THE UNIVERSITY OF QUEENSLAND
AUSTRALIA

Early Cognitive Development Centre
School of Psychology

ECDC RESEARCH RESULTS

2015 Edition

All of us at the ECDC would like to sincerely thank you for participating in our studies. You have not only increased our knowledge about children's development, but also assisted our students in obtaining their degrees at both the postgraduate and undergraduate levels. We hope you enjoy reading about our recent research results for 2014 in this edition of our newsletter.

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Why are children so good at picking up new languages?

As adults, we typically find it very difficult to learn a new language, but for children, this seems to come rather naturally. In particular, one of the most challenging aspects of secondary language acquisition in adulthood is the attainment of native-like pronunciation. But why is pronunciation—an aspect of language that children acquire effortlessly when learning their native language—so hard to learn as an adult?

This study investigated how children's willingness and ability to copy other people (i.e., imitation) may play a role in the acquisition of native-like pronunciation. Imitation is one of the primary ways through which children learn how to navigate the world around them, but its role in pronunciation acquisition is unknown.

While adults who are learning a new language may feel self-conscious and uncomfortable about imitating the exact tones and nuances when trying to speak the language, children seem to find joy in imitating other people, even when they do not understand the significance of the words or actions that they imitate.

Therefore, we predicted that children's inclination and comfort in imitating what and how others speak guides their pronunciation acquisition. We also explored how children's inclination and comfort in imitating other people's actions is related to their imitation of words.

To test these possibilities, we had 3½-year-old children take part in this study.

The experimenter demonstrated unique actions using a set of toys, and children were given the opportunity to interact with the toys. We observed children's willingness to copy the experimenter's actions, and if so, how precisely they would copy them.

The experimenter also introduced children to unfamiliar objects and named them using non-English words. Children were then given a chance to say the words themselves.

We found that children, who were more comfortable at spontaneously imitating what other people say, were able to pronounce the non-English words more accurately. Additionally, these children also seemed to know more English words in general (i.e., greater receptive vocabulary).

Surprisingly, there were no relations overall in children's inclination to copy other people's actions and to copy other people's words. These findings suggest that imitation may be a means by which children learn both the pronunciation and meaning of new words.

Is 4 year-olds' learning influenced by the fair or unfair behaviour of a teacher?

"Children are sensitive to the unfairness and the disadvantage of the other children"

The present study, investigated the impact of being treated fairly or unfairly on children's learning.

There are very few studies that have investigated this topic; however, there is evidence to suggest (unsurprisingly!) that children react negatively to being disadvantaged by a distributor. There is also evidence that children prefer distributors who have favoured them to distributors who have treated them fairly when in a competitive context; however, they prefer fair distributors when the context is not competitive.

The present study aimed to investigate how being treated fairly or unfairly (either advantaged or disadvantaged) influenced learning.

An experimenter used puppets to act as characters in the study: a puppet 'allocator' of treats (stickers) and a 'recipient' puppet that received stickers along with the child. The distribution of the stickers was either fair (the child and recipient puppet received the same number of stickers), unfair where the child received more stickers than the recipient puppet or unfair where the child receive fewer stickers than the recipient puppet.

Both puppets then taught the child how to retrieve a toy from a puzzle box, taking turns to demonstrate different, but equally difficult and complex methods. The child was then provided the opportunity to retrieve the toy and we investigated which puppet they chose to copy.

We found that when the sticker allocation was fair or the child was disadvantaged there was no overall preference for either the allocating or recipient puppet's method of opening the box. However, when the child was advantaged, children copied the recipient puppet significantly more.

This was an unexpected finding, however we suggest that it may be that when the child observes the recipient puppet being disadvantaged they perceive the allocating puppet to be ostracising the recipient puppet and act to show affiliation with it.

Previous research has shown that children respond to ostracism by increasing their copying behaviours.

This is interesting as it suggests that despite accepting the unfair distribution, children are sensitive to the unfairness and the disadvantage of the other recipient, whereas previous research has suggested that children's acceptance of unfair advantage indicates insensitivity to the disadvantage of other parties.

Who children choose to learn from and how they respond to situations of inequity are complex, and we show here how these two approaches to engaging with others can interact in unexpected ways.

Why is it so hard to get 4 – 7 year-olds to practice?

Practicing new skills and knowledge is an incredibly important strategy that we teach children from a young age. From the time they first enter formal schooling, children are pushed to practice reading, writing, and mathematics even outside of school hours. Many children are also enrolled in music and sporting lessons at this time.

We know that starting to practice skills from a young age can have huge benefits, from helping a child's self-control, to contributing to success in later life, and even influencing brain development. But motivating a child to practice can be a real struggle. Our research aims to discover why, and whether there is anything we can do differently to help children practice from an early age.

Children's understanding of practice, as well as their ability to practice, has never been scientifically investigated before. So this past year, our goal was to find out:

1) When children start to talk about practice.
2) At what age children understand what practice is, why it is important, and what sorts of activities it can help with.
3) When children start to spontaneously practice to improve their own skills.

Our study is still ongoing, but what we've found so far is surprising. While most 5-year-olds talk about practice and seem to understand what practice is and what sorts of activities it can help with, even 6-year-olds struggle to actually practice skills themselves.

There are a number of reasons why young children may struggle with practice, and this is what we hope to explore further throughout 2015.

It may be that young children are still very present-orientated and they don't spend a lot of time thinking about or preparing for the future. It may be that they simply forget their intentions to practice. It may be that they have trouble monitoring their own skill development and underestimate their need for practice. It may be that they lack the self-control needed to persist at a repetitive and perhaps boring task. It is likely to be a combination of these factors.

The implications of this research are important and may influence how we teach children to regulate their own learning. If you'd like to be involved in this research and have children aged 5-, 6-, or 7-years old in early 2015, please email Melissa at m.brinums@uq.edu.au.

"Most 5-and 6-year-olds talk about practice and seem to understand what practice is but struggle to actually practice skills themselves"

Do 4-year-olds know the difference between right and wrong when making a decision to copy someone?

Children imitate the behaviour of those around them for two reasons: to learn new skills and to be social. Children are also strategic in whom they choose to copy. For example, children tend to imitate trustworthy and competent people over those who are not.

Everyday, children observe people who vary on a number of qualities. These qualities can include competence, but they can also include moral aspects (such as sharing or stealing).

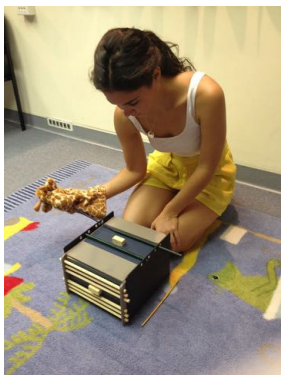
To date, no-one has investigated how the moral character of an individual influences a child's decisions to imitate and learn.

With 4-year-old children, we are currently investigating whether the moral aspects of another's behaviour influences children's decision to imitate.

Children who participate watch two agents (either puppets or experimenters), one acts morally (i.e., shares and helps) and the other acts immorally (i.e., steals). The agents then demonstrate a new skill in different ways. Following this, the child is given an opportunity to try the new skill.

By looking at who the child chooses to copy, this research will contribute to our understanding of how children learn.

As this research is still currently in testing phase, results will be made available once testing is finished.



"Children tend to imitate trustworthy and competent people over those who are not"

Can book reading help 15-month-olds understand counting?

"Between 15- and 18-months-old there is a crucial period of development for understanding correct counting and will benefit substantially from being exposed to counting every day"

Counting is learned throughout the first several years of life and is the foundation for all future mathematical skills. We have previously learnt in research that 18-month-old infants understand two of the rules necessary for correct counting even before they are able to count for themselves.

18-month-old infants understand that when we count, we must recite our count list in a stable order and we must use one-to-one correspondence as we point and count the objects in a set. However, 15-month-olds' do not understand these rules. We have also found that the extent to which an infant understands these counting rules is related to the amount they are exposed to counting in daily life.

In our study, we invited 14-month-old infants and their parents in to participate in a training study on counting. All infants played a Magic Buttons Game and watched a counting video testing the two rules of correct counting. Infants went home with a training book to read daily and returned 4 weeks later to play the games again. Some infants got a counting book, and others got a book about the body. We expected that increasing the amount of counting a child hears in their daily routine would increase their understanding of the counting rules.

We found that the training did not influence the infants' understanding of the counting rules. It is possible that while 14-month-old infants may be developing an understanding of counting during the training period, they may not have formed a strong enough comprehension of correct counting over the short training period of 4 weeks.

However, given that we know infants do understand these counting rules as little as 12 weeks later, this indicates that there is a crucial period of development for understanding correct counting between 15- and 18-months-old. It is during this period where infants can benefit substantially from being exposed to counting in daily life and suggests that we should be engaging in counting activities with infants often.

Do 3 - 5 year-olds understand rituals as being socially important?

"5-year-olds are beginning to become increasingly aware of abstract social rules"

Humans of all ages and all cultures participate in rituals. We use them in formal settings, to ease personal anxiety, for luck, out of habit, or to demonstrate our group associations. Rituals are universal, but how do we come to understand their significance, and what effect do they have on the world? After all, they're just a series of strange movements performed for reasons that are not always obvious. We expect that understanding and interpreting ritual is an advanced social skill that isn't fully developed for many years.

In answering this question we were fortunate enough to work with nearly 70 3- and 5-year olds this last year. Those who participated played a number of games with me while we watched a third person perform a ritual (or a similar non-ritual act) over bowls with chocolate (or stickers) in them. We offered children the opportunity to collect a chocolate from one of the three bowls present. We expected that – if children understand rituals as socially important – they would treat the ritualized bowl differently from other bowls. It turns out that when 5-year olds witness a ritual they tend to avoid that bowl. It's not that they're afraid or distressed; we speculate that they recognize the act is socially significant, and that children sensibly take a conservative approach to this apparently special object.

We believe this demonstrates that at 5-years children are beginning to become increasingly aware of abstract social rules. Some objects are special in invisible ways, and ritual seems to be able to make those objects special. We expect this awareness is not fully developed until the age of 7, but its clear that as children get older they are increasingly aware and savvy social operators.

Could this study assist development of a programme to reduce social problems with ASD?

In our society, understanding and respecting the ownership of objects is an important social skill. For example, understanding ownership helps us to avoid faux pas, such as using someone else's toothbrush, as well as more serious property violations, such as theft.

Children begin to talk about ownership early, for example, we learn through childhood that toys belong to us or to others, but may be shared. However, is not yet clear when children first begin to show other aspects of an adult concept of ownership.

Using motion capture technology, previous studies have identified subtle and consistent differences in the way adults interact with objects they own, compared to objects another person owns.

Our study hopes to identify and track the development of ownership concepts in children aged 2-6 years, and understand how this influences their behavioural interaction with property.

Our study involves playing a series of games with the children to observe how they generally interact with objects. Children are then given a drink bottle to take home and use for several weeks – as a reward and as part of the experiment.

Parents and children then return approximately two weeks later and we play additional games with the children while observing their actions in more detail using motion capture cameras. Reflective markers are placed on the drink bottles the child interacts with during a reaching and lifting game.

The motion capture cameras track only the movement of the markers, but do so with great precision so that we can describe how the movement unfolds, and pin-point behaviour which is not apparent through observation.

Our study also aims to compare the development of ownership concepts of typically developing children and with children diagnosed with autism. Children with Autism Spectrum Disorder (ASD) tend to handle objects that do not belong to them. This can cause negative social interactions, involvement with the law, and can be a major burden for carers.

We predict that the development of the concepts 'mine' and 'not-mine' in children with ASD may differ from that of typically developing children. This may lead children with ASD to commit property transgressions that put added pressure on their strained social interactions.

We aim to identify whether this problem may be a result of a delay, or a deficit in developing a concept of ownership.

We anticipate this research will increase understanding of these problematic behaviours in ASD, and facilitate the development of intervention programmes to reduce such problematic social interactions.

This study is a continuation of Sam Spark's research investigating ownership behaviour in children.

We are currently still in the testing phase of our study and anticipate results will be available once testing is finished in late 2015.

"We predict that the development of the concepts 'mine' and 'not-mine' in children with Autism Spectrum Disorder (ASD) may differ from that of typically developing children"

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Please visit us on Facebook to see what studies we are currently running and if you are interested in participating with your child, you can also register your interest on our website below.

Why are 4-year-olds such poor tool innovators?

"This is important new information that sheds light on the development of one of the most important features of human psychology"

"Young children can engage in tool innovation, so long as they are given some information about what can be done or given simpler innovation tasks"

Humans use tools with a depth and complexity that is without comparison in the animal kingdom. In fact, from a very young age children are remarkable tool users and manufacturers.

However, tool innovation (the construction of a new tool or the application of an old tool to solve a problem) is extremely difficult for young children, who continue to perform poorly even into their primary school years. Given children's early emerging tool using and tool making abilities it appears that young children should be able to innovate. Hence, two separate research studies investigated why children are such poor tool innovators.

One explanation that both studies addressed is that past studies have presented tool innovation tasks in scenarios where children may anticipate that they are to be taught something, and hence they don't consider the possibility that they could invent a solution of their own. Both studies assessed tool innovation in children aged 3.5-5.5 years old, where tasks were presented in a structured teaching context or not, manipulating a non-teaching context in different ways.

Firstly, no differences in children's success on innovation tasks was present when they were administered in a playful way, in contrast to a structured teaching way. This is perhaps due to children's individual differences in their typical propensities for play, in that the benefits of a playful environment may have only been evident for children that are typically very playful.

Secondly, contrary to hypotheses, children performed slightly better on the innovation tasks when placed within a structured teaching context compared to a non-teaching context where children had to modify a tool to help a 'naïve' experimenter retrieve a hidden toy. This may be due to children's heavy reliance on teaching interactions to direct attention and increase motivation towards the task requirements.

Another possible explanation for children's difficulty with tool innovation is that children may simply lack ideas about how different objects can be modified in order to create a tool appropriate for the problem.

Hence, one study assessed tool innovation when half of the children received a demonstration, highlighting how different objects could be modified to create an appropriate tool. Consistent with predictions, children performed better on the innovation tasks when they had observed a demonstration showing how objects could be modified. Hence, by providing children with added information about the affordances of task materials, we may encourage an innovative capacity in young children.

The final possible explanation assessed in this pair of studies was perhaps the type of innovation required by children in previous experiments was particularly difficult, and children might be able to achieve a simpler form of innovation. Thus, one study assessed whether children were able to innovate when objects required a theoretically easier subtraction method, in comparison to a more difficult reshaping method.

There was some support for the hypothesis, in that children were more successful with some tasks requiring a simpler form of innovation. Although these results were not strongly conclusive, they provide important insight into the different levels of difficulty in tool innovation.

In combination, these two studies demonstrate for the first time that young children can engage in tool innovation, so long as they are given some information about what can be done or given simpler innovation tasks. This is important new information that sheds light on the development of one of the most important features of human psychology.

Do babies react to what someone else feels?

Our ability to feel what someone else is feeling is called emotional contagious responding and it is related to our ability to empathise. Several studies have explored this ability in infants and have found that infants only a few hours old will cry when they hear another infant crying. These studies suggest that even newborn infants show emotional contagious responses!

Our study aimed to build upon this research by exploring 6.5- to 9.5-month old infants' behavioural (i.e., facial expressions) and physiological (i.e., heart rate) responses to negative (infants' crying) and also to positive (infants' laughing) emotional stimuli.

Infants listened to audio-recordings of other infants crying and laughing, as well as two non-emotional control recordings to make sure that responses were based on the emotions that crying and laughing sounds convey.

While listening to the recordings, they had their facial expressions and heart rate measured to assess their emotional contagious responses. For example, emotional contagious responses to the sound of infants crying might be evidenced by infants' sad facial expressions and an increase in heart rate.

In addition, infants were observed during mother-infant play periods to investigate the effect of maternal responsiveness on their emotional contagious responses.

Unfortunately, we could not establish any meaningful findings from the heart rate data given issues with the equipment used.

We did, however, find that infants exhibited emotional contagious responses to the laughing recording; that is, infants smiled and laughed in response to this recording. In contrast to previous findings, the infants in oue study did not seem to exhibit emotional contagious responses to the crying recording. There was no relation between infants' emotional contagious responses and maternal responsiveness.

In conclusion, our study suggested that 6.5- to 9.5-month old infants experienced emotional contagious responses for positive emotions, suggesting that others' positive emotions can have a positive effect on infants' moods, but such an effect may not exist at this stage, or may not be as strong with negative emotions.

"Positive emotions from others can have a positive effect on infants' moods"

Do 4 - 5 year-olds understand the function of tools?

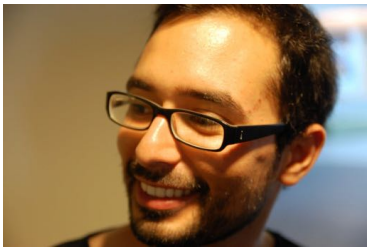
In everyday life, we use many specialised tools for specific purposes. In doing so, we often use a tool specifically for its socially accepted function, rather than alternatives for which it may be equally suited.

For example, even though we can use a glass for several things we tend to use it exclusively for drinking. We are interested in how children come to understand the function of tools.

In this study, children are told a story about a character who is trying to use a novel tool for its socially accepted function but fails. At the end of the story children are asked about the function of the tool (What do you think this tool is really for?).

We have found that 4- to 5-year-old children prefer a socially accepted function to an alternative function even when the tool seems not to be working for this socially accepted means.

This shows the importance of social information for children's reasoning about tools and how they are to be used.
This study will help us to understand how children use tools and what pieces of information they process when learning to use them.



"It doesn't appear that 5-year-olds acquire any new physical skills by watching themselves or others perform well on video"

Do 3-year-olds anticipate actions based on others' unspoken desires and beliefs?

" 3-year-olds are able to anticipate actions based on others' desires, beliefs and false beliefs, respectively"

In our social world, interaction with others is vital. Our human capacity for seamless interaction relies on our being able to anticipate other people's actions based on their intentions, desires and beliefs.

Children typically start to explicitly express their understanding of others' beliefs and desires around the age of 4. For instance, they will say things like "She wants a lolly" or "He doesn't know where they're hiding." However, these explicit expressions strongly depend on their language ability.

This study examined whether or not children understand what is in other people's minds implicitly even if they do not show it explicitly in language.

To do this, we presented a Y-shape tunnel with a doll at one end, and two different objects at the other ends. In one version of the test, two foods were at the ends of the tunnel. We asked the children which food they would prefer (it was generally the biscuit), and then told them that the doll wanted to eat other food (e.g., the banana).

For the test, we said that the doll was ready for morning tea, and then the doll entered the tunnel. Now we observed children's eye gazes to the tunnel exits, to find out if they would anticipate the doll's action (exiting the tunnel) based on its desire (to eat the banana). We also asked the direct question "What does the doll want to eat for morning tea?"

So far, we have found that children's eye gazes and verbal responses tend to agree. That is, if children can say that the doll wants the banana, then they tend to look toward the exit where that food is located. If they can't answer the question correctly, then we find that their eye gaze is random.

This was not what we expected, because other studies indicate that children's eye gazes reveal precocious knowledge and explicit verbal responses come later. Therefore we are doing more research with the tunnel. Thankfully, children seem to enjoy this game!

Do 4 - 5-year-old children copy based on action-intention or action-outcome?

Whose actions do children prefer to copy?

We know that children learn by copying those around them, but which, and more importantly, whose actions do they choose to copy? In the past we have shown that children prefer to copy the group over an individual, but not if the individual is more successful.

Our current research follows on from this, investigating whether the nature of the modelled actions comes into play.

We are investigating the behaviour of four and five year old children when provided with two different methods to engage with a puzzle box.

The individual successfully opens the box, while the group either (a) actively fails to open the box or (b) interacts with the box in a purposeful manner, without actually opening it.

The study may reveal whether the intention behind a model's actions influences children's choice of whom to imitate. Testing is still underway for this study, and results will be available upon completion of the experiment.

If you would like your child to participate in this study, please email Matti at matti.wilks@uqconnect.edu.au

Could moving in time together improve the social behaviours of children with ASD?

Joint music-making is an important part of human culture that serves many social functions.

Research has suggested that engaging in joint music-making can improve the social behaviour of typically-developing pre-schoolers by promoting joint attention and collaboration. It is unclear, however, what specific aspect of music-making drives this effect.

We focused on the most fundamental aspect of music (the beat) to investigate whether the benefits of joint music-making extend to children with Intellectual Disability (ID) and/or Autism Spectrum Disorder (ASD).

Children aged 5- to 9-years-old who had either ID alone, or ASD with comorbid ID participated in this experiment, along with a group of typically-developing 4-year-old children who matched the verbal ability of the clinical group.

All children engaged in a joint drumming, or joint colouring activity with an experimenter. The key difference between these activities was the presence (in the drumming condition) or absence (in the colouring condition) of a central beat.

After completing one of the two activities, children were faced with three situations in which they could demonstrate improvement in social behaviour by helping, sharing with, or comforting the experimenter.

If the beat element alone was sufficient to promote the social effects of joint music-making, overall, children who engaged in the drumming activity should act more social, behaviourally, than those who engaged in the colouring activity.

Results showed that overall, children's improvement in social behaviour did not differ whether they engaged in the drumming or the colouring activity. However, children in the clinical group did perform better than expected on the social behaviour tasks, suggesting that both activities may have had an equally positive effect on their social behaviour.

It is likely that the similar aspects of each activity (the collaboration and social context involved) may have been driving these effects. This finding should help to inform the design of future therapy or interventions that aim to improve the social behaviour of clinical groups of children.

"Moving in time together with another person appeared to improve the social behaviour of children with ASD"

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Training newborns to imitate: Can parents increase newborn imitative responses?

"Tongue protrusion imitation can be accounted for by associative learning and that early social experience improves newborn imitation"

Newborn imitation is the term used to describe when a baby within the first four weeks of life imitates an adult's modelled action. Whether or not newborns have this ability has been the focus of considerable research efforts and much theoretical debate over the past three decades.

It has been argued that imitation is the foundation for all later social learning, and considering imitation and observational learning are essential methods by which humans learn, change behaviours and interact with others it is important to try and understand more about this phenomenon.

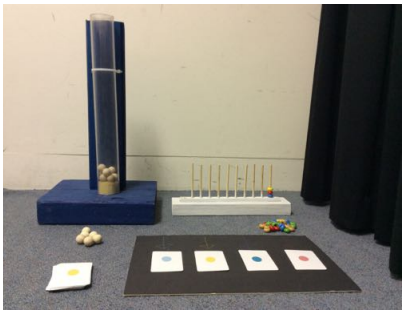
This study sought to establish whether parents can increase infant imitative responses by training their infant on a specific gesture. 36 parent-infant pairs participated in an imitation training study. Prior to training, newborns were tested on an imitation task at approximately 1 week of age. Four different gestures were presented to the babies: tongue protrusion, mouth opening, the end of a wooden spoon protruding through a tube and a box opening (these last two were chosen to see if babies also responded to non-social stimuli).

The newborns and their parents were then randomly assigned to one of three training groups, where they undertook a program of daily training with tongue protrusion, mouth opening or hand grasping. After a fortnight of training, infants were reassessed on the imitation task.

Results show that the imitation levels of babies in the hand grasping and mouth opening groups stayed the same and were not statistically affected by training. However, babies in the tongue-protrusion training group significantly increased their imitation of tongue protrusion after the fortnight of training.

These findings have serious implications for how we understand newborn imitation research. This study provides the first evidence that tongue protrusion imitation can be accounted for by associative learning and that early social experience improves newborn imitation.

Are children and adults rational when completing tasks?



"It is unclear whether or not children demonstrate this bias or whether it is unique to adults"

Research into human decision-making reveals a number of biases that can affect what we choose to do. One such bias is known as the sunk cost effect.

The sunk cost effect is our tendency to persist with something because we have previously put time, effort, or money into it. Rationally, only the future costs and benefits of putting more resources into something should matter because our prior investments are irretrievable. Sometimes this means continuing, but often it means stopping and doing something else. Imagine you've spent thousands of dollars on a project that isn't working out. You might continue to put money into it in hopes of gaining something. In reality, stopping might be better.

It is unclear whether or not children demonstrate this bias or whether it is unique to adults. As part of a project in 2013, we used behavioural tasks as a way of seeing whether 4-year-old children would show this effect. Children were presented with three tasks that required them to invest their time and effort to complete. After a predetermined amount of time, we would stop them and give them the opportunity to switch to easier versions. The results showed that children were equally likely to switch or continue the task, regardless of the effort or time invested.

We are currently conducting a study with adults to see when they show the sunk cost effect. To expand and develop suitable tasks for children that might reveal the effect, we are using behavioural tasks on adults as well. Participants are presented with three tasks and at a predetermined level of completion; they are then given the option of either stopping and receiving a small money reward, or continuing to gamble for a larger reward. Some participants are given this choice prior to starting any of the tasks. Participants who are susceptible to the bias may be more likely to continue after completing some of the task first.

These results will help us to better understand our decision-making and when it occurs in development.