

The Child in Time: Temporal Concepts and Self-Consciousness in the Development of Episodic Memory

Teresa McCormack
Christoph Hoerl
University of Warwick, UK

One interesting aspect of recent research on long-term memory and its development has been the exploration of possible links between memory and self-consciousness (Fivush, 1997; Howe & Courage, 1993, 1997; Perner, 2000; Perner & Ruffman, 1995; Wheeler, Stuss, & Tulving, 1997). In this chapter we distinguish between two different ways of linking memory and self-consciousness. According to some theorists, types of long-term memory differ primarily in the degree to which they involve or are associated with self-consciousness, although there may be no substantial differences in the kind of event information that they deliver (e.g., Wheeler et al., 1997). One of the difficulties with such a view is that it is not obvious what motivates introducing self-consciousness as the decisive factor in distinguishing between types of memory and what role it is supposed to play in remembering. In this chapter we argue in favor of the alternative view that distinctions between different kinds of memory should be made initially on the basis of the ways in which they represent events. In particular, we suggest that the way in which

remembered events are located in time provides an important criterion for distinguishing between different types of memory. According to this view, if there is a link between memory development and self-consciousness, it is because some temporal concepts emerge developmentally only once certain self-conscious abilities are in place.

THE EPISODIC–SEMANTIC DISTINCTION

Tulving's (1972) distinction between episodic and semantic memory has been highly influential in shaping research on long-term memory over the last 30 years. However, the basis of this distinction remains controversial, particularly in the light of Tulving's more recent attempts to characterize it in terms of the *phenomenology* (i.e., subjective experience) associated with each type of memory (Tulving, 1985). Thus, although both episodic and semantic memory are described as species of conscious memory (as opposed to unconscious or implicit memory), episodic remembering involves a distinctive kind of subjective experience whose "phenomenal quality is not mistaken for any other kind of conscious awareness" (Tulving & Markowitsch, 1998, p. 202). This subjective experience is described as that of "re-experiencing something that has happened before in one's life" (Wheeler et al., 1997, p. 349).

Thus, according to Tulving's definition, it becomes necessary to consider the phenomenology of memory experiences when exploring empirically episodic and semantic memory. One way in which this has been attempted is by explicitly asking participants in memory experiments to report on their subjective experiences in recall (Gardiner & Java, 1993; Tulving, 1985). There is some controversy as to whether different responses in these tasks should indeed be interpreted in terms of the different states of awareness that Tulving discussed (Donaldson, 1996; Hirshman & Master, 1997; Inoue & Bellezza, 1998; though see Gardiner & Gregg, 1997). At the very least, however, the fact that participants can readily make sense of the instructions in such tasks suggests that Tulving's distinction captures an important ingredient of our common sense understanding of memory and memory experiences. Furthermore, Tulving's description of episodic memory as involving re-experiencing or reliving the past has close similarities to the notion of *experiential memory* that is central to some philosophical debates on memory (Wollheim, 1984).

A further claim that Tulving makes is that episodic recollection essentially involves *self-consciousness*, in the sense of a reflection on one's experiences at different times and on one's own identity across time. According to Tulving, the rememberer must represent the fact that "the self doing the experiencing now is the same self that did it originally"

(Wheeler et al., p. 349). In other words, episodic recollection is thought to involve a representation of oneself as the subject of certain experiences both in the past and in the present, and thus the self is represented in episodic recollection as an entity that persists over time and is in different mental states at different times.

It is important to be clear about the relation between the claim that episodic recollection involves self-consciousness and the claim that it has a distinctive phenomenology. The claim that episodic recollection involves reflecting on one's past and present mental states does not follow from the idea that when a person remembers episodically, he or she is in some sense re-experiencing or reliving the past. Indeed, attempts have been made to describe the notion of re-experiencing the past without introducing self-consciousness in this sense (e.g., see Conway & Rubin, 1993; Martin, 2001). Some theorists have used the notion of re-experiencing primarily to capture the idea that in episodic remembering one's recollection shares some features with one's original sensory or perceptual experience. Having memories of this character may be a matter of having available particular types of memory images (Hoerl, 2001), or what Conway (2001) has referred to as *phenomenological records*.

Thus, the claim that episodic recollection has a distinctive phenomenology and the claim that it involves self-consciousness are separable theoretically, and it is at least possible to make either of these claims without the other. However, in characterizing episodic memory Tulving seems to have had in mind William James' (1890/1950) notion of "memory proper" as "the knowledge of an event ... *with the additional consciousness* [italics added] that we ... have experienced it before." Moreover, his claim seems to be that it is this kind of self-conscious reflection that "provides the characteristic phenomenal flavor of the experience of remembering" (Tulving, 1985, p. 1).

Self-Consciousness and Episodic Memory

From a developmental standpoint, an implication of Tulving's view is that episodic memory can emerge only once a certain type of self-consciousness has developed. Indeed, Perner (1991, 2000, chap. 10, this volume) has argued for just such a developmental claim. Our aim in this chapter is to explore in more detail the way self-consciousness and episodic memory might be related in development. One important issue is the nature of the self-consciousness that is thought to be linked to episodic memory. Specifically, we need to consider whether the involvement of self-consciousness in episodic memory should be spelled out in terms of the ability to reflect on one's own mental states at different times (so-called theory-of-mind abilities) or in terms of a grasp

of one's persistence over time (Povinelli, Landau, & Perilloux, 1996; Povinelli & Simon, 1998) or some more primitive grasp of one's own identity (e.g., as measured in mirror self-recognition studies; Howe & Courage, 1993).

More generally, however, we think it is important to distinguish between two different ways in which a link could be made between episodic memory and self-consciousness:

1. The *constitutive view*: There is a constitutive connection between episodic memory and self-consciousness because what episodic recollection is has to be spelled out in terms of the idea that the self is represented in certain ways in episodic memory.
2. The *causal view*: The ability to represent oneself in certain ways plays a role in the development of the concepts used in episodic memory. However, episodic recollection itself need not involve representing oneself.

Both Tulving and Perner seem to subscribe to the first type of view, the constitutive view. As we discuss later, Perner defends a particular version of this view, according to which episodic memory has a metarepresentational structure in which one's current mental state is represented as resulting from one's previous experience. However, in this chapter we defend a version of the causal view. In particular, we argue that episodic memory requires the ability to conceptualize the past in a certain way and that the development of the necessary concept of the past depends on the ability to engage in certain forms of self-conscious reasoning. In the section entitled 'Episodic Memory and Time' we defend the view that episodic memory differs from other types in memory in virtue of the way in which the concept of the past is used in episodic recollection. In particular, we identify two ingredients in the ability to think about remembered events as events that have happened in the past: (a) the ability to integrate nonperspectival and perspectival representations of time and (b) the ability to think of events as unrepeatable and thus as happening at unique points in time. In the section entitled 'Episodic Memory and Perspective Taking' we argue that having a concept of the past, in this sense, requires grasping that there are systematic temporal relations between different points in time and that this is a matter of being able to engage in a particular form of reasoning that we describe as temporal perspective taking. Finally, we explore the extent to which the ability to engage in temporal perspective taking requires self-consciousness.

Before turning to our positive claims regarding temporal concepts and episodic memory we first discuss Perner's proposal regarding

episodic memory and self-consciousness in more detail. We do this because we see Perner's theory as one of the most fully articulated versions of what we have called a *constitutive view*.

Perner's Metarepresentational Theory of Episodic Memory

Perner (1991, 2000) has argued that although both episodic and semantic memory involve retrieval of information about events, episodic memory also involves grasp of an additional fact about this event information; namely, that it concerns an event that was personally experienced. Representing this kind of fact is importantly different from representing other types of information about the event, because it involves representing one's own mental states: On Perner's analysis, it involves *metarepresentational* abilities. Thus, Perner (2000, p. 300) gave the following example of the kind of representation involved in episodic memory: "I have information (that 'pear' was on the list and that I have *this information* because I have seen 'pear' on the list)."

Note that this involves metarepresentational abilities in two different senses. First of all, the rememberer has to represent her previous mental state (the seeing of the word *pear*). Second, however, she must also represent her current mental state (the bearer of "this information"). Not just any information about having been in a certain mental state in the past will do, as the rememberer can acquire such information through, say, the testimony of others who tell her that she experienced a certain event. It is the fact that her current mental state itself derives directly from her past mental state, and is represented as such, that Perner has taken to be the defining characteristic of episodic memory. Taking up a suggestion from Dokic (1997, after Searle, 1983), Perner has therefore called episodic memory "causally self-referential."

The claim is that in episodic memory one's current mental state refers not just to a past event but also to one's past experience of that event as the cause of that mental state. This seems to imply, though, that there might be a more primitive way of remembering the past, that is, a case in which one simply has a memory of a past event, without being aware that one's memory stems from one's own experience of that event. Indeed, in his 1991 book Perner argued that it is possible to switch from representing the present to representing the past *before* he believes that metarepresentational abilities are intact (i.e., before age 4 years). For example, he described a 2-year-old as remembering something that happened last winter by switching to a representation of a past event, claiming that the child is not confused about the difference between past and present, because she can mark off representations of different situations by a process described as *quarantining*. This would seem to be compatible with the abilities of 2- and 3-year-olds who are beginning to

use past-tense morphology (Weist, 1989). It is also consistent with numerous reports in the literature of children of this age verbally recalling at least some information about specific past events (see Nelson, 1993; Pillemer, 1998, chap. 4). The crucial question is why one should view this way of remembering past events as falling short of episodic memory. In other words, why does Perner insist that we can speak of genuine episodic memory only once metarepresentational abilities have emerged?

As far as we understand his position, what has motivated Perner's claim is the idea that memories count as truly episodic only if they come with a particular phenomenology, and, crucially, he believes that what "confers the special phenomenal flavor to the remembering of past events" (Perner & Ruffman, 1995, p. 517) is precisely its special metarepresentational or self-referential structure. However, questions have been raised about the connection Perner draws between phenomenology and self-consciousness at this stage. One objection to Perner's account has run as follows. The fact that a certain memory originates from past visual perception, say, might *in and of itself* explain why this memory is of a type that is phenomenologically different from memories originating in some other way (e.g., why remembering a visually experienced event is different from retrieving information about an event about which one has merely been told). On this alternative view, what would explain the phenomenological difference is not the rememberer's ability to think about the experiential origins of her memory; rather, the difference can be explained in terms of the very fact that the memory derives from a past experience, and the particular kinds of information that have been encoded and retained (Peacocke, 2000). Such a claim is consistent with accounts that explain the notion of "re-experiencing" in episodic recollection in terms of the retrieval of certain kinds of sensory records or memory images (Conway, 2001; Martin, 2001).

Although Perner (chap. 10, this volume) allows for such differences in phenomenology between memories that have different origins, he does not believe that they are the ones that are relevant for distinguishing episodic memory from other types of conscious states. Rather, he claims that the distinctive phenomenological flavor that defines episodic memory is due to the involvement of metarepresentational abilities. However, it is difficult to see how metarepresentational abilities are supposed to explain the kind of difference in phenomenology that Perner envisages. Intuitively, it is not one's grasp of the fact that one's present mental state originates from a past experience that explains the subjective experience that one has when one is in that mental state. Rather, the reverse seems to be true: If one thinks about one's present mental state as originating from a past experience, one's reason for doing so is normally because of the

particular kinds of conscious information one has about the past—that is to say, one’s mental state must *already have* a certain phenomenology that makes it reasonable to think that it originates in past experience. Thus, we have to turn to features of the mental state itself, and the way in which it represents things, to explain the nature of the subjective experience one has when one is in that mental state, rather than introducing a higher order state to do this job.

Taking the conscious nature of episodic memory seriously means discussing its distinct phenomenology within the context of overall cognitive and representational capacities rather than taking that phenomenology to be merely epiphenomenal. No psychologically useful category is captured by defining episodic memory purely in terms of a subjective experience that does not make any difference to the kind of information that can be retained or to how that information can be used. If our interpretation of Perner’s claims is correct, the connection he has drawn between episodic memory and self-consciousness can be seen, in part, as an attempt to make good this idea. He has tried to elucidate Tulving’s (1985) claim—that episodic memory can be distinguished from other forms of memory in virtue of its distinct phenomenology—in terms of the involvement of a certain representational capacity, namely, metarepresentation. Yet, if what we have been saying is right, this attempt cannot succeed. Reflection on the nature and origin of a certain mental state is something that comes in over and above one’s being in that mental state, and we have to appeal to the fact that this mental state has a certain phenomenology to explain what makes such reflection possible in the first place.

If one is to argue for a connection between episodic memory and self-consciousness, what needs to be shown is why the emergence of certain abilities for self-conscious reasoning should be thought of as making available a new type of memory. Perner tries to do so by adopting what we have called a *constitutive* view. In other words, he distinguishes between episodic memory and other forms of memory by arguing that episodic recollection itself involves metarepresentation. However, what Perner talks about is arguably not an emergence of a new type of memory but rather a new ability to reflect on memory itself and to think about different ways in which one’s present mental states may derive from the past. (Of course, it would not be surprising if a new ability to reflect on memory facilitates performance on memory tasks, such as the free-recall task used by Perner & Ruffman, 1995. For example, the emergence of encoding or retrieval strategies may depend on such an ability, as earlier work on metamemory would suggest [Flavell & Wellman, 1977]. This in itself may explain the relation that Perner and Ruffman found between performance on memory tasks and performance on theory-of-mind tasks.)

According to the view we put forward in this chapter, episodic memory is first and foremost a matter of being conscious of past events in a certain way, rather than being self-consciously aware of one's own current mental state and its connection with experiences one has had in the past. However, being conscious of past events in the particular way in which we are when we episodically recollect events may involve the use of certain conceptualizing abilities. What this suggests is that if there is still a sense in which episodic memory requires self-consciousness, a more fruitful approach may be to ask why the required concepts could not be available before the development of certain self-conscious abilities. In the next section we develop the suggestion that having episodic memories is in part a matter of being able to conceptualize the past in a certain way. In the last part of the chapter, we argue that there are good reasons to doubt whether one could possess the requisite concept of the past without being able to reflect on one's own persistence through time and involvement with certain past events. Thus, if there is a connection between self-consciousness and episodic memory, it lies in the fact that the ability to engage in certain forms of self-conscious reasoning plays a crucial role in the development of the temporal concepts used in episodic recollection. Self-consciousness, in this picture, could have a substantive *causal* role in the emergence of episodic memory rather than being a necessary component of episodic recollection as such.

EPISODIC MEMORY AND TIME

Although Tulving's focus on phenomenology and self-consciousness has been influential recently, there are other aspects of his conception of episodic memory that should not be overlooked. Tulving and Markowitsch (1998) pinpointed two other less controversial features of episodic memory: First, it involves memory for specific past events, and second, the rememberer is thought to be "oriented, at the time of retrieval, to the past." It is crucial to consider these two points in parallel: If one does so, it is clear that to demonstrate episodic memory it is not enough to show that specific past experiences have simply had an influence on behavior. Rather, the second feature suggests that, in addition, in episodic memory the mental state of the rememberer must be directed toward the past. This seems to capture some of the difference between retrieving a fact from semantic memory that one learned on a single occasion versus remembering the episode in which one learned the fact. Only in the latter case need the rememberer be thinking about the past at all.

There are numerous studies that show that young children are capable of remembering information that stems from a single past event.

Studies of memory in very young infants demonstrate that they can reproduce a response, such as activating a mobile by kicking their feet, that has been acquired in a single learning session (see Rovee-Collier, 1997, for review). A large number of studies of deferred imitation have also demonstrated that even after long delays, 1- or 2-year-olds can reproduce a sequence of novel actions that they observed on a single occasion (e.g., Bauer & Mandler, 1989, 1992; Mandler & McDonough, 1995). There are a number of features of deferred imitation that suggest that it involves a relatively sophisticated kind of memory: It is intact even when different props are provided at retrieval (Bauer & Dow, 1994), it survives shifts in context (Herbert & Hayne, 1999; Meltzoff, 1999), and amnesic patients have difficulties with deferred imitation tasks (McDonough, Mandler, McKee, & Squire, 1995). However, we can still ask whether children engaged in deferred imitation are oriented toward the past. The crucial issue here is how remembered events are represented in recall or, more specifically, the way in which their temporal location is specified.

The Concept of the Past

As should become clear, we think that the crucial developmental question is when children become capable of representing events as having happened at particular times in the past. In this section, we also hope to make clear that this is not a developmentally primitive ability. We have argued elsewhere that although young children have ways of representing the temporal locations of events, these early frameworks fall short of the ability to locate events at particular times in the past (McCormack, 1999; McCormack & Hoerl, 1999). But in what does such an ability consist, and why should we believe that young children do not yet possess it? We address these questions by providing a more detailed analysis of two aspects that seem central to conceptualizing an event as having happened at a particular time in the past.

Perspectival and nonperspectival representations of time. Not all kinds of temporal thought need involve a concept of the past. Some kinds of temporal information about events may simply represent the relations in which they stand to each other: That is, one could represent Event B as coming before Event C but after Event A, and so on. Representing the order in which meals happen each day could be of this form (breakfast, then lunch, then dinner, then supper). Although this involves representing some kind of temporal information, what is represented are the temporal relations between the events in the sequence rather than the location of the events relative to one's current position in time. An analogy can be made with spatial representations: It is possible to represent the spatial location of an object with respect to a set of other

objects (e.g., as in between the table and the bookcase), or with respect to a fronted object (e.g., as behind the TV set) without also representing where any of these objects are located relative to one's own spatial position. The fundamental difference here is captured in the distinction between allocentric (nonperspectival) and egocentric (perspectival) spatial representations. However, it would seem that a nonperspectival representation can tell one about where an object is actually located only if one has some means of combining it with a perspectival representation (e.g., one needs to combine the information that the object is behind the TV set with one's knowledge of where the TV set is relative to one's own location). Similarly, in order for a nonperspectival representation of events within a sequence to tell one something about their actual temporal location, one would also need to have a way of locating the sequence itself with respect to one's current temporal perspective. For example, events could be represented as being in the past or as just about to happen. Thus, like a mature concept of space, a mature concept of time has both perspectival and nonperspectival ingredients (see also Miller & Johnson-Laird, 1976).

The claim is that children may be able to represent the location of an event relative to other events in a sequence without in addition representing where it is located with respect to their own perspective on time. One way of interpreting deferred-imitation studies is that they are measuring children's ability to represent temporal information in this limited sense, that is, their ability to extract and remember the relative order of events in an event sequence. Typically, performance is scored not simply in terms of the number of component events remembered but also in terms of whether the events are reproduced in the correct order. Thus, such studies measure some kind of basic ability to remember temporal-sequential information. However, simply being able to reproduce a sequence one has previously encountered does not seem to require thinking of the sequence as a sequence that happened in the past, that is, identifying a particular occurrence of the sequence as being in the past with respect to one's current temporal perspective.

Specific past times. It is interesting that we can also turn to an observation made by Tulving to elucidate further the difference between children's early abilities to represent the relative order of events within a sequence and the mature understanding of time involved in episodic memory. Speaking of the reasoning that led him to develop his theory of episodic memory, Tulving (1983) mentioned how he came to realize the crucial importance of something that "many wise philosophers from Heraclitus on had known all the time: events do not repeat themselves, there is never another event exactly like a given one" (p. 19). The basic point is that part of what it is to represent an event as having occurred in the past is to think of it as unrepeatably (see also Hoerl, 1999). There is, of course, also a sense in which one can speak of certain events as

reoccurring at different times, but each occurrence is distinct from the others in virtue of the particular, unique, position in time when it happens. Thus, it is not clear whether young children's ability to retain the relative order of events within a sequence also involves an ability to distinguish between, say, different occurrences of the same sequence.

It is important that, to show that someone has grasped the unrepeatability of events, in the sense described by Tulving, requires more than showing that he or she possesses knowledge that, as a matter of fact, derives from a single event. For example, one could acquire "script-like" knowledge about an event sequence (Schank & Abelson, 1977), such as what happens when you visit a restaurant, on the basis of a single visit. Subsequently, one need not remember the visit *as* a specific, unique event: one may simply remember what usually happens during restaurant visits.

A considerable amount of research suggests that young children are very good at remembering everyday event sequences in this way (Fivush & Hudson, 1990; Nelson, 1986). Children's scripts are fairly sophisticated in that they allow for a flexible way of representing event sequences and for the integration of newly encountered events into a representation of an already-familiar sequence (see McCormack & Hoerl, 1999, for more details). For example, when the child encounters a novel event occurring at a certain point in the nursery school day, she can encode its temporal location with respect to her script of the school day (e.g., as happening "before lunch break" or "after nap time"). As other theorists have emphasized, representations of such sequences have good practical purposes, because knowing what normally happens at such and such a point in a sequence can have many implications for action. Nelson (1990, p. 308) argued that

the most basic general function for memory ... is to provide guidance for action. What has happened is used as the basis for predicting what will come next. For this purpose the most useful type of evidence comes from events that are frequently repeated, and thus the most useful ... type of memory is that for familiar routine events, the type of generalized event memory realized as scripts.

However, the restricted use to which scripts are put may still mean that the temporal information they can represent may fall short of adults' abilities for representing time. Encoding the temporal location of events within familiar event sequences is importantly different from the way in which we as adults think of the time of events we remember episodically. The temporal representations in question are representations of repeated events, of "what usually happens," and thus

encoding an event in terms of a location within a script does not involve assigning it a unique location in time. If, as has been suggested, episodic memory involves locating events in the past, then an ability to assign events a unique location in time is crucial. Otherwise, it is difficult to see how the rememberer can be described as thinking about the past at all rather than as thinking of potentially reoccurring events. Thus, even though research suggests that young children can and do recall information that stems from a specific past event, in considering whether this is episodic memory one needs to consider whether the child is representing the remembered event as unrepeatably.

The Concept of the Past and Perspective Taking

The claim is that episodic memory differs from semantic memory in terms of the kind of information about events that must be represented. Episodic memory involves representing events as specific occurrences in the past, whereas this is not the case in semantic memory. This requirement raises key developmental issues. It implies that in giving an account of episodic memory development what needs to be considered are the particular type of temporal framework in which remembered events can be located and the development of such frameworks. As adults, our most common way of locating events in time (i.e., our most familiar temporal framework) is the conventional clock and calendar system. Our clock and calendar system is only one example of a mature temporal framework, but we introduce it here to bring out some features of a framework that assigns events a unique location in time.

We argued earlier that locating events in the past involves integrating nonperspectival and perspectival ways of representing temporal locations. Although, of course, the clock and calendar system provides a nonperspectival way of representing temporal locations (e.g., specifying the date at which an event occurred need not involve bringing in one's current temporal location), when we actually make use of the system we are typically sensitive to our own position within it. For example, we think of Christmas as being "2 months ago" when it is February.

This kind of temporal framework differs in crucial ways from the scriptlike frameworks described earlier. First, it is a *unified* temporal framework: All temporal locations are represented within the same system. By contrast, scriptlike frameworks may be localized insofar as different, unrelated, frameworks may be used in different contexts. For example, a different script may function for weekends versus school days. Thus, although young children may have extensive knowledge of everyday sequences in the form of scripts, and be able to use these

representations in flexible ways, such representations do not provide them with a unified way of encoding temporal locations.

The second, related, property of the conventional clock and calendar system is that it allows one to *distinguish between repetitions*. For example, there is a sense in which times “repeat” (e.g., 4:00 comes around every day). However, the system provides a way of distinguishing between such repetitions such that every possible time can actually be specified uniquely. An important consequence of these properties is that the system allows one to specify the temporal relations between *any* two events, because each has a unique location within a unified temporal framework. Even if two occurrences of events are virtually identical (e.g., any two occurrences of the event of eating one’s breakfast might be very similar), it is possible to specify the temporal relations between the events (e.g., eating breakfast on Monday happened before eating breakfast on Tuesday).

Of course, often one cannot remember accurate temporal information about events: One remembers an event, but one does not know how long ago it occurred, or one cannot decide which of two events happened longer ago. However, even under these circumstances one knows that there is a fact of the matter as to which of two remembered events, for example, happened first. One may find it difficult to uncover the fact, and may have to engage in further memory retrieval and complicated inferential reasoning (Friedman, 1993), but one is not in any doubt that there is such a fact. Thus, a hallmark of being able to think of events as having happened at unique past times seems to be that one is able in principle to reason about the temporal relations between *any* events (see Campbell, 1997, for a related point). In other words, one grasps that there are *systematic relationships* between different events in virtue of the points in time at which they are located.

We should emphasize that we do not believe that grasping the systematic relations between points in time depends on being competent at using the clock and calendar system. Rather, the reverse is more likely: This kind of understanding emerges developmentally earlier than the ability to use such a system, and it underpins subsequent competence with the conventional time system. Indeed, there is already evidence to suggest that by at least age 4 or 5 years, children do grasp that there are systematic relations between points in time (i.e., well before the age at which competence with conventional time systems is intact; Friedman, 1982). One way to measure this understanding is to ask children to make judgments about the temporal relations between past events. For example, Friedman (1991) asked children which of two events “happened a long time ago.” The events in question had occurred at the children’s school and had been created by the experimenter. In one experiment (Experiment 3), the first event consisted in children being introduced to a new kind of game, and the second event was a science

demonstration. The events were separated by a period of 6 weeks, and the testing session took place a week after the second event. Friedman found that nursery school children were able to judge which of the two events occurred most recently.

In other studies, Friedman and his colleagues have examined children's ability to order events such as birthday and Christmas (Friedman, Gardner, & Zubin, 1995) and to judge the relative distances from the present of a number of holidays (Friedman & Kemp, 1998). Although accurate responding in such tasks clearly loads heavily on memory processes, it also depends on the children making sense of the question regarding the temporal relations between arbitrary and unrelated events, that is, events that do not fall within one sequence for which they have a script. Thus, many years before children are competent at using conventional temporal frameworks, such as the clock and calendar system, they seem to be able to reason about the objective temporal relations between events.

How does this understanding of the systematic temporal relations between events emerge from the more primitive abilities to represent event sequences? Consider a case in which Event A happened before Event B, and both of these happened before the current time, C. The issue is: What is involved in understanding the temporal relations between these events? One basis for this understanding might be grasping that Events A and B differ in terms of the temporal distance in which they stand to the present, for example, A stands X units from the present, and B stands $X - N$ units. What might be thought to recommend this picture is evidence of "distance-based" processes in memory, and thus a primitive way of recording the time that has elapsed since a particular event happened, which allows us to make judgments about which of two different events happened earlier (Friedman, 1993, 1996, 2001). However, there is still a problem with seeing this as the basic way in which we conceive of the order of events in the past. The problem, in short, is that it begs the question as to how one can think about the temporal relations in which past events stand to each other. For instance, it is not at all clear that someone who represents Event A as being X units in the past and Event B as being $X - N$ units in the past has all that is needed to represent the temporal distance between the two events as N units. What seems to be needed is a grasp of the *transitivity* of temporal relations: that is, an understanding that given the relation between A and C and the relation between B and C, it is possible to specify the relation between A and B.

How, then, must someone be able to think of two past events in order to have a conception of the way in which they are related to each other? Elsewhere (McCormack & Hoerl, 1999), we have suggested that the necessary form of reasoning involves perspective taking abilities. Understanding the transitivity of these temporal relations involves

understanding that Event A stands in the same type of relation to Event B as both events stand to C; that is, what needs to be grasped is that when B was present, A was past, in the same way as at C, the current time, A and B are both past. Thinking of Event A as having been past when B was present requires imaginatively taking up a perspective corresponding to the time of B. From that perspective, A will be in the past while B is in the present. Thus, temporal perspective taking can be thought of as a specific kind of imaginative exercise, in which one envisages events and their relations to each other from a different temporal perspective while keeping track of the relation between one's actual temporal point of view and the alternative one adopted in imagination. It is the ability to engage in this kind of reasoning that may be seen as being at the heart of our understanding of events as happening at unique points in time.

We have argued that episodic recollection is not just a matter of retrieving information that stems from specific past events but representing remembered events as specific past events—as unique and unrepeatable and thus as having occurred at particular times in the past. We have suggested that representing the temporal locations of events in this way involves a grasp of the systematic temporal relations that obtain between events happening at different points in time and the transitive nature of such relations. We have also described the reasoning that this involves as a particular form of perspective taking. In short, therefore, the argument is that the ability to engage in this type of perspective taking is at the heart of our conception of events as having happened at particular unique points of time in the past.

EPISODIC MEMORY AND PERSPECTIVE TAKING

Although the notion of temporal perspective taking may be an unfamiliar one, we are using the term to capture a type of understanding that is obviously available to mature thinkers. As adults, we realize, for instance, that an event that happened yesterday is now past, but was present then, was still in the future 2 days ago, and so on. Indeed, the idea that mature temporal thought involves temporal perspective taking (or temporal decentering) is one that has occurred previously in the area of language acquisition (Cromer, 1971; Smith, 1980; Weist, 1986). There, it has been used in order to describe what is involved in mastering complex tenses (Reichenbach, 1947; although see Nelson, 1996). Our claim concerns conceptual development and is (arguably) a stronger one than that which has usually been made in the language acquisition literature. We argue that the ability to engage in this form of reasoning is central to possessing the concept of the past that is used in episodic memory and that children do not possess this concept until they are

capable of engaging in this type of reasoning. Also, insofar as episodic memory requires such a concept of the past, its development involves the ability to engage in temporal perspective taking.

We began this chapter by considering previous claims regarding the link between self-consciousness and episodic memory, and we now return to this issue in the light of our discussion of temporal perspective taking. There already is a tradition in developmental psychology of linking perspective taking abilities to the development of self-consciousness (see Perner, 1991) and, to anticipate, our basic claim is that temporal perspective taking is developmentally grounded in the ability to engage in certain types of self-conscious reasoning. We elaborate this basic claim in two ways. The first issue to which we turn is the nature of the self-conscious abilities that are invoked here. Previous claims regarding memory development and self-consciousness have differed greatly in terms of the types of self-consciousness on which they have focused (Howe & Courage, 1993; Perner 1991; Povinelli et al., 1996). We believe a promising way to assess some of the claims that have been made in this context is by considering the particular kind of self-conscious reasoning required for temporal perspective taking.

The second, and final, issue that is discussed is the sense in which our claim is what we have termed a *causal* claim regarding the link between episodic memory and self-consciousness, rather than a *constitutive* claim. We argue that it is a causal claim in that self-consciousness is required for the requisite concept (a concept of the past) to develop. We are not making a constitutive claim, because we do not view episodic recollection itself as always involving a representation of the self.

Self-Consciousness and Temporal Perspective Taking

As we have said, temporal perspective taking can be thought of as a certain kind of imaginative exercise, in which one envisages events and their relations to each other from a different temporal perspective while keeping track of the relation between one's actual temporal point of view and the alternative one adopted in imagination. For example, consider your last day at school and your first driving lesson. As mature thinkers, we can grasp that from the perspective of our last day at school, taking our first driving lesson was still in the future, or vice versa, while keeping track of the fact that both of these events are actually in the past from our current point of view. In other words, we can conceive of the times when these events happened as affording alternative temporal perspectives on the order of events in time. It is this kind of ability that is at the heart of our grasp of the systematic temporal relations that obtain between events that have happened at different times in the past.

We want to distinguish between two respects in which this kind of perspective taking might be thought to involve self-conscious reflection or reasoning. First, it would seem that envisaging events and their relations to each other from alternative temporal perspectives, in the way we have described, entails the ability to think of one's *current* temporal perspective as but one of many perspectives. For instance, in order to grasp that your last day at school was once in the present, you must also have some grip on the fact that you consider it to be in the past only because of where you are now located in time. In other words, to think of finishing school as the very same event that was once present and is now past, you must have a conception of your present perspective as one perspective among others. It is in this sense that we can think of temporal perspective taking as involving a certain form of self-conscious reflection on one's own temporal point of view. In short, the claim is that the capacity to engage in temporal perspective taking involves a conception of oneself as being located at a certain position in time and as having a certain perspective onto time due to being at that position rather than another.

However, in the example we have used, temporal perspective taking also involves self-consciousness in a stronger sense, insofar as it seems to rely on a conception of oneself as persisting through time and occupying different temporal points of view at different times (or what Povinelli et al., 1996, referred to as a conception of the *temporally extended self*). In other words, we have used an example in which a person considers events that have, as a matter of fact, happened to him or her and can think of them as, say, "my last day at school" and "my first driving lesson." Here, temporal perspective taking involves more than the ability to think of one's current position in time as affording just one temporal perspective among others. It also involves the ability to think of oneself as the kind of entity that traces a certain path through time and that is involved with different events at different times, and we suggest that the ability to think about past events in this way, as events with which one was involved oneself, plays a crucial role in the development of temporal perspective taking abilities.

The claim, in other words, is that the ability to consider different temporal perspectives is tied up with the ability to think of one's own perspective as changing as one's life unfolds through time. Temporal perspective taking, as we have described it, is a way of understanding what it is for a past event to have happened at a particular time by considering it as having been present at that time in the past when other events had already happened or were still to come. But how does this kind of grasp of the systematic temporal relations between past events develop? A plausible developmental claim is that children first develop such an understanding by considering that what they could or could not do at one point in time in the past depended on what had or had not

already happened at that time, or, similarly, by considering how what they did at one point in time had an effect on what they have been able to do since. One example of this type of reasoning in adults would be the way in which someone might grasp that her last day at school and her first driving lesson must have happened in a particular order, in virtue of remembering that she was able to drive to school on her last day there.

When thinking about how children first come to engage in these forms of reasoning, we could, for instance, turn to connections that other theorists have drawn between memory development and joint reminiscence. Previous research suggests that children come to a new understanding of past events and their significance through talking about the past with parents and other adults and that particular parental narrative styles promote such understanding (Fivush & Reese, 1991; Haden, Haine & Fivush, 1997; Reese, Haden & Fivush, 1993). One way of interpreting this research might be that the narrative style adopted by parents makes particularly salient how, for instance, the outcome of certain events in the child's past depended on what had happened previously. Similarly, we may think that part of parent-child discourse about the past consists in considering the reasons why it is correct to think of them as having happened in a certain order rather than another. It is in this sense that parent and child can be thought of as jointly reconstructing the order in which events happened rather than simply recalling events in a particular sequence. For instance, Fivush and Fromhoff (1988) give the example of a mother talking to her 31-month-old child about the birth of her brother: Although the child recalls little about the event, the mother seems to draw the child's attention to the fact that certain things led up to the birth of the baby ("Mommy had a really big tummy") and that the baby came home from hospital together with her (correcting the child, who was maintaining that the baby stayed with the child while the mother was in hospital). What the mother makes salient, in other words, are the reasons why events in the child's own past happened in a particular order.

In short, the kind of temporal reasoning we have described as temporal perspective taking might be thought to be developmentally grounded in the ability to reflect on the fact that certain events in one's own past had to take place before one could do certain things or before certain other events could happen. Thus, if self-consciousness, in the sense of a grasp of one's own persistence through time, is required for temporal perspective taking, it is because such reflection brings in the thought of oneself as having been involved with different events at different times in the past.

Perspective Taking as a Causal Requirement for Episodic Memory

Where does this leave the idea that there is a link between the emergence of episodic memory and the development of self-consciousness? The arguments we have put forward would seem to support the view that the ability to represent oneself in certain ways plays a causal role in the development of episodic memory. Specifically, if what we have been saying is right, the ability to engage in certain forms of self-conscious reflection and reasoning can be seen to play a crucial role in the development of the temporal concepts used in episodic memory. To recap, our approach has been to look at the particular way the past is represented in episodic memory and to elucidate the sense in which episodic memory can be said to involve an orientation toward the past not involved in other forms of remembering. We have argued that possessing the concept of the past that is used in episodic memory is in part a matter of being able to engage in temporal perspective taking. Thinking of an event one remembers as an event that happened at a particular, unique time in the past requires the ability to grasp that events that happened at other times were already in the past or still in the future when it happened. Furthermore, we have suggested that this ability to engage in temporal perspective taking involves certain forms of self-conscious reflection and reasoning. In particular, it would seem to require the ability to think of one's current temporal perspective as but one of many perspectives on time and the ability to think of oneself as an entity that persists through time.

It is in this sense that certain forms of self-consciousness must be in place for the concepts used in episodic memory to develop. However, this type of causal claim has to be distinguished from a constitutive claim, according to which what it is to remember episodically has to be spelled out in terms of the idea that the self is represented in certain ways in episodic memory. That this is only a causal developmental claim, rather than a constitutive one, is clear if we consider whether one really goes through the modes of reasoning we have described as temporal perspective taking every time one remembers specific past events. It seems implausible that episodic recollection always involves going through such a reasoning process. Intuitively, when one remembers a particular past event one does not first have to reflect on and reason about one's own temporal perspective and how it has changed over time, by considering, for instance, how what one did at that point in time might have depended on what had happened previously, or might have had an effect on what one has been able to do since. Rather, what is before our mind in episodic memory is simply the event itself, as it happened at a particular time in the past.

How do our claims relate to other claims that have been put forward in favor of a connection between episodic memory and consciousness? It

might be helpful to summarize some of the implications of the account that we have put forward by comparing it specifically with aspects of Perner's theory that we discussed earlier in this chapter.

Our account differs from Perner's in two ways. First, and most important, according to Perner, episodic remembering is constitutively dependent on self-consciousness insofar as each act of episodic recollection involves representing the fact that one's own present mental state was caused by a certain past experience. Thus, his claim is that episodic remembering is essentially a matter of metarepresentation, that is, of representing one's own past and present mental states. In our account there is instead a causal dependency between self-consciousness and episodic memory. Thus, even if there may be a sense in which the kinds of metarepresentational abilities Perner discusses must be in place for episodic memory to develop, individual occurrences of episodic recollection need not involve representing oneself as being or having been in certain mental states, over and above having a particular past event before one's mind.

Second, however, it should also be pointed out that the notion of metarepresentation may not be best suited for capturing the particular forms of self-conscious reflection and reasoning that we have associated with possession of the temporal concepts used in episodic memory. Elsewhere, we have suggested that temporal perspective taking may involve an understanding of the perspectival nature of one's mental states and hence theory-of-mind abilities (McCormack & Hoerl, 1999). This suggestion is analogous to claims linking spatial perspective taking and theory of mind (e.g., see Perner, 1991), and it was made in the light of previous work relating theory of mind and memory development (e.g., Welch-Ross, 1996, 1997). However, if what we have been saying in this chapter is right, one might think that the primary way in which temporal perspective taking is connected with self-consciousness is that it is developmentally grounded in the ability to reflect on one's own persistence through time. Furthermore, in spelling out what it is to reflect one's own persistence through time we have not specifically talked about the ability to think about one's own mental states. Indeed, a grasp of one's persistence through time would seem to be presupposed in the ability to think of oneself as having had different experiences at different times rather than being made available by one's ability to conceptualize these mental states.

Instead, in spelling out what it is to grasp one's own persistence through time we have appealed, for instance, to the ability to reason about how certain events in our own past had to happen before we could do certain things, or how things we did at certain points in time have had an effect on what we have been able to do since. Thus it is arguable that the specific kind of self-consciousness we have described is at least as much a matter of being able to think of oneself as an agent whose

possibilities for action are determined by one's own past as it is a matter of being able to conceptualize one's own mental states at different times.

CONCLUSIONS

In his book *Elements of Episodic Memory* Tulving (1983) speculated that there is a relation between children's representations of temporal information and the development of episodic memory: "The absence of episodic memory in young children may be related to their inability to keep track of the order of events in their personal past. The difficulty that children have with the temporal organization of their memories has been described by Piaget" (p. 50). More recently, there has in fact been a general revision of the Piagetian picture of young children as unable to represent and remember temporal sequential information (see Mandler, 1986, for a discussion of this point). However, there is an important sense in which Tulving's basic intuition is correct: We have argued that although young children may be competent at learning ordered event sequences, they cannot represent events as happening in at unique temporal locations in their past. There is an important sense in which children's memories are not temporally organized like those of adults, because they lack a unified temporal framework that can be used to represent the systematic relations that obtain between past events in virtue of the particular times at which they happened.

The claim we have made is that the subsequent development of episodic memory is linked to the development of temporal perspective taking abilities. We have argued that the ability to engage in temporal perspective taking is a crucial ingredient in the possession of the temporal concepts that are used in episodic memory. However, we have also tried to show that temporal perspective taking requires the ability to engage in certain types of self-conscious reflection and reasoning. It is in this sense that the development of self-consciousness can be seen to play a central role in the emergence of episodic memory.

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