

Early Cognitive Development Centre

Research Results



The ECDC team would sincerely like to thank you for participating in our studies during 2022. We greatly appreciate how you have helped increase our knowledge about children's development and assisted our students in obtaining their degrees at both postgraduate and undergraduate levels. We hope you will enjoy reading the recent results of our research.

*To find out more about us, visit our website
ecdc.psychology.uq.edu.au*

Do 4- to 6-year-old children copy even when it's costly?

Our research explored children's imitation and ritual behaviours. A ritual is a set of actions performed in a regular or set way, usually without thinking about it. Past studies have found that children rely on copying when learning new ritual behaviours. However, we know little about children's responses when copying others is costly. Would children continue to copy what they have seen others do, or do they devise strategies when learning costly behaviours?

In our study, 4- to 6-year-old children were shown a task where the more tokens were placed into a transparent and vertical tube, the more stickers would be earned. An adult demonstrated how to place the tokens into the tube, incorporating either ritual or non-ritualistic actions. Both approaches needed to be faster to execute and hence costly in the number of stickers earned in one minute.

We found that children aged 4- to 6-years copied the ritualistic actions precisely and only earned a small number of stickers. In contrast, older children ignored the non-ritualistic actions and earned the maximum number of stickers. This highlights the strikingly strong tendency of young children to learn conventional social information even at a cost to themselves, pointing to their roles as "cultural magnets".

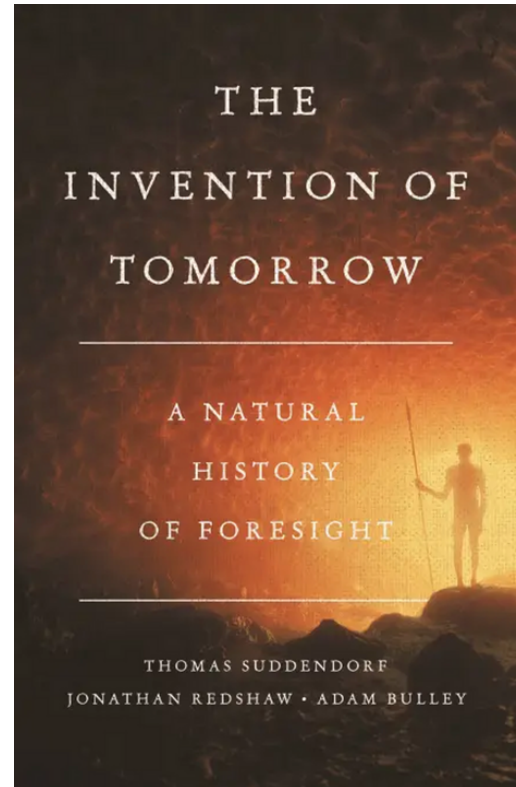


A new book from our researchers is out now!

A spellbinding exploration of the human capacity to imagine the future.

Our ability to think about the future is one of the most powerful tools at our disposal. In *The Invention of Tomorrow*, cognitive scientists Thomas Suddendorf, Jonathan Redshaw, and Adam Bulley argue that its emergence transformed humans from unremarkable primates to creatures that hold the planet's destiny in their hands.

Drawing on their cutting-edge research, the authors break down the science of foresight, showing us where it comes from, how it works, and how it made our world. Journeying through biology, psychology, history, and culture, they show that thinking ahead is at the heart of human nature—even if we often get it wrong. Incisive and expansive, *The Invention of Tomorrow* offers a fresh perspective on the human tale that shows how our species clawed its way to control the future.



<https://tomorrow.psy.uq.edu.au>

Help us investigate how siblings learn from each other!



A big thank you to all families who have participated in the Siblings Study so far! We greatly appreciate your time and look forward to seeing you all in the labs for your follow-up sessions this year.

We aim to understand how children help their siblings to learn. We are exploring the role of siblings in typically developing sibling pairs and sibling pairs where one child has a diagnosis of ASD (autism spectrum disorder). To register to participate, we are looking for:

- 1 sibling aged 2 ½ - 8 years old **with** ASD
- AND
- 1 sibling aged 2 ½ - 8 years old **without** ASD.

Siblings will be asked to complete two visits to the ECDC and one home visit over a year, where they will complete fun play and learning activities. **Families will receive a \$100 gift voucher for their time.**

If you are interested in participating in the Siblings Study or have any questions, contact Kendall at k.wall@uqconnect.edu.au

How do 7- to 11-year-olds develop a sense of control?

The sense of agency has been defined as the feeling of control an individual has over their actions and the outcomes of those actions. Previous research on agency has focused on adults, with very few studies examining how this sense develops for children. This is surprising, as it has been shown that a significant amount of development occurs in brain regions linked to the sense of agency from 7- to 11-years of age.

So, does one's sense of agency become stronger or weaker across age? The current study aims to address this question in children aged 7- to 11-years using a fun computer-based agency task.

This study is still in progress. *If you are interested in participating, you can contact Sumeet Farwaha at s.farwaha@uq.edu.au*



Does changing the stakes alter 6- to 9-year-olds problem-solving?

Humans often change their environment to simplify difficult tasks through cognitive offloading behaviours. For example, we write lists and set reminders instead of relying on our memory, and we use maps and GPS devices to find our way around. Our previous research has indicated that from around age 6, children use cognitive offloading more frequently when the ongoing task is relatively tricky and less frequently when the ongoing task is relatively easy.



In our study, we present children with pictures of blue and red stick figures with their arms facing up or down. Children are asked to count the blue figures or the figures with their arms up. The pictures were always presented to children upside-down on a turntable, allowing them to rotate the turntable to make the pictures easier to interpret. Critically, rotating the turntable was only useful on some trials but not others. On some trials, there is a large reward for interpreting the pictures correctly, and on some trials, there is a smaller reward or no reward.

We are interested in whether changing the stakes of each trial will also change children's perception of whether cognitive offloading is useful or redundant. For example, if a large reward is available, children may use cognitive offloading even when it is redundant (counting the blue figures), just to be sure. This is comparable to using a calculator to double-check the answers for easy mathematical problems (like $4 + 5$) when there are considerable consequences for being wrong – for example, in an exam environment.

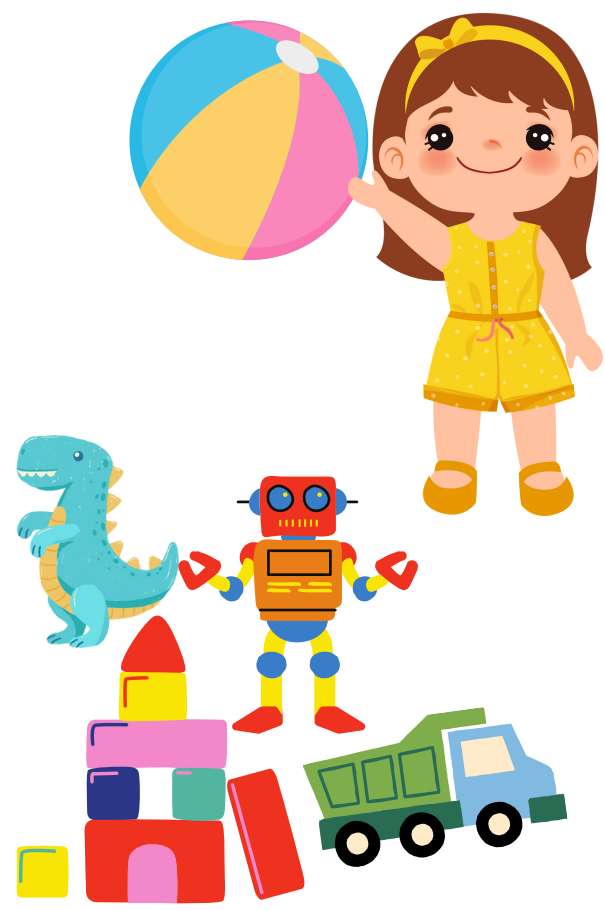
How do 4- to 9-year-olds feel emotions about things they can control?

Considering counterfactual alternatives to events that have already occurred can help us make better decisions when we are confronted with similar situations in the future. To investigate this in children, we presented them with two pairs of boxes, each pair concealing one white ball and one black ball. Children selected a box from one pair (within their control), and the experimenter spun a wheel to choose a box from the other pair (out of their control). If the two selected boxes had matching coloured balls, they would win more stickers but would lose stickers if not.

When children won more stickers, we asked them if they felt better about the box they selected or the box the wheel selected. However, when children lost their stickers, we asked them if they felt worse about the box they selected or the box the wheel selected. We found that children felt better about the box within their control when they won. It is suspected that when children won, they did not need to engage in counterfactual thinking because they had a controlled and positive outcome. When they lost, older children were more likely than younger children to feel worse about the box that was within their control. This suggests that older children may consider the controllability of events when thinking about a negative outcome.



When do children aged 3- to 4-years-old start to plan for the future?



Planning for the future and preparing accordingly is an essential daily ability. But when do children develop the ability to use foresight?

Previous studies have focused on children's ability to identify and utilise solutions to solve future problems. This study investigated whether children's ability to recognise their limitations in carrying capacity and use of a mobile container to carry many toys may represent the emergence of foresight.

We told children 3- to 4-years-old that there were many toys in another room, presented them with a view of the thirty toys and led them back to another room where they played a game. After five minutes, the children were told to transport the toys from the other room back here and were given the option to take one of the multiple items to take with them. One of these items was a basket.

We did not find the results similar to previous studies on foresight as there was no difference between ages on basket usage. We will have to keep exploring how children plan for the future!

Do 3- to 6-year-olds believe what is on a screen?

Recent research suggests that young children now value information presented on a screen more than information presented in person. Very little research has investigated this potentially new pattern of cognitive behaviours. Further, research has yet to examine if this effect is influenced by what type of screen the information is presented on (i.e., a phone or TV). As such, our study used a task of children's beliefs to measure the influence of screens.

This study saw children aged 3- to 6-years-old hearing conflicting, though similar, stories about three different events from both a screen-based informant and an in-person informant. Children witnessed the screen-based story on either a smartphone, a television or a tablet. Upon hearing both stories, children were invited to reveal what event they believed the stories to be about. Results indicated that children did not associate their beliefs about the event with the screen-based informant to a significantly greater extent than the in-person informant. More so, the screen that the story was presented on did not influence the likelihood for a child to align their beliefs with the screen-based or in-person informant.

Therefore, whether children receive information in person or from a screen, may not influence their beliefs. Further, the screen they receive information from may also not influence these beliefs. However, further investigations are needed as screen use and reliance increase, especially in our children's lives.



Do 4- to 9-year-olds feel regret when they can predict the result?



Past research investigating regret, has used two boxes where children select one of two boxes and receive a hidden prize before discovering that the alternative, the non-selected box contained a better prize. However, this traditional two-box design does not allow for any foreseeability of the outcomes. Children cannot choose to increase their chances of selecting the better box or learning to do so in the future. In other words, there is no reason for children to think, "I should have known better".

In this study, children were asked to select one box each from two pairs of boxes. Before selecting their boxes, they were given time to explore them. It was revealed that each chosen box had one sticker, and the non-chosen boxes had five stickers. We then told the children that one pair of boxes had windows on the bottom that they could have looked through before choosing a box. However, the other pair of boxes did not have windows on the bottom.

We asked the children if they felt worse about the box they chose that had a window or the box they decided that had no window. We found that 4- to 7-year-olds felt worse about the box with no window (the unforeseeable outcome) and that 8- to 9-year-olds felt worse about the box with a window (the foreseeable outcome). This suggests a shift between 6- to 7-years and 8- to 9-years where children begin to consider foreseeability when experiencing regret with increasing age.

How do 2- to 5-year-olds with language delays learn about others?

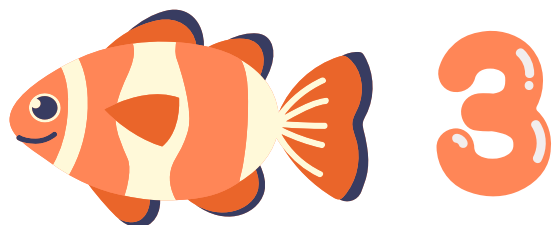
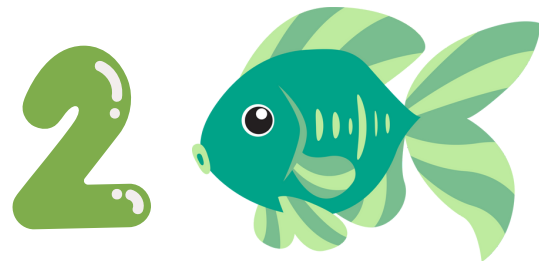
During early childhood, children learn how others think, feel and act. Children who do this well are generally more socially skilled and accepted by their peers. We know that conversations between mothers and their children are essential for helping children to learn about others. Throughout 2022, researchers have been running a study with families looking at how mothers talk to different children within the same family when one sibling experiences a delay in developing language. This knowledge will help us better understand the development of social thinking in children who experience language delays, provide helpful information for parents, and lead to better support for children with social challenges.

Researchers are looking for families with sibling pairs between the ages of 2.5 and 8 years where; one sibling has a language delay, AND one sibling is typically developing. If this applies to your family, we would love to have you participate in the study. The study involves a single 1.5hr visit to the ECDC.



If you're interested in participating, contact Aisling
a.mulvihill@uq.edu.au. **Participating families will receive a \$20 gift card.** Please also share this study with any families interested and able to participate.

Can 18-month-olds understand correct and incorrect counting?



The development of counting is important in a child's cognitive development, as it provides a foundation for future achievement in formal mathematics and problem-solving. The development of counting in children is ruled by three principles: one-to-one correspondence, stable order, and cardinality. We are currently running a study on 18-month-olds to investigate their understanding of the one-to-one correspondence principle. Particularly, we are exploring how monolingual and bilingual children identify violations of this principle through visual preference. Previous research has indicated that bilingual infants can better differentiate between correct and incorrect counting than monolingual infants.

Our study involves children watching a short video of fish being counted in an extinct language. A series of videos are presented with the fish following and violating the one-to-one correspondence principle. Children's visual preference for each video is recorded and coded to understand if monolingual and bilingual children prefer correct or incorrect counting.

We are nearing the end of recruiting for this study!
If you'd like your child to participate, **please get in touch with Kate Macklin (kate.macklin@uq.net.au)**. Testing sessions are up to 15 minutes and are available on weekdays and weekends.

Does asking for help aid 6- to 11-year-olds in regulating their emotions?

Everyday, children face unexpected problems and must regulate their emotions to find solutions. In recent years, scientists have found that children's capacity for emotional regulation is underpinned by their ability to reflect on and control their thinking and emotions. This study aimed to examine if children's engagement in a memory game is associated with their emotional regulation capacity.

Children aged 6- to 11-years-old played a memory game where they had to search for coins under a circular array of cups and could rely on puppets and tokens to remind them where the coins were hidden. The children then participated in a disappointing gift task where they first received a toy they liked and then received a toy they did not like. The children's responses to the two toys were observed and recorded as a direct measure of emotional regulation.

We found that children in the study demonstrated an ability to exert control over their thinking, such that they effectively used the tokens and puppets to make it easier to find the coins. On the disappointing gift task, children also showed more negative emotions for the unwanted toy than for the wanted toy. Our study is one of the first to directly compare emotional regulation in children to their greater internal cognitive abilities. It appears that children can regulate their thinking and exert control over their mental states to self-regulate.



How do mothers of 2- to 8-year-olds talk about mental states to siblings?

Mental state talk relates to talking about desires (e.g., I want...), emotions (e.g., they are happy) and thoughts (e.g., they know that...). Research indicates that mothers who talk more often about mental states and explain the cause of mental states (e.g., they are happy because they won the game) have children that are more advanced in their social understanding. Social understanding is important for peer relationships and social skills. Generally, mothers are found to adjust the way they speak according to what a child knows and understands. This study investigated whether mothers adjusted the amount of talk and explanation of mental states when speaking with older or younger siblings.

Sibling pairs (aged between 2- and 8-years-old) and their mothers participated in this study. We recorded conversations about wordless picture-book. We expected mothers to display more frequent and explanatory talk about mental states when speaking to an older sibling than a younger sibling.

Unexpectedly, mothers talked more about mental states with younger siblings than older siblings. Perhaps this is because storytelling with older children quickly becomes more conversational rather than simple story telling. Our ongoing research on this topic will help us explore what factors of a child's development (e.g., language ability) or the nature of the interaction are associated with mothers' talk about mental states to their children.

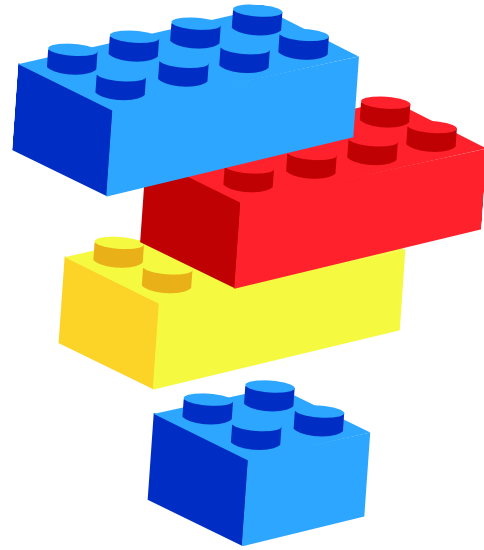


How do children aged 4- to 9-years-old think about others' decisions?

When making moral judgements about someone's behaviour, we often consider what they could have done differently. Someone with more choice is judged more harshly than someone without no choice. "Choice" here involves whether a person could have (or couldn't have) pursued a different course of action than the one taken. Therefore, moral judgements assume a person has a capacity for counterfactual thinking, which refers to the ability to think about how the past may have turned out differently.

We ran a study that aimed to confirm the role of counterfactual thinking in children's moral judgements. We investigated this by asking children to judge the behaviour of four characters who were asked to bring a gift to a friend's Lego party. Critically, the characters were aware of the host's preferences – they like Lego but do not like Playdough. Two of the characters had a choice of the toy they selected to bring to the party and could either have chosen to be nice and bring the toy the target likes (i.e., Lego) or determined to be mean and bring the toy that the target dislikes (i.e., Playdough). The other two characters had no choice in the toy they got as only Lego or Playdough was available.

The study provided evidence to suggest that 6- to 9-year-olds, but not 4- to 5-year- old's can counterfactually consider a person's intention when morally considering their behaviour. 8- to 9-year-olds demonstrated an ability of this cognitive process. Results from this study indicate that the ability for counterfactual thinking is important for making moral judgements and supports findings that children begin to think counterfactually from around the age of 6-years-old.



How do rituals influence 3- to 6-year-olds magical beliefs?



Engaging in rituals is a uniquely human behaviour that has been found to serve several purposes. Previous research has found a strong association between magical beliefs and engagement in ritualistic action. However, we know little about whether rituals are causally related to children's acquisition of magical beliefs.

Our study aimed to investigate whether engaging in a ritualistic action made 3- to 6-year-old children more likely to believe an object to be magical. Children were assigned to one of two conditions; Ritual or Instrumental. All children were presented with two identical objects and told one of them was magical. In the ritual condition, a demonstrator ritualised one of the objects and performed matched functional acts on the other object. In the instrumental condition, practical actions were performed on both objects. The children were then asked which of the object they thought were magical. Next, a second demonstrator challenged their novel belief, provided a conflicting function of the object and breached the normative rule. Lastly, the child was asked again which object was magical to see if they had taken on board the contradictory evidence.

The results suggested that children more often believed an object was magical if paired with ritual actions compared to instrumental actions, and imitated ritual actions much more than instrumental ones.