day with others also show higher levels of emotional well-being (Frederickson 2001). Thus, the way in which we remember and share specific autobiographical events bears on our well-being.

As argued throughout this review, developmentally, children are learning how to create more elaborated and coherent autobiographical narratives through participating in adult-guided reminiscing. In fact, mothers who reminisce about emotional experiences with their children in more elaborated and coherent ways have children who show higher levels of emotional understanding and regulation (Laible 2004a,b). More specifically, mothers who provide more explanations and emotional
expressions and resolutions when reminiscing about highly stressful events with their children have children who show higher levels of coping skills and lower levels of depression and anxiety (Fivush & Sales 2006, Sales & Fivush 2005).

Turning to more overarching autobiographical life narratives, individuals who are able to create more coherent life narratives, narratives that span their childhood and early adulthood and create a coherent story of self, show higher levels of emotional well-being (McAdams 2004). In particular, individuals who are able to create a life narrative that presents difficult and stressful life experiences as opportunities and springboards for growth show higher levels of identity achievement in early adulthood (McLean & Breen 2009), generativity and emotional well-being in middle adulthood (Burton & King 2004, McAdams 2004), and a sense of integrity and acceptance in old age (Webster 2001). Clearly, our memories and our well-being are intimately related; provocatively, we do not yet understand the mechanisms linking coherent life narratives to well-being. This is an intriguing and important area for future research.

CONCLUSIONS

Autobiographical memory is a uniquely human system that depends on a complex set of skills that develop gradually across childhood and adolescence within specific social-cultural interactions. Several themes emerge from this review. First, autobiographical memory can be distinguished from episodic memory. Episodic memory, defined as representations of specific past events that include information about what, when, and where, is present across species and across ages. Autobiographical memory, in contrast, builds on the episodic system to include representations of self engaging in experiences that link past self to current self along a personal timeline that defines a life. Second, autobiographical memory is socially and culturally variable and empirically related to participation in specific social activities. Third, autobiographical memory is late developing. Multiple component skills, each with its own complex developmental history, coalesce in adolescence and early adulthood to form a coherent life narrative, which is the crux of autobiographical memory. Fourth, if autobiographical memory is, indeed, unique to humans and is late developing, the question of why such a system develops at all becomes important. In contrast to episodic memory, which serves mainly directive functions, autobiographical memory seems to serve more social and self-defining functions.

Perhaps surprisingly, we know remarkably little about the development of autobiographical memory. Although it is well established that maternal reminiscing style predicts the development of elaborated and coherent narratives, the development of a subjective self has been less studied. Further, research on the development of autobiographical memory has focused on the emergence of these abilities during the preschool years, and we know little about the development of autobiographical memory during childhood and adolescence. Moreover, in order to fully understand the development of autobiographical memory, we need to know a great deal more about the developmental understanding of time and the construction of a personal timeline. Finally, the question of why autobiographical memory develops at all leads to intriguing questions about the intersections of memory and self and, ultimately, how humans create meaning out of their lives.

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