

“Mommy, can we go to the park tomorrow?”

UNCOVERING THE STRENGTHS AND LIMITATIONS IN FUTURE THINKING SKILLS IN CHILDREN WITH AUTISM

by Laura K. Jackson



Future oriented skills, such as the ability to delay gratification, plan ahead, and anticipate future events are critical aspects of human cognition and behaviour.

In daily life, an adult might display future thinking skills by writing out a shopping list, thus anticipating his future needs, or by saving a favourite snack until after he completes a project, thereby delaying gratification. Although children might not engage in future-oriented thinking that is as elaborate as this, they too can think ahead. To better understand the emergence of future thinking ability, researchers, including my supervisor Dr. Cristina Atance at the University of Ottawa, have begun devising tasks for preschool-aged children. As a Master’s student funded by Autism Ontario, I will extend this research by investigating future thinking skills in children with autism. My supervisor and I will explore how future thinking is affected by autism, theory of mind skills, and executive function ability.

Early in the preschool years, typically-developing children begin to talk about the future, using words like “gonna,” “will,” and “might,” saying, for example, “I might go to the park.” In our lab, we’ve tested future thinking skills using a number of different tasks. One such task is the “Trip” task. We present children with a picture of a location and ask them to pretend that they are going there on a trip. We ask them to choose one of three items to bring with them and to explain their choice. In one scenario, children are shown a picture of a long path in the desert. They are given the choice between bringing a plant, a present, or water. This task assesses whether the child can anticipate a future state (thirst) and plan accordingly (by packing water). Our

research shows that 3-year-olds are already quite good at selecting the correct item, and when asked to explain their choice, their language generally reflects a basic understanding of the future. For example, in an explanation for why she should bring water, one child explained, “*in case we get thirsty.*” Children’s performance on this task improves significantly between the ages of 3 and 5, indicating that children’s ability to talk about the future and their ability to anticipate a future state of self both develop during the preschool years.

We have also looked at other future oriented skills, including planning and delay of gratification. Children’s performance on tasks testing these skills improves between the ages of 3 and 5, again suggesting that children’s ability to think about and understand the future develops significantly during the preschool years. Although there are likely individual differences in the extent to which children engage in future thinking, the fact is well supported that typically-developing children seem to have a fairly good grasp of the concept of the future by about 5 years of age.

We know very little about the future thinking skills of children whose development is not typical, including children with Autism Spectrum Disorders and Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS). There is evidence that these skills might show a different profile in this population. Children with autism demonstrate several cognitive deficits including delays in imitation, attention,

language and most notably, theory of mind skills. Theory of mind skills are those which allow a person to understand, conceptualize, and apply knowledge about mental states, including desires, intentions and beliefs. Theory of mind also involves children's ability to develop a differentiated concept of self and others. Researchers argue that theory of mind skills develop between the ages of 3 and 5 [Gopnik]. The particular theory of mind skills that may be closely related to future thinking skills are those that allow children to understand that others can have different perspectives from those of the self. For example, when children have a well-developed theory of mind, they realize that their friend might be sad even if they, themselves, are not. Recent theorizing and research suggests that adopting the perspective of a *future self* may be related to this ability to adopt the perspective of another [Moore, Barresi & Thompson]. Therefore, it is logical to deduce that the development of theory of mind skills during the preschool years may allow children to understand and recognize the concept of a future self.

Children with autism have been found to experience difficulties with theory of mind skills [Baron-Cohen]. According to Dr. Simon Baron-Cohen, they have difficulty with tasks that require the ability to acknowledge the existence of mental states, and then to use this understanding to explain and predict others' behaviour. He argues that although typically-developing children acquire at least an elementary understanding of mental states and perspectives by the end of the first year of life, with further development in these skills during the preschool years, even the most high functioning children with autism develop only low level theory of mind skills. Without a theory of mind, children with autism are developmentally delayed in their ability to communicate with others, to form relationships, and to make sense of their social milieu [Baron-Cohen]. The theory of mind hypothesis is often provided as an explanation for the deficits seen in autism. If children with autism are impaired in theory of mind abilities, then it is possible that they would also be impaired in future thinking skills.

In our studies, children with autism are tested on a series of future thinking tasks that were originally developed with typically developing children. In our first study – *Self- and Mechanical-Based Future Thinking Skills in Children with Autism Spectrum Disorders* – we investigated how children with autism performed on two types of future thinking tasks. Some of these tasks involved the ability to imagine, or picture, themselves in the future and to anticipate how they would be feeling, thinking or acting at that time. We categorized these tasks as “self-based” future thinking tasks. An example of a selfbased task is the “Trip” task described earlier. Another example is the “Plans for Tomorrow” task [Busby & Suddendorf] in which children

are asked about what they are going to do tomorrow. Other tasks involved thinking primarily about the transformation of physical objects, and so we categorized these as “mechanical-based” future thinking tasks. In the “Tower of Hanoi” task [Welsh], children are asked to move small disks from peg to peg to achieve an end state that is identical to the experimenter's model. Another mechanical-based task is the “Mail Delivery” task [Carlson, Moses & Claxton], in which children deliver multicoloured paper letters to coloured cardboard houses on a bristol board street. The trick is that children must put the letters in the back of a plastic truck in reverse order, thereby planning ahead for the delivery stage. We found preliminary evidence to suggest that children with autism are better at performing the mechanical-based future thinking tasks than they are at performing the self-based tasks. This may be because the self-based tasks require theory of mind skills that children with autism tend to have difficulty with.

Executive function skills – such as working memory, goal monitoring and inhibitory control – may be important to future thinking. These skills have been found to be impaired in children with autism [Hughes, Russell & Robbins]. In future studies we will examine several types of tasks including those that measure future thinking, theory of mind, and executive function in order to observe the influence these skills have on each other and on the deficits seen in children with autism. Research of this nature will increase academic knowledge about the complex disorder of autism, establish a number of future thinking and executive function tasks that can be used in studies and identify areas for intervention and teaching for children with autism. The more knowledge we gain about the way children with autism think, the greater our chances of developing specific, effective interventions which will improve these children's outcomes. □

For more information about these studies, please contact the Childhood Cognition and Learning Lab at ccll@uottawa.ca.

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