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Cognitive Development



Episodic memory and episodic foresight in 3- and 5-year-old children[☆]

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ABSTRACT

In the present study, we examined the development of episodic memory and episodic foresight. Three- and 5-year-olds were interviewed individually using a personalised timeline that included photographs of them at different points in their life. After constructing the timeline with the experimenter, each child was asked to discuss a number of different events: an event that happened yesterday, an event that happened earlier today, an event that would happen later today, and an event that would happen tomorrow. As judged by their parents, children's accounts were highly accurate. After controlling for age and language scores, there was a strong relation between amount of information reported about past and future events. Overall, 5-year-olds reported more total information than 3-year-olds; however, reports by 3-year-olds included a similar proportion of first-person reference as did reports by 5-year-olds. No age difference appeared in proportion of future-oriented talk. We conclude that the present task provides a promising method of exploring the emergence of mental time travel during early childhood.

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"It's funny how memory erodes. If all I had to work from were my childhood memories, my knowledge of my mother would be faded and soft, with a few sharp moments standing out."

Audrey Niffenegger, *The Time Traveler's Wife* (2003), pp. 107–108

In Audrey Niffenegger's highly acclaimed novel, *The Time Traveler's Wife*, the main character, Henry, suffers from a fictional genetic disorder that transports him forward and backward in time. As the story

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unfolds, we watch as Henry experiences his life in both directions, encountering both younger and older versions of himself and other important people in his life. He travels back in time to meet his wife when she was only a child and returns again and again to the scene of the car accident that killed his mother. Henry also travels forward in time to meet his daughter before she is born and to learn the circumstances that will ultimately lead to his own death. In the present study, we explore the psychological equivalent of Henry's condition—*mental* time travel (Suddendorf & Corballis, 1997; Tulving, 2002)—the ability to travel forward and backward in mental, rather than physical, time. As adults, this ability allows us to remember our past and make predictions about our future. Here, we explore the developmental emergence of mental time travel in preschool age children.

Memory is a fundamental aspect of human cognition that emerges very early in development. Even newborns exhibit memory for their mother's face (Pascalis, de Schonen, Morton, Deruelle, & Fabre-Grenet, 1995) and voice (DeCasper & Fifer, 1980; DeCasper & Spence, 1986). In fact, depending on their age, human infants exhibit memory when tested after hours, days, weeks, or even months (Bauer, 2007; Hayne, 2004). Despite a large body of research on memory development, a number of key questions remain. For example, what *kind* of memory do infants and young children exhibit? Although it is now generally accepted that by 6 months of age, infants succeed on memory tasks that are thought to measure explicit or declarative memory (Hayne, 2004, 2007; Rovee-Collier, Hayne, & Colombo, 2001), there is no evidence that these early memory skills are episodic in nature, and they may instead reflect semantic memory skill (Colombo & Hayne, 2010). Although episodic and semantic memory are both considered part of the explicit or declarative memory system, episodic memory refers to memory for events, while semantic memory refers to memory for facts. Tulving originally coined the term episodic memory almost 40 years ago (Tulving, 1972). Although some of the specific details of the theory have changed since then, the underlying assumption has always been that episodic memory involves a highly specialised set of neural structures that support autobiographical memory. More recently, Tulving has also argued that episodic memory is characterised by two other important features: (1) it involves a form of mental time travel in which the rememberer travels backward or forward in mental time to relive a past experience or to consider possible future scenarios, and (2) it is accompanied by conscious awareness that the event happened to "me" or will happen to "me" that does not accompany retrieval of other kinds of memories (Conway, 2009; Tulving, 2002, 2005).

The bulk of research on episodic memory development has focused on the retrospective quality of memory—that is, the ability to remember events from the past. By comparison, the prospective nature of episodic memory, or the ability to predict what might happen in the future based on what has happened before, has received much less attention. The relative lack of research on the development of mental time travel into the future is somewhat surprising given the importance of episodic foresight in accomplishing a wide range of tasks central to everyday life (Atance & Jackson, 2009; Hudson, 2002; Nelson, 1996; Suddendorf, 2006; Suddendorf & Corballis, 1997). Recent interest in the phenomenon of episodic foresight has been fuelled, at least in part, by growing interest in Tulving's general theory of episodic memory.

Much of the contemporary research on the development of episodic foresight has involved planning tasks in which children are required to anticipate their needs (or the needs of others) under a set of hypothetical circumstances. In some of these experiments, children are asked to imagine possible future events and to then make choices about items that might be necessary for those particular events. For example, Atance and O'Neill (2005) asked 3-year-olds to imagine that they were going on a trip with their parents. They were shown a group of eight items and were asked to choose which of them they would like to take on the trip and to provide a reason for their choice. These reasons were coded to determine how often they referred to the future in general (e.g., using words like *will*, *going to*, etc.) and how often they referred to an uncertain future (e.g., using words like *maybe*, *might*, etc.). Overall, 3-year-olds used these future-related terms approximately 37% of the time.

Using a similar task, Atance and Meltzoff (2005) examined age-related changes in children's ability to talk about hypothetical future events. They showed 3-, 4-, and 5-year-olds a book containing photographs of different landscapes (e.g., a desert). For each photograph, children were given a choice of three items and asked which of the items they would take with them if they were walking across the landscape depicted in the photograph. Each landscape was associated with a particular physiological state; for example, the desert scene was associated with sun getting in the child's eyes. The three items

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