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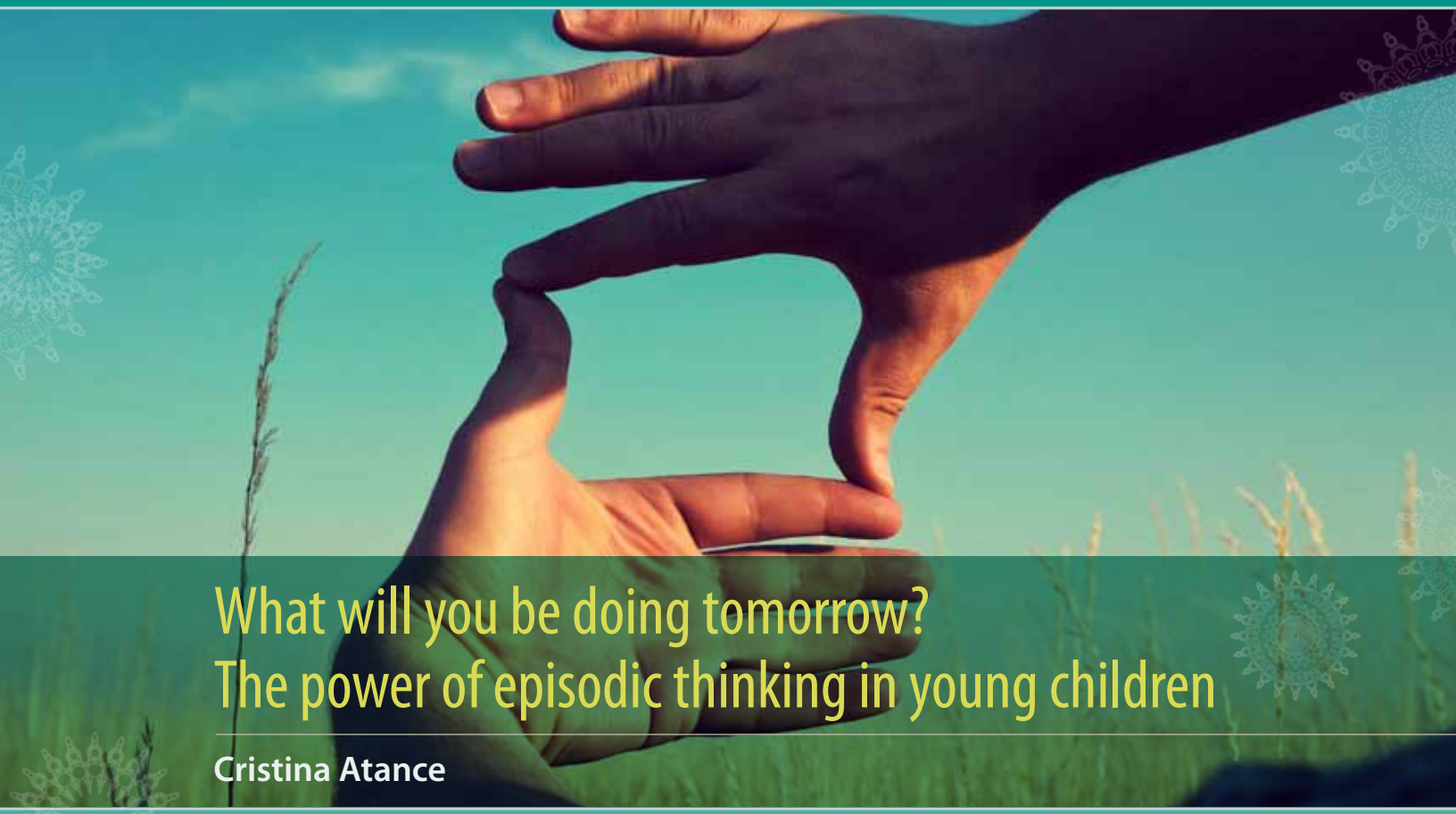

What will you be doing tomorrow? The power of episodic thinking in young children

Cristina Atance

Our capacity to think about the future is an essential part of what makes us human. It enables us to envision our goals and aspirations - whether these pertain to a job interview one week from now, or to retirement twenty years from now. If we could not imagine ourselves in the future— an ability that is part of what researchers now refer to as "mental time travel" — we would lack the necessary frame of reference to guide our current decisions and plans. Yet, despite the importance of future thinking to humans' adaptive functioning, it is only recently that psychologists have begun to study its development. This is in contrast to the study of memory, for example, that has a long and rich history in developmental psychology.

The term "future thinking" is considerably broad and is potentially involved in a number of different behaviours, including planning and delaying gratification (e.g., foregoing a small treat right now in favour of a larger treat later on). However, researchers have honed in on a specific aspect of future thinking that is referred to as "episodic future thinking."

Episodic future thinking describes what may be the uniquely human capacity to mentally project the self into the future to pre-experience specific episodes (hence the term "episodic"). For example, imagine that you are planning a trip to Paris next summer. In doing so, you can mentally pre-experience your sense of wonder at seeing the Eiffel Tower, the hustle ▶

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and bustle of the Champs-Elysées, and your sense of satisfaction after enjoying a delicious meal at the bistro beside your hotel.

When do young children begin to make these same kinds of "mental projections" into the future? One of the challenges of studying how children begin to think about the future, or their episodic future thinking, is a methodological one. Whereas one can simply ask adults to envision and talk about various events that might occur the next day, the next week, or even years from now, young children do not have the necessary language or knowledge of conventional time units (e.g., "next week", "a year from now", etc.) to answer such questions. As such, developmental psychologists have taken various approaches to assess what children know and understand about the future.

In their chapter entitled *Future Thinking in Young Children*, recently published in the *Oxford Handbook of the Development of Imagination*, Cristina Atance and Jennifer Metcalf present a state of the art review of the research, and particularly the methods that have been used in the last 10 years to study children's episodic future thinking. They also consider the relation between episodic future thinking and memory, as well as the factors that might contribute to the development of episodic future thinking. They conclude their chapter by considering the role that imagination may play in the development of episodic future thinking.

Researchers have studied future thinking in children by either asking them to report future events involving the self or by setting up scenarios in which children's actions can be taken as a reflection of their future thought. For example, in some studies, children are asked to talk about an activity that they will do "tomorrow". Typically, the majority of 4- and 5-year olds are able to answer this question correctly (as measured by parental reports),

" […] our ability to think about the future is intimately connected with our ability to remember the past. "

but 3-year-olds are not. Although such verbal methods are straightforward, some researchers have argued that young children's limited language capacities may mask their understanding of the future. For example, terms such as "tomorrow" and "later" are not always well understood by young children. Thus, an alternative is to assess children's future-oriented actions.

Imagine the following scenario originally described by the cognitive psychologist, Endel Tulving: a young girl dreamed she was at a party where all the guests were being served a delicious chocolate pudding. However, to eat the pudding, guests needed to have their own spoon and the young girl did not. That night, she fell asleep while holding a spoon in her hand because she wanted to avoid making the same mistake again. Tulving and others have argued that this particular behaviour (i.e., getting a spoon) shows that this little girl is truly thinking about the future – otherwise, why would she have bothered to get the spoon?

Researchers have since attempted to devise tests in the laboratory that mimic the "spoon" scenario. For example, in one study, preschoolers were led into an empty room which contained only a puzzle board, but no puzzle pieces. After a few minutes, children were taken into a neighbouring room to play unrelated games for five minutes. They were then shown a set of four items (including the missing puzzle pieces). Children were told that they would now return to the first room and were asked which of the items they wanted to bring with them. The logic of this study is that if children are indeed thinking ahead (similar to the little girl in Tulving's scenario), they should choose the puzzle pieces to avoid further boredom in the room that only contained the puzzle pieces. Whereas 4- and 5-year-olds were more likely to select the puzzle pieces compared to a control group of children (who were not presented with the puzzle board in the empty room), 3-year-olds were not. This suggests that only the 4- and 5-year-olds were able to act in the present to fulfill an anticipated future need.

An exciting new topic in both the study of adults' and young children's episodic future thinking is the extent to which it is related to memory. For example, some researchers have argued that the same "core" brain network is involved in both episodic memory and episodic future thinking, thus suggesting that both rely on similar cognitive and neural processes. Early evidence from amnesic patients supports this claim. For example, consider the following interaction between the cognitive psychologist, Endel Tulving, and his patient, N. N.

E.T.: "Let's try the question again about the future. What will you be doing tomorrow?" (There is a 15-second pause)

N.N.: Smiles faintly, then says, "I don't know."

E.T.: "Do you remember the question?"

N.N.: "About what I'll be doing tomorrow?"

E.T.: "Yes. How would you describe your state of mind when you try to think about it?" (A 5-second pause).

N.N.: "Blank, I guess."

This is one among several examples that suggests that our ability to think about the future is intimately connected with our ability to remember the past; more specifically, it has been argued that we draw upon our past experiences to imagine our future experiences. If so, then we might expect that children's ability to talk about the past emerges around the same time as their ability to talk about the future. Indeed, when researchers asked the same group of children to report an event that will happen tomorrow as well as one that happened yesterday, performance on both questions was positively correlated. In other words, those children that were accurate in remembering an event that occurred yesterday (as assessed by their parents) tended to be the same children who also made plausible predictions about what might happen tomorrow (also as assessed by their parents).

Another topic of interest in the study of episodic future thinking is the extent to which imagining oneself in the future (i.e., adopting a "future perspective") is similar to imagining the perspective of other people (part of what has been termed "theory of mind" ability). Evidence to support this link has recently been highlighted by Buckner and Carroll (2007). These authors argue that envisioning the future (or what they refer to as "prospection"), remembering the past, and conceiving the viewpoints of others all reflect the workings of the same core brain network: frontal lobe and temporal-parietal lobe systems.

What these capacities are believed to have in common is imagining perspectives/events that are not currently being experienced - a requirement that Buckner and Carroll term "self-projection." In fact, some authors argue that children may first have to understand that other people's perspectives may differ from their own (e.g., "I hate broccoli but Mum loves it") before they understand that their current and future perspectives may also differ (e.g., "I hate broccoli *right now* but I may like it in the *future*"). This is an intriguing issue that developmental psychologists are just beginning to explore.

What other factors may influence children's understanding of the future? One interesting proposal is that the amount of control or "input" children have over a future event plays a role. For most young children, parents make the bulk of the decisions about what events will transpire during the day and how these events will unfold. However, it may be that when children have more control about how an event will transpire, they are more motivated to think about it and thus more accurate in their descriptions of it. Consistent with this proposal, one recent study (by Cristina Atance and her former undergraduate student, Elizabeth Quon)[1] found that children more accurately described (as assessed by parental report) future events for which their parents rated them as having a high level of control (e.g., playtime) than ones for which their parents rated them as having a low level of control (e.g., bedtime).

Finally, how is thinking about the future different from the mere act of imagining? At first glance, these terms appear almost interchangeable. Indeed, it would not be uncommon to ask someone to "imagine" what he will be doing a year from now, which might very well be akin to asking him to mentally pre-experience his future. However, Atance and Metcalf argue that imagination and episodic future thinking differ along two important dimensions. The first is the plausibility of the event in question, and the second is the event's temporal location.

With respect to "event plausibility," someone who has just learned to swim can imagine himself powering through the water to surpass Michael Phelps at the Olympics, but cannot realistically (or plausibly) project himself into this situation. As such, this particular instance of imagining would not qualify as episodic future thinking. Rather, episodic future thinking must entail an appreciation that one's future self is "limited" to some degree by one's present self, and thus is not equivalent to imagining, fantasizing, or daydreaming about the future. As for the temporal location of an event, Atance and Metcalf argue that episodic future thinking must entail some recognition that the event in question could potentially occur in one's future. In contrast, an imagined event is not restricted in this way. Thus, whereas both the mental acts of envisioning oneself lying on the beach during an upcoming holiday or merely envisioning the act of lying on the beach (with no upcoming plan to do so and thus no "temporal location") would qualify as imagination, only the former would qualify as episodic future thinking. Atance and Metcalf conclude by arguing that imaginative capacity is necessary but not sufficient for episodic future thinking.

Researchers have only begun to scratch the surface of this important aspect of human cognition and so, not surprisingly, there are many intriguing directions for future research. Atance and Metcalf suggest a number of interesting possibilities in their chapter including the extent to which thinking about one's own personal future differs (at the cognitive and neural levels) from thinking about another person's future (especially when this person is someone whom we know very well). In other words, to what extent is the notion of "self" central to episodic future thinking? Second, although having the capacity to think about the future is a highly adaptive cognitive capacity, can excessive focus on one's future sometimes be maladaptive? ■

[1] Quon, E., & Atance, C. M. (2010), "A comparison of preschoolers' memory, knowledge, and anticipation of events", *Journal of Cognition and Development,* 11, p. 37-60.

Cristina Atance is a developmental psychologist at the University of Ottawa. Her primary area of interest is the development of future thinking in preschool-aged children. Dr. Atance is currently running a series of studies that explores children's ability to think about and anticipate future states of the self, as well as their understanding of the types of situations that may cause. She is also interested in the development of theory of mind skills, and more specifically how such skills may be related to other aspects of young children's cognitive development. You can reach Dr. Atance at Cristina.atance@uottawa.ca.

Atance, C. M., & Metcalf, J. L. (in press), "Future thinking in young children", in M. Taylor (ed.), *The Oxford Handbook of the Development of Imagination*, New York: Oxford University Press Inc.