thinklab Newsletter

Spring 2018

Hello from the UTD Think Lab!

We have been hard at work studying how children learn, think, and develop. As another school year comes to a close, we thought we would share some updates with you regarding our completed and ongoing research projects!

Inside this newsletter, you will find summaries of some of our most recent findings, publication updates, and lab news. Additionally, we have included some information about our current projects and upcoming testing plans. If you know another family or school that might be interested in participating in these projects—feel free to send them our way! We are always interested in working with families and their children.

We would like to thank you again for your participation in our research projects and continued support of our lab!

All the best to you and your family,
The UTD Think Lab

Contact Information

If you have any questions, would like to learn more about the lab, or would like to participate in one of our current studies, feel free to visit us at:

http://www.utdallas.edu/thinklab/

Like us on Facebook!
https://www.facebook.com/UTDallas.thinklab/

Call us at: **972-883-6075**

Or email us at utdallas.thinklab@gmail.com

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In this issue:

* Numbers correspond to citations for our published articles or poster presentations -- listed on the last page!

Think Lab at the University of Texas at Dallas
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What do preschoolers understand about biology?

"How do caterpillars change into butterflies?" "How does food help keep us alive?" "How do flowers grow?" During the preschool years, children ask a lot of questions about biology and the natural world. Although we know from past research that young children ask a lot of questions about biology, less is known about how young children make sense of the answers they receive from adults. Thus, it is important we understand more about what children accept as good information to determine what role children play in their own learning about the world.

In this project led by doctoral student Kaitlin Sands, we aimed to discover if 4-, 5-, and 6-year-old children could recognize the difference between different quality explanations about biological process for a variety of animals. Children heard questions someone asked about these biological processes and different quality explanations to answer those questions. For example, children were told that when a cheetah runs, it can go really fast. Then were then told that someone asked, "How does a cheetah run really fast?" They were then provided a number of explanations such as, "The cheetah runs and runs so that it can go really, really fast" and "The cheetah has a long and stretchy backbone that pushes it forward so the cheetah can run really fast." Then, children decided how well each of these explanations answered the question that was asked about that animal. Once children rated all of the explanations for the different animal processes, they played a few different games to assess their verbal skills and general biological knowledge.

We found that overall, children's ability to distinguish between different quality explanations changed based on how old the children were. Four- and 5-year-old children thought all responses were ok at answering biological questions regardless of whether they were high or low in quality. On the other hand, 6-year-olds were much better at distinguishing between the explanations. They recognized that some explanation types were very good at answering the question, some were only ok at answering the question, and other types were not good at answering biological questions. We also found that children with higher verbal skills and more prior biological knowledge were better at distinguishing which explanations were really good and really poor at answering biological questions. Thus, it seems that children's age, verbal skills, and prior biological knowledge all play a role in children's ability to discern the quality of explanations they hear about biological concepts.

Follow-up studies plan to look into why 4- and 5-year-olds did not distinguish between the different types of explanations. We hope that these studies will allow us to see what young children actually understand about biology during the early years so that we as adults may be able to better engage with young children about biology in ways that most enhance their learning.

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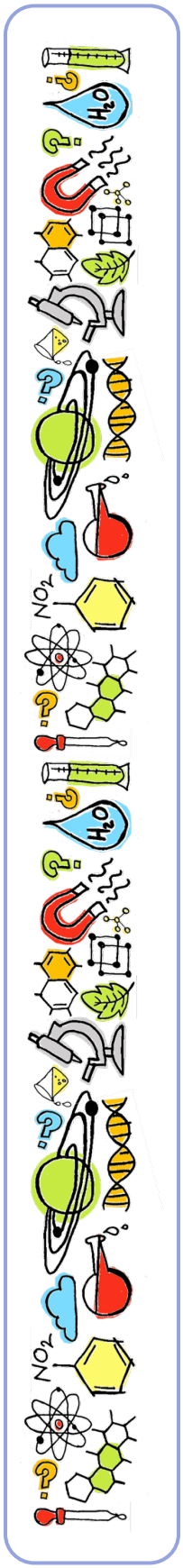
Is high quality information really worth the wait?

Preschool is a time where children are learning a lot of new information. There are many things that preschool children do know; indeed, they are incredible learners. That said, preschool children do not know everything, and they may need to gather information from others with more experience. Children often go about gathering information by asking questions, and they need to make decisions about who the best person to ask is. Past research has shown us that 4- and 5-year-old children understand at least some things about expertise (e.g., understanding that a doctor knows about medicine) and can recognize what questions an expert may be able to answer. But what if that expert is not easily accessible? For example, if children have to wait or have to complete some sort of task (e.g., finishing homework, doing chores) before they can gather information, will children think that gathering information from the best quality source is worth it?

For this recently completed dissertation project by Dr. Sydney Rowles, we sought to understand how children gather information from experts when those experts are not equally accessible. Children were introduced to two puppets (a doctor and a car mechanic) and heard different questions. These questions fell into 3 categories: questions about medicine/the human body, questions about cars and vehicles, and questions about local government (and thus unrelated to either a doctor's or car mechanic's area of expertise). Children were asked to decide which expert they wanted to answer each question for them. Importantly, children could not freely choose between both experts equally: children could go to one of the experts immediately, but the other expert would come at a "cost". For this "costly" expert, children either needed to wait for 30 seconds or they had to complete an effortful task (sorting pom-pom balls) before they could give him a question. After children assigned all of the questions to the expert puppets, the puppets answered those questions and children received a sticker for every correct answer. We wanted to see whether children were willing to pay a "cost" in order to gather the best quality information. Finally, children completed a number of other measures, which tapped into more general differences among children that may explain different responding patterns (e.g., verbal skills, working memory skills). We were particularly interested in examining children's inhibition skills: children's ability to inhibit a response (i.e., think carefully before acting).

We found that children are, at times, willing to pay a cost in order to receive good information. That said, children by far preferred giving questions to the non-costly expert than the costly one. And for questions within the costly expert's domain (e.g., questions about medicine for a doctor), children still gave that expert his related questions only about half of the time. In other words, children recognized that they should sometimes go to the expert that came at a cost, but did not do so *every* time it was appropriate. We also did not see a difference between when the cost was a 30 second wait or sorting the pom-poms; children responded mostly the same regardless of whether time or effort was the primary cost. Finally, we found that inhibition skills played a role in how willing children were to pay a cost. Children who had better inhibition skills were more likely to go to the costly expert when he was the appropriate expert.

These findings have allowed us to understand more about how children gather information in the face of costs. It may be beneficial for us to help children understand that although not all good information is immediately accessible, it is worth the time or effort it takes to gather it.



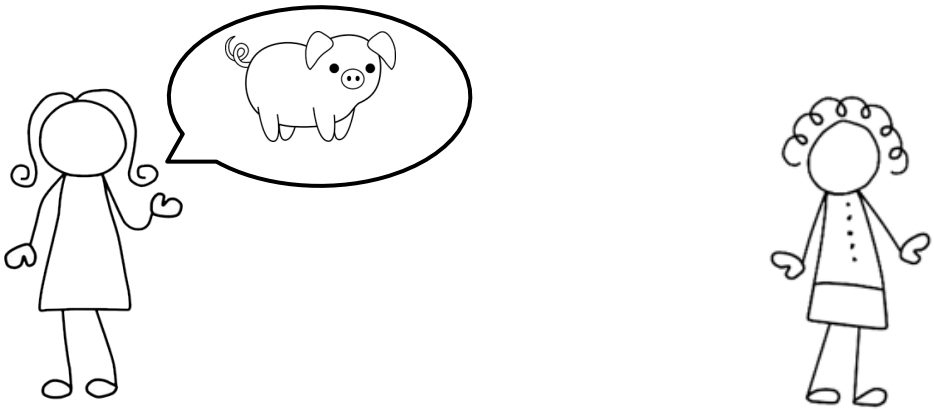
Explanations and curiosity

Interest in scientific concepts and curiosity in science are important factors that influence whether children will choose scientific degrees or careers later in life. But in order to understand science, children need to evaluate the explanations they receive about scientific concepts. Previous research has found that starting at the age of 5, children have a preference for explanations that provide new, additional information for biological questions compared to explanations which repeat the information from the question without adding any new information (Baum, Danovitch, & Keil, 2008). This study, and others like it, found that children can choose which explanation is better when given two choices, but these studies don't determine whether a child can tell the difference between a good explanation and a poor explanation without the presence of another explanation to weigh it against. Our study set out to determine whether children would not only recognize when they encounter an explanation with a gap in information, but also whether that gap in information motivates them to seek more information.

In our study, children ages 7-10 listened to "how" questions about animal behavior. They then heard answers to the questions that were either complete or had some information missing (known as gap explanations). At the end of the study, children were shown animal trading cards featuring the animals in the study and were allowed to take any home that they would like. After choosing the cards they wished to take home, the children also completed surveys asking about their interest in different topics and their science curiosity, measures of their verbal skills and executive function, and a test of their biological knowledge. While the children were in testing, parents completed tasks and questionnaires about science, their child(ren), and their family background.

This study is still ongoing, but preliminary results suggest that most children are able to discern when an explanation is missing information, and 10-year-olds are slightly better at this distinction compared to 8-year-olds. We also found that children reported that they knew more information when they heard a full explanation compared to explanations that were incomplete. Similarly, children were more likely to take home the animal cards for the animals that they previously heard gap explanation for. These results indicate that children can tell when an explanation has missing information, and they seem to be motivated to gather more information to close that gap.

This study was part of our three-year grant through the **National Science Foundation**! In upcoming projects, we will be working with a few local classrooms to help children better evaluate the information they receive. We are working collaboratively with Dr. Judith Danovitch from the University of Louisville on this grant. To stay up to date on this project, please visit our lab website at www.utdallas.edu/thinklab/news/



Participate!

Families and schools with children between the ages of 4 and 10 are invited to join our research family.

For our projects, children play games and/or hear short stories and answer some questions about them. Our studies involve a one-time session that lasts between 30 and 90 minutes, depending on the study.

These sessions take place at our lab at Green Hall in Richardson, where convenient free parking is provided. We also interview children at local daycares and after school programs. Most studies involve a small toy or gift for your child and parents receive helpful information about child development. Our families tell us that the experience is enjoyable and interesting for children, parents, and teachers!

A big thank you to last year's participating programs!

Campbell Rd KinderCare
Kids USA Montessori
Messiah Lutheran Lambs
North Star Learning Center
Saint Andrew's Children's Center

About Us

The UTD Think Lab is located at the University of Texas at Dallas, and is under the direction of Dr. Candice M. Mills.

At the Think Lab at UTD, we seek to discover knowledge that will contribute to the healthy cognitive and emotional development of our children, and we are looking for schools, parents, and children to take part in important and fun research studies on child development. Much of our research focuses on issues related to the development of critical thinking skills. We believe that this research can help educators, families, and scientists understand important aspects of how children think, learn, and develop.

Article Key

1. Rowles, S. P., & Mills, C. M. (under review for revise and resubmit). How children weigh competence and social engagement when seeking help from others. *Cognitive Development.*

2. Mills, C. M., Sands, K. R., Rowles, S. P., & Campbell, I. L. (under review). "I want to know more!": Children are sensitive to explanation quality when exploring new information. *Cognitive Science.*

Posters Presented This Year:

3. Sands, K. R., & Mills, C. M. (2017, October). *Accepting or discerning: Do preschoolers have preferences for certain types of explanations of biological causality?* Cognitive Development Society, Portland, Oregon.

4. Rowles, S. P., & Mills, C. M. (2017, October). *How timed delay and effortful timed delay affect how children seek information from others.* Cognitive Development Society, Portland, Oregon

Center for Children and Families
Promoting optimal family and child development

We would also like to take this opportunity to remind you about UTD's **Center for Children and Families**. The center aims to promote optimal child development with research focusing on three initiatives: parenting healthy families, strengthening interpersonal relationships, and enhancing thinking and learning. Through the center, you can find out more about other groups here at UTD doing research on child development. In addition, the Infant Development Program offers screenings for children under age two and consultations for parents who may be concerned about their children's development. You can find more information about the center and other programs online at: **ccf.utdallas.edu**

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