

Chapter 24

Autobiographical Memory: Individual Differences and Developmental Course

Mary L. Courage and Mark L. Howe

The fate of our earliest autobiographical memories has been a matter of intense speculation for over a century (e.g., Freud, 1905/1953; Henri & Henri, 1895). The enduring interest in this topic has become stronger over the past few decades as important mental health and forensic questions on the accuracy and durability of adults' memories of childhood experiences have required answers. Coincident with (and partly as a consequence of) these questions, researchers have examined the fate of early memories in normally developing children and adults (for a review, see Howe, 2000). With this research direction, the emphasis shifted from the offset of infantile amnesia to its converse – the onset and development of autobiographical memory. We (e.g., Howe & Courage, 1993, 1997; Howe, Courage, & Edison, 2003; Howe, Courage, & Rooksby, 2009) have maintained that the necessary though not sufficient foundation for this achievement is the emergence of the cognitive self. The cognitive self refers to that objective aspect of the self that embodies the unique and recognizable features and characteristics that constitute one's self concept, or "me." This sense of the self contrasts with a different but related facet of the self that comprises the more subjective aspects of the self as a thinker, knower, and causal agent, or "I" (for a review see Courage & Howe, 2002). The cognitive self becomes stable at about 2 years of age and serves as a new organizer around which events can be encoded, stored, and retrieved as personal; that is, rather than being a memory for something that has happened, it is a memory of something that happened to "me." Subsequent developments in basic memory processes (e.g., encoding, storage, and retrieval) as well as language and other aspects of social cognition serve to elaborate and refine characteristics of the self and help to shape the nature and durability of autobiographical recall.

Much of this research has focused on the factors that underlie changes in autobiographical memory with age, although age alone is not necessarily the best predictor of what is recalled. More recent research indicates that a multiplicity of interactive individual and group differences in cognitive (e.g., self-concept, knowledge), biological (e.g., stress reactivity, gender), emotional (e.g., traumatic vs. nontraumatic; attachment status), linguistic (e.g., narrative skill), social (e.g., parent-child interaction styles) and cultural (e.g., self vs. community focus) factors also contribute to the recollection and reporting of personally experienced events. In this chapter we first provide some background on autobiographical memory research followed by a brief overview of the literature on the emergence of autobiographical memory in infants and young children. After that, we review

M.L. Courage
Memorial University, St. John's, NF, Canada

M.L. Howe (✉)
Department of Psychology, Lancaster University, Lancaster LA1 4YF, UK
e-mail: mark.howe@lancaster.ac.uk

some of the individual difference factors that affect the onset, durability, content, and fluency of autobiographical memory for routine and emotional events that are apparent in the recollections of older children and adults. We conclude with an integration of the two theoretical perspectives that have dominated the recent debate on the origin and development of autobiographical memory – the emergence of self versus the nature of sociolinguistic interactions between the child and others.

Some Background: Autobiographical Memory and Its Relationship to the Self

Autobiographical memory has been defined as memory for the events of one's life (Conway & Rubin, 1993). Such memories involve the who, what, where, when, and how of the personalized events that we experience as well as our emotional reactions to those events and our reflections on them. Autobiographical memory forms the personal life history that helps define the core of who we are. Although autobiographical memory can be considered a special case of event memory, it differs in the sense of personal involvement or ownership of the constituent events that it entails. Autobiographical memories are about specific events that happened to "me" at a particular time and in a particular place (e.g., one's first day at school) rather than generalized pieces of semantic knowledge about events related to the self (e.g., that one attended a particular school). The loss of this important self-memory relationship that occurs in amnesic conditions has devastating consequences for the individuals affected (e.g., Conway & Fthenaki, 2000), something that is most poignant in Alzheimer's disease.

Research on the durability and accuracy of autobiographical memories over time reveals both remarkable robustness and significant fragility (for a discussion see Bauer, 2007; White, 2002). In general, central components of events that are distinctive, emotionally charged (positively or negatively) (see Paz-Alonzo, Larson, Castelli, Alley, & Goodman, 2009), and that occurred within the age range of 10–30 years (or very recently) are recalled the best (i.e., the reminiscence bump) (see Rubin, Rahhal, & Poon, 1998). Those that are peripheral, routine, or that occurred before the age of 2 years (i.e., during infantile amnesia; for a review, see Howe, 2008) are recalled most poorly (e.g., Brewer, 1988; Usher & Neisser, 1993).

The importance of the relationship between autobiographical memory and the sense of self has long been recognized in the adult literature, and the theoretical perspectives on the nature of the relationship between them are diverse (e.g., for reviews see Beike, Lampien, & Behrand, 2004; Conway, 1996, 2005; Conway & Pleydell-Price, 2000; McAdams, 2001; Skowronski, 2004). Although a detailed review is beyond the scope of this chapter, suffice it to say that some have argued that autobiographical memory plays a central role in constituting the sense of self as an entity that is developed, expressed, and adapted through narrative construction and reconstruction of the past (e.g., McAdams, 1988; Singer & Salovy, 1993). As such, autobiographical memories contribute directly to the development and maintenance of a viable and stable self-concept through conversational exchanges with others about personally experienced past events. Alternatively, others contend that it is the self that directs the ways in which autobiographical memories are encoded, stored, and retrieved such that relevant autobiographical knowledge structures remain consistent with one's current self concept or "working self" goals (e.g., Conway & Pleydell-Price, 2000; Ross & Wilson, 2000). What both views express in common is that the relationship between the self and autobiographical memory is dynamic and interactive such that the self will construct (and reconstruct) the past and the past will construct (and reconstruct) the self. These diverging views on the primacy of the self in autobiographical memory are also reflected in the developmental literature on the onset and subsequent course of autobiographical memory (Howe et al., 2009).

Regardless of which view one prefers, a number of studies have shown that the best retained memories over the lifespan are those pertaining to the self, especially the self in times of transition (e.g., Conway, 1996). In particular, as the self goes through changes and stabilizes, events associated with those change points are well remembered (e.g., Csikszentmihalkyi & Beatie, 1979; Rubin et al., 1998). Although such findings highlight the importance of changes in the self in autobiographical memories, such transitions also represent unique occurrences in one's life, an idea that is consistent with other findings showing that the uniqueness of an event is one of the best overall predictors of recall generally (e.g., Howe, 2006a, 2006b; Howe, Courage, Vernescu, & Hunt, 2000) and autobiographical recall specifically (Betz & Skowronski, 1997; Brewer, 1988; Linton, 1979). Thus, it is clear that events about the self, particularly those that are personally consequential, transition defining, or otherwise distinctive, are best remembered autobiographically.

Although there is a large literature on the form and function of autobiographical memory in adults and older children (for reviews, see Conway, 2005; Conway & Rubin, 1993; Fivush & Haden, 2003; Rubin, 1996), there is far less empirical research on its early development. This is due in no small part to the circularity of how some researchers operationalize autobiographical memory, namely, that what constitutes a confirmation of an event memory as autobiographical depends on its verbal report as such by the individual. As infants and very young children are immature in both language production and in narrative skill, such confirmation is not possible and must, therefore, be inferred from their nonverbal behavior (e.g., reenactment of previously experienced events). Indeed, a number of researchers have shown that young children's nonverbal behaviors do provide a reliable and valid index of their autobiographical memory (see Howe et al., 2003). Once children become proficient language users and story tellers, their autobiographical memories become consistent with the verbal requirements in the definition of autobiographical memory above and can be assessed in more traditional ways. In what follows, we provide a brief overview of theories concerning the beginnings of autobiographical memory, ones that set the stage for interpreting and understanding the nature of individual differences in this all important memory system.

The Origin and Early Development of Autobiographical Memory

We contend that the necessary (though not sufficient) condition for the onset of autobiographical memory is the emergence of the cognitive self late in the second year of life (e.g., Howe & Courage, 1997; Howe et al., 2003). This achievement sets the lower limit on the age at which memories can be encoded, stored, and retrieved as personal. This fledgling cognitive self enables a new knowledge structure, whereby information and experience can be organized as autobiographical. Prior to the articulation of the self, infants learn and remember, but their experiences will not be recognized as specific events that happened to "me." After the onset of the cognitive self, adults' recollection of childhood events become more numerous and as with advances in memory more generally, are due to increases in storage maintenance and to strategic retrieval processes. Importantly, the onset of the cognitive self coincides roughly with the point at which studies have dated the onset of adults' earliest memories for significant life events (e.g., Eacott & Crawley, 1998; Usher & Neisser, 1993).

Research and theory on the nature and early development of the cognitive self have a long history (e.g., see Courage & Howe, 2002; Howe & Courage, 1993, 1997; Howe et al., 2003). Here, we provide a brief overview of the emergence of the objective, categorical (i.e., cognitive) aspect of the self described by William James (1890/1961) as the "me" component of the self and the one that we contend forms the cornerstone of autobiographical memory. Empirically, the first unambiguous sign of the emergent cognitive self occurs when the child recognizes that his or her mirror image is "me." This is assessed with a mirror self-recognition (MSR) test during which a dot of face paint is surreptitiously placed on the child's nose. The child who recognizes the marked image as "me" will touch

his or her own nose as opposed to other mirror-directed reactions. Coincident with the onset of MSR, infants begin to show other signs of self-awareness such as embarrassment when confronted with their images and subsequently, at about 22 months of age, will provide a correct verbal label of the image (see Courage, Edison, & Howe, 2004). Although there is evidence from research with photo and video materials that infants can discriminate their facial and other body features from those of another infant from about 4 or 5 months (Bahrick, Moss, & Fadil, 1996; Legerstee, Anderson, & Schaffer, 1998; Rochat & Striano, 2002; Schmuckler, 1995), the level of self-knowledge inherent in these discriminations is unclear (but see Nielson, Suddendorf, & Slaughter, 2006).

However, visual self-recognition is only one facet of the self concept, one that can be readily operationalized for research with preverbal children. The self concept (and self-awareness) implies more than recognition of one's physical features and is a fundamental aspect of social cognitive development that has roots in the early weeks of life and continues to evolve throughout childhood and adolescence (for reviews see Butterworth, 1990; Cicchetti & Beeghly, 1990; Damon & Hart, 1988; Lewis, 1995; Neisser, 1993, 1995; Rochat, 1995, 2001). For example, Povinelli and his colleagues (Povinelli, Landau, & Perilloux, 1996; Povinelli, Landry, Theall, Clarke, & Castillo, 1999; Povinelli & Simon, 1998) have shown that MSR may be only the first step toward the recognition of the objective self as "temporally extended" and continuing to exist over time. They reported that 2-year-old children who were able to recognize themselves on-line, failed to do so after a brief delay and the provision of noncontingent feedback of themselves. It was not until about 5 years of age that children fully understood the relationship between the present self vis-a-vis the recent and more distant pasts. Regardless, most authors agree that the achievement of MSR is an important developmental milestone (Asendorpf & Baudonniere, 1993; Butterworth, 1990; Kagan, 1981; Lewis, 1994; Meltzoff, 1990; Neisser, 1993) and that a critical step is reached when children are able to represent themselves as an object of knowledge and imagination.

The key point to note from this is that at about the age of 2 years the cognitive self, a new organizer of information and experience, becomes available and facilitates the grouping and personalization of memories for events into what will become autobiographical memory. That childhood memories become more numerous after the onset of the self is expected given that (a) features associated with the self grow and expand, providing a larger base which encoding processes can reference, (b) improvements in the basic processes that drive memory (encoding, storage, and retrieval) that occur across development (attention, strategy use, knowledge, and metamemory) facilitate memory functioning in general (see Bjorklund, Dukes, & Brown, 2009), and (c) certain neurocognitive developments (e.g., prefrontal cortex) relevant to this expanding knowledge base (see Bauer, 2009) about the self occur in this time frame.

Alternative views of the onset and development of autobiographical memory set a different time course for this achievement. For example, Nelson, Fivush, and their colleagues (e.g., Fivush, 1997, 2009; Fivush, Haden, & Reese, 1996; Fivush & Reese, 1992; Nelson, 1996; Nelson & Fivush, 2004) adopting a sociolinguistic perspective contend that autobiographical memory follows from the child's ability to establish a "personal life story" in memory. This achievement occurs largely through conversations with adults and significant others with whom personal events and experiences are shared. As young children learn to talk about the past with adults, they begin to organize these events autobiographically in memory. Thus, the primary function of autobiographical memory is to develop a life history in time and to do that by telling others what one is like through narrating the events of the past. In this way, children learn both the form of reporting about past events and the social functions that talking about the past performs. However, this view of the emergence of autobiographical memory presupposes linguistic and narrative competence that is immature until the preschool years thus ruling out the infant and toddler periods (see also Pillemer & White, 1989). A related position has been taken by Perner and Ruffman (1995) who tied the emergence of autobiographical memory to general advances in metacognition, specifically to children's emerging theory of mind. They argue that event memory in very young children is based on "noetic" awareness or

“knowing” something happened rather than on “autonoetic” awareness or “remembering” something happened (see Tulving, 1984). The transition from one to the other at about the age of four marks the beginning of autobiographical memory. Consistent with the sociolinguistic perspective, they believe that children’s conversations with others (mothers in particular) serve as an important source of data for the development of their theory of the mind, in turn promoting the establishment of autobiographical memory.

Individual Differences in Autobiographical Memory

Research generated by these two disparate (but not mutually exclusive) theoretical perspectives on the substrates of autobiographical memory indicates that this achievement involves a complex and extended interaction between the individual, his or her developing perceptual and cognitive systems, and forces in the social (e.g., familial, institutional, cultural) environment in which he or she is growing up. Moreover, it has been the identification and examination of individual and group differences in these factors in relation to the early development of autobiographical memory that has informed the broader debate about its origin and subsequent course. Here, we focus primarily on the individual differences in autobiographical recollection that have emerged as a function of individual differences in the self, in sociolinguistic interactions between the child and significant others, and in their conjoint effects. We will also provide a brief review of what is known about individual differences in autobiographical memory for stressful events. Although such differences might logically be predicted from a host of biological (e.g., stress reactivity) cognitive (e.g., attention), and affective (e.g., attachment status) factors, they have remained elusive.

The Self

In the developmental literature, there have been few systematic studies of individual differences in the onset of the self or of the functional implications of early versus late self-recognition for autobiographical memory. Although cross-sectional studies indicate that there is a marked increase in children’s success on the classic rouge task after about 18 months of age (e.g., Amsterdam, 1972; Asendorpf, Warkentin, & Baudonniere, 1996; Bullock & Lutkenhaus, 1990; Lewis & Brooks-Gunn, 1979; Lewis, Brooks-Gunn, & Jaskir, 1985) these studies also reveal substantial individual differences in the age of onset (i.e., from 15 to 24 months) (e.g., see Brooks-Gunn & Lewis, 1984). The origins of these individual differences have not been established conclusively. Although the onset of MSR has been related to mental age, attentiveness, and stress reactivity (e.g., Lewis & Brooks-Gunn, 1979; Lewis & Ramsay, 1997; Mans, Cicchetti, & Sroufe, 1978), a number of other factors (e.g., socio-economic status, maternal education, gender, birth order, number of siblings) have been ruled out and others (e.g., attachment status, temperament, general cognitive ability) have provided inconclusive evidence (Brooks-Gunn & Lewis, 1984; DiBiase & Lewis, 1997; Lewis & Ramsay, 1997; Lewis, Sullivan, Stanger, & Weiss, 1989; Lewis et al., 1985; Schneider-Rosen & Cicchetti, 1991).

More recently, we (Courage et al., 2004; Howe et al., 2003) used a microgenetic approach to assess the development of the cognitive self in toddlers from 15 to 23 months of age. Data taken from cross-sectional samples showed the typical abrupt onset of MSR at about 18 months with a range from 15 to 23 months. The longitudinal data were generally consistent with this, but also indicated that within individual children, MSR emerged more gradually and showed wide variability in expression prior to becoming stable, a finding masked in the cross-sectional data. Moreover, regardless of age, infants who had achieved stable MSR performed better on a unique event memory

task than did infants who had not achieved MSR. Consistent with these findings, Prudhomme (2005) found that the cognitive self was essential for early declarative, autobiographical memory and that children with an established cognitive self were not only better than those without a cognitive self on an elicited memory task, but they were also much more flexible when retrieving information. However, in a longitudinal study on this early self-memory relationship, Harley and Reese (1999) found that although individual differences in self-recognition skill (early vs. late MSR) at 19 months of age predicted toddler's independent memory for autobiographical events at 2.5 years, so too did parent-child interactional style during reminiscing about past events. In a subsequent follow-up study, Reese (2002) found that once children became language users, parent conversational style (i.e., high vs. low elaborative) and the child's language skill became increasingly important predictors of verbal memory reports. Collectively, these studies provide evidence that an early and stable self identity provides the foundation that facilitates the development of the autobiographical memory system which becomes elaborated with advances in language and narrative skill.

Sociolinguistic Interactions

As noted earlier, the sociolinguistic perspective on the onset of autobiographical memory sets a later beginning for this achievement and a developmental course rooted in language and social cognition. One of these perspectives has focused on the role of social interaction in the emergence of the autobiographical memory system, in particular, the sharing of experiences with others linguistically (Fivush, 2009; Fivush & Nelson, 2004; Fivush & Reese, 1992; Fivush et al., 1996; Hudson, 1990; Nelson, 1993). It is important to note however, that the functional aspects of memory should not be identified with its representational structure. Although autobiographical memories are typically reported verbally in a narrative format, their representation does not depend on language facility per se, but includes all of the encoding, storage, and retrieval processes that are integral to the formation of memories more generally (e.g., see Damasio, 1999; Howe, 1998b).

Research on the emergence of linguistic communication indicates that at about 2.5 years, most children begin to talk about specific events but that these early conversations are heavily "scaffolded" by adults (e.g., Hudson, 1990). By about 3 years, children assume more responsibility for talking about past events and begin to use the story or narrative form in these conversational interactions. However, although some of these advances begin to occur as early as 3–4 years of age, Nelson (1993) has maintained that "true" autobiographical memory is quite late to develop and may only be complete near the end of the preschool years. According to this sociolinguistic view, then, autobiographical memory is predicated on the development of rather sophisticated language-based representational skills, ones that do not emerge until children are about 5 or 6 years old. Once these skills are established, memories can be retained and organized around a life history, one that extends in time.

Because this sociolinguistic perspective places major importance on children's conversations about the past, particularly with their parents (and especially mothers), it is important to see what empirical support exists for the role of these conversations in children's autobiographical memory. Research conducted within this framework reveals that individual differences in the way that parents talk to their children about the past leads to individual differences in children's reporting of their own past experiences. In particular, two different parent conversational styles of talking with children have been identified. Parents who are "high-elaborative" provide a large amount of detailed information about past events. They elaborate and expand on the child's partial recall, ask further questions to enhance event detail, and correct the child's memory if necessary. In contrast, "low-elaborative" parents tend to repeat their questions over and over in an attempt to get a specific answer from the child, switch topics more frequently, and do not seek elaborative detail from the child's report. The high-elaborative style is associated with children's provision of more elaborative narratives, both

concurrently and longitudinally (Haden, Hayne, & Fivush, 1997; Reese, Haden, & Fivush, 1993). There is evidence that adults' conversational styles do facilitate the richness and narrative organization of children's memory talk and in so doing plays an important role in children's developing ability to report autobiographical memories. However, it does not necessarily determine the content or accuracy of children's memory reports (see Fivush, 1994; Goodman, Quas, Batterman-Faunce, Riddlesberger, & Kuhn, 1994). In fact, reconstruction of events through conversations with others can lead to systematic distortions of memory details, ones that are congruent with the current beliefs and expectations of both conversational partners (e.g., Ross & Wilson, 2000). Thus, consistent with the memory literature more generally, the strategy of verbal rehearsal (elaborative or otherwise) can serve not only to reinforce and reinstate memories, but can also lead to errors in recall.

The Self, Sociolinguistic Interactions, and Culture

Although the origin of the cognitive sense of self (i.e., the "me" component) appears to be rooted primarily in cognitive development, its subsequent evolution into a mature self concept occurs in the context of family, society, and culture. As these contexts vary in their perspectives on the nature and importance of selfhood, their impact on the way that the self is apparent in the process of remembering and in what is remembered will also be expected to vary (e.g., Mullen, 1994; Wang, 2001). For example, in many Western cultures, a strong emphasis is placed on individuality and personal achievement that promotes the development and expression of an autonomous and independent self, one whose personal beliefs, attitudes, and goals are primary. In contrast, many Asian cultures place a greater emphasis on interpersonal connectedness, group solidarity, and achievement that promotes the development of a relational or a communal self. Such individuals tend to define themselves in terms of their social roles, duties, and responsibilities, and these come to comprise the critical features of one's sense of self. These different cultural self-constructs have a profound effect on individuals' perceptions and emotions during an ongoing event and consequently, the way that the event is encoded and subsequently remembered and recounted. Predictably, these different self-constructs will also affect caregivers' interactions with infants and children, such that they foster culturally appropriate self-systems that focus on autonomy or community as appropriate (e.g., see Wang & Conway, 2006).

Research on the onset, form, and content of autobiographical memories as a function of cultural differences in self construct indicate that there is a marked difference in the age at which adults in certain Eastern versus Western cultures can retrieve their earliest autobiographical memories. Typically, Americans and Europeans can date their earliest childhood memory from about 6 months earlier than do Asians and also show a greater age-linked increase in memory fluency (e.g., MacDonald, Uesiliana, & Hayne, 2000; Mullen, 1994; Wang, 2001; Wang, Conway, & Hou, 2004). These cultural differences suggest that the early appearance of an autonomous self-construct (as seen in Western cultures) might facilitate the formation of a unique and detailed personal history that contributes to the formation and organization of early events as having happened to "me." Moreover, the way in which the self is structured might further influence how autobiographical memory is represented, evaluated, and reconstructed over time (e.g., see Conway & Pleydell-Price, 2000). Individuals from cultures in which the focus is on an autonomous self might be more likely to encode and retrieve information that is related to the self than those from cultures who view the self as part of a community of selves who in turn may be attuned to information that forms collective or group-centred autobiographical memories. Indeed, research by Wang and colleagues (e.g., Wang, 2001; Wang, Leichtman, & White, 1998) has confirmed this. Compared to Chinese college students, American college students reported not only an earlier age of first memory but also reported more self-focused, specific, and emotionally elaborate content of those memories. Chinese students

tended to provide briefer reports of general and routine collective events that were also emotionally neutral. Similar cultural differences in the content of autobiographical memories have been observed in preschool children (e.g., Han, Leichtman, & Wang, 1998; Wang, 2004; Wang & Leichtman, 2000). Interestingly, culture appears to affect not only the linguistic expression and content of event memories but also the perspective from which events that are encoded. In a recent study with Asian and American adults, Cohen and Gunz (2002) found that the contents of their memories of events were colored by their phenomenological experiences as members of these two cultures, with Asians being more likely than Americans to experience the self in memory from the perspective of the generalized other (e.g., to have more third person memories).

In the developmental literature, recent research shows that like the individual differences in children's conversational styles and their memory reports that correlate with parent talk, children in other cultures exposed to different conversational styles also differ in memory reporting. For example, some research shows that American mothers talk to their 3-year-olds about past events three times as often as do Korean mothers. Further, American children talk about past events more than do Korean children and as reported above, American adults report earlier autobiographical memories than do Korean adults (Han et al., 1998; Mullen, 1994; Mullen & Yi, 1995). Similar relationships were found between age of earliest memory, culture, and conversational interactions in a comparison group of Maori, Pakeha, and Asian adults living in New Zealand (MacDonald et al., 2000; Reese, Hayne, & MacDonald, 2008).

Interestingly, the different autobiographical memory profiles that have been related to cultural differences in self construct and sociolinguistic interaction are parallel to differences in autobiographical memory reports that have been observed as a function of gender. A consistent finding in the literature is that women have earlier first-memories than do men, although these differences are often small (e.g., Dudycha & Dudycha, 1941; Mullen 1994; Rubin, 2000). Moreover, women's autobiographical memory reports contain longer, more detailed, and more vivid accounts of their childhood experiences than do men's reports (e.g., see Bauer, 2007; Bauer, Stennes, & Haight, 2003; Fivush, 2009). Women and men also express different emotional content in their memory reports with anger, shame, guilt, and attachment issues common themes among women and concerns about competence, performance, achievement, and identity more commonly expressed by men (Cowan & Davidson, 1984; Dudycha & Dudycha, 1941). The origins of these individual differences between women and men in their reports of autobiographical events have typically been interpreted in a sociocultural framework. Particular emphasis has been placed on the different ways that boys and girls are socialized to talk about the past. Parents talk to their daughters more frequently and at greater length about the past than they do with their sons. They also place more emphasis on interpersonal and emotional aspects of experiences in conversation with their daughters when compared to the individual, emotionally neutral aspects that they emphasize with sons (for discussions see Bauer, 2007; Buckner & Fivush, 1998; Fivush, 1998). It is interesting to note that, in general, very few differences in nonverbal recall of events as a function of gender have been reported in studies with infants and preverbal children. This indicates that the gender differences that are apparent in later childhood and adulthood are not a function of memory processes per se but rather of the socialization of reminiscence that children learn through the particular characteristic narrative interactions that they experience in their familial and cultural environments.

Individual Differences in Autobiographical Memory for Emotional and Stressful Events

It is well known that stressful events lead to the release of adrenal stress hormones (e.g., catecholamines, glucocorticoids) and that these have been associated with alterations in memory and other cognitive processes (e.g., Cahill, 2000; Cahill & McGaugh, 1998). Although catecholamines

and glucocorticoids have differential effects on the neural and neuroendocrine systems, they share an inverted-U shaped dose–response relationship such that small amounts have little effect on memory, moderate amounts can enhance memory, and large amounts can impair memory. What this means is that the psychobiology of stress is not straightforward and predicting whether memory in (or for) any particular stressful situation is enhanced or diminished depends on a host of factors such as the chronicity of the stress, its intensity, as well as on individual differences in reactivity to stress itself (see Howe, 1998a; Howe, Cicchetti, & Toth, 2006; Quas, Bauer, & Boyce, 2004).

Over a decade of research has failed to elucidate the nature of the relationship between stress and memory although a number of theories have been proposed, evaluated, and received mixed support. For example, Christianson (1992) suggested that during highly stressful events, memory for the central features of the event are strengthened whereas memory for the peripheral details is impaired. Alternatively, Deffenbacher, Bornstein, Penrod, and McGorty (2004) concluded from a meta-analysis of the stress and eyewitness memory literature that memory is best for moderately arousing stimuli and becomes poorer when high stress activates defensive processes. What is known is that both stress-induced catecholamines and glucocorticoids as well as the associated change in the delivery of oxygen to the brain that they precipitate, can modulate what gets stored in memory by altering (for better or worse) processes involved in encoding and consolidation of information and in the effectiveness of its retrieval (see Cahill & McGaugh, 1998; Howe, 1997, 1998a; Howe, Cicchetti et al., 2006; McGaugh, 2000). Further, there is evidence from nonhuman animal research that prolonged exposure to severe stress can precipitate damage to the developing brain (e.g., dendritic atrophy, neuronal death, hippocampal atrophy) in a variety of mammalian species and suggestive evidence of parallel effects in human adults and children (see Howe, Gicchetti et al., 2006; Nelson, 2007).

In part, the difficulty in establishing the relationship between stress and memory in humans is due to the fact that the results of the standard behavioral, self-report, physiological, and autonomic measures commonly used to measure stress rarely converge, especially in children (see Howe, Cicchetti et al., 2006). An additional and arguably larger difficulty is that a multitude of individual differences in cognitive (e.g., knowledge), temperamental (e.g., reactivity), social (parent–child interactions), emotional (attachment), and situational (interviewer support) factors will moderate the effects of the cascade of neuroendocrine reactions to the stressful situation (for reviews see Deffenbacher et al., 2004; Chae, Ogle, & Goodman, 2009; Christianson, 1992; Cordon, Pipe, Sayfan, Melinder, & Goodman, 2004).

As this issue has significant theoretical and practical implications, a large body of literature has evolved and some important facts have been established. Some of the strongest research has been done on children’s memory for naturally occurring stressful events such as medical experiences (e.g., inoculations, voiding cystourethrogram fluoroscopy or VCUG), natural disasters (e.g., hurricanes, earthquakes), and sexual abuse and maltreatment (see chapters in Howe, Goodman, & Cicchetti, 2008). Interestingly, there is growing evidence from these studies that children’s memory for stressful events operates in much the same way as memory for nonstressful events. Across the wide range methods, measures, situations, and ages employed in this research, it is generally the case that children’s recall of the stressful events is quite accurate even after extended delays (but see Goodman, Batterman-Faunce, Schaff, & Kenney, 2002), though accuracy is compromised to some extent by the same reconstructive processes that affect memory more generally. For example, if an event (emotional or nonemotional) is personally distinctive or salient to the child, it will be better recalled than an event that is less so (e.g., Howe, 2006a, 2006b; Howe et al., 2000). In general, emotional or stressful events are distinctive, though ironically, cases of repeated maltreatment may lose their salience and appear to be recalled more poorly (see Howe, Cicchetti et al., 2006). Events that are personally experienced (e.g., venipuncture) generally leads to better recall than simple observation of the event (e.g., Gobbo, Mega, & Pipe, 2002). Finally, as noted above, a variety of parent–child interaction variables affect children’s recall of emotional or stressful events in much the same way as they do for memory of nonstressful events. Parents who are highly elaborative in their conversational styles are likely to have children who provide more information in their reports

of both stressful and nonstressful events (Fivush & Reese, 2002; McGuigan & Salmon, 2004). These parent–child exchanges not only provide an opportunity for rehearsal of the event but teach children how, what, and when to communicate their emotions and experiences to others.

It is interesting to note that high-elaborative parents are also more likely to have secure attachment relationships with their children than are low-elaborative parents (see Alexander, Quas, & Goodman, 2002; Fivush & Reese, 2002). Consistent with these parenting characteristics, children of parents who provided physical comfort after a stressful experience and who discussed the event with them before and after it occurred provided more accurate recall of the event than children whose parents did not (e.g., Goodman et al., 1994). Recently, the quality of the attachment between parent and child has emerged as an important intervening variable that moderates the child's response to a stressful situation and in so doing provides an insight into some of the contradictory findings about the role of stress and memory (e.g., see Alexander et al.; Chae et al., 2009).

According to Bowlby's (1969) theory of attachment, infants form internal working models about themselves and their caregivers through the routine, dynamic interactions that occur between them early in life. These stable representations of self and caregiver are used to interpret the intentions and actions of others, to form expectations of others' behavior in relation to them, and to regulate their own responses. Infants who experience secure attachment relationships as a result of sensitive, responsive, and consistent caretaking form internal working models that are coherent, organized, and facilitate the emerging sense of self. Those who develop insecure attachments develop internal working models that are disorganized and disruptive to a coherent sense of self. Secure and insecure (avoidant, anxious, disorganized) attachments in infancy and their associated internal working models are still evident in adulthood and continue to characterize their affective relationships with others and also their own parenting behavior (e.g., see Fraley, Garner, & Shaver, 2000; Simpson & Rholes, 1998). There is evidence that children and adults who are the product of secure attachments have better access to autobiographical memories (especially those with negative emotional content) and are less suggestible to misinformation than those with insecure attachments (e.g., see Alexander et al., 2002; Chae et al., 2009). Children with secure attachments also rate these memories as more positive and more vivid (Main, 1990; Wang & Conway, 2006). The mechanisms that might mediate the attachment-memory relationship are a focus of current research and include general factors such as the emerging sense of a secure self and the role that sociolinguistic interactions in secure and insecure dyads might play as well as more specific factors such as strategies that might facilitate (e.g., attentional focus) or interfere with (e.g., defensive exclusion) the encoding of emotional information and the presence of social support at the time of retrieval (for reviews see Chae et al., 2009; Paz-Alonzo et al., 2009).

Conclusion

To conclude, we have provided an overview of the empirical literature on the onset and developmental course of autobiographical memory and related it to two theoretical perspectives that have been prominent in trying to explain this achievement over the past few decades. One of these perspectives has focused on the emergence of the cognitive sense of self (e.g., see Howe et al., 2003) and the other has focused on sociolinguistic interactions that occur when children share their personal memories with others (e.g., see Fivush & Nelson, 2004). However, it may be that the debate over the importance of the cognitive self versus sociolinguistic factors in the development of autobiographical memory is more apparent than real. We continue to maintain that it is the emergence of the cognitive self late in the second year of life that launches autobiographical memory and that the coincident developments in language and social cognition that occur in the same time frame do not directly affect its onset. This time frame is consistent with the empirical literature on adults'

recollection of childhood experiences, one that clearly shows that early memories are available from late in the second year of life.

Subsequent to the advent of the cognitive self, developmental advances in memory (e.g., encoding, storage, and retrieval processes; knowledge acquisition and reorganization), language, and social cognition assume increased importance as they provide for more stable memory representations as well as an expressive outlet for those recollections. As autobiographical memory continues to mature across childhood, what sociolinguistic theories make clear is that the language environment of the child, whether familial or cultural, serves to teach children that reporting memories is important, that such reports have a particular narrative structure and content, and a particular social and cognitive function. In that capacity, conversational exchanges not only provide a narrative structure for reporting events, but also serve to preserve (e.g., through rehearsal, reinstatement) or potentially alter (e.g., through reconstruction) memory records of personally experienced events.

We have also reviewed some of the individual differences in autobiographical memory and found that many of these were directly or indirectly related to individual differences in aspects of the self (e.g., early self-recognition, working self, cultural self) as well as to aspects of social cognition and socialization (e.g., parent conversational style, internal working models). These empirical findings have confirmed that autobiographical memory emerges first from an early sense of self that begins to appear in early infancy and becomes stabilized during the second postnatal year. Only at this time will familial, social, and cultural factors begin to affect the way in which the child perceives, thinks, and talks about him or herself and in so doing, further shapes the maturing self-concept and its expression in autobiographical memory.

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