

## Music & Movement Classes

Welcome back, Lauren Hraber! Last spring, Mrs. Hraber conducted monthly Music and Movement classes with all of the children at the Children's School. The program was such a success that we have increased her sessions to twice a month. Our first classes were held on September 24<sup>th</sup> and will continue approximately every other week for the remainder of the school year.

Lauren Hraber is an experienced preschool and elementary music teacher with a MED in Special Education from the University of Pittsburgh and a BFA in Piano Performance from Carnegie Mellon University. She spent 10 years teaching General Elementary Music in Baldwin-Whitehall, Woodland Hills, and Canton City Schools. Lauren founded Piano Tots for preschoolers and has spent the last 10 years teaching Piano Tots classes. Presently, Lauren serves as the music teacher at several preschools in the Pittsburgh area. Lauren's family includes husband Zach and 2 children - Maddy & Jax, a Children's School alum.



## Keeping Parents Informed about Research

The **Research Spotlight** section of the monthly newsletter is one way Children's School parents can learn about research in progress. Also, each time your child participates in a study that involves playing a "game" with a researcher (i.e., as opposed to merely being observed), he or she will get a **participation sticker** suggesting that you, "Ask me about the ... game" and a **study description** detailing the task. We also have **recent articles** resulting from Children's School research posted on the school web site ([www.psy.cmu.edu/childrenschool](http://www.psy.cmu.edu/childrenschool)) and a notebook of articles in the office. Feel free to contact Dr. Carver to discuss any questions you have about research.

**Observations for Psychology Assignments:** Students from Dr. David Rakison's Child Development class conduct periodic observations throughout the fall. For each assignment, they observe specific differences between preschoolers and kindergartners in motor skills, social interactions, language, etc.

**Research Methods Class Studies:** Students in Professor Anna Fisher's Developmental Research



Methods class will start with a lab entitled **The Wrong Name Game** to explore development of inhibitory control in 3 and 4 year old children. Inhibitory control allows one to suppress actions that are not appropriate (e.g., speaking out of turn in class or grabbing a toy someone else is using). This project uses the Day/Night task in which children are instructed to say "day" when shown a picture of the moon, and "night" for a sun. Undergraduates will add more task versions to better understand the conditions under which children can and cannot inhibit inappropriate responses. Later in the semester, students will work in small groups to conduct a study of their own design, which will be approved both by their instructor and by Dr. Carver.

## Research Spotlight

### The Shapes and Colors Game

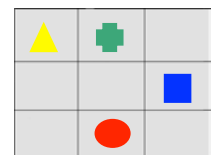
Sandrine Girard, a graduate student working with Dr. Erik Thiessen, is studying the process of statistical learning in children of various ages using an engaging, age appropriate paradigm. Statistical learning involves sensitivity to the statistical structure of the input. Unlike the spaces demarcating word boundaries in writing, words in fluent speech are not consistently marked by pauses. This makes segmentation difficult, especially for individuals (such as infants) who are unfamiliar with the words in the speech stream. However, infants and adults can use a statistical feature of the input to segment words: sounds within words (such as the syllables that go together to make a word) are more likely to co-occur than sound sequences that spuriously occur across word boundaries. By detecting which sounds are more likely to co-occur, learners can identify words

In this project, the researcher will ask children to watch a sequence of objects appear on the screen, one at a time and press the space bar every time that they see a grey circle. At the end of the video, children are asked to decide which group of objects should go together. To accomplish this task, children have to learn the particular grouping of objects in the video stream. If children learn the groupings, they are able to anticipate the presentation of the grey circle (and so press the spacebar faster) and they are also able to identify the correct grouping of objects during the testing portion.

Children's performance in the Shapes and Colors Game will help researchers to compare the rate of learning (how fast they press the spacebar when the grey circle appears on the screen) and the outcome of learning (how accurate they are at identifying the correct grouping of objects). Their performance in this task will also be compared to their performance on the project called "Moving Eyes" designed to assess selective sustained attention. If parents completed the optional questionnaire on their child's language use and history, researchers can also link the child's language profile to his or her performance on the statistical learning task and the selective sustained attention task. Linking all three sets of data will allow researchers to investigate the link between statistical learning, selective sustained attention, and language background.

### The Moving Eyes Game

The world around us is complex and maintaining focused attention can sometimes be challenging, even for adults. The goal of this project in Dr. Erik Thiessen's lab is to investigate the developmental course of deliberate selective attention and to examine factors that play a role in attentional selectivity at different points in development. In this project, researchers ask children to play a game in which they see several objects moving on a Tobii T60 eye tracker (which looks like a typical computer screen) landing on one of the nine screen locations, each a different color. Children are instructed to watch a particular object while ignoring the rest of the objects. When the objects stop moving and disappear from the screen, children are asked to name the color of the grid in which the object disappeared. Children play the Moving Eyes Game several times, tracking either many objects or just a few objects at a time. Additionally, if there are technical issues with the eye-tracking hardware, a session may be begun on one day and finished on a later day. Children's performance in the Moving Eyes Game will help researchers to map the developmental course of deliberate selective attention and improve scientists' understanding of this basic cognitive ability required for successful performance in many everyday tasks.



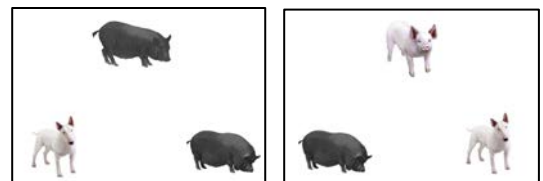
## Research Spotlight, continued ...

### The Finding Pictures Game

As children learn about things in the world around them, they also learn about how different things are related to each other. For instance, children can learn that different things are *taxonomically* related when they share features with each other (e.g., *dog* and *seal* both have fur), or *thematically* related when they are associated with the same event e.g., *dog* and *bone*). Sometimes, things can be both taxonomically related, such as *cat* and *dog*, which both share features and are often associated with each other. The purpose of Dr. Anna Fisher and graduate student Layla Unger's study is to explore how children's knowledge of these relations develops with age. During this study, children look for a specific target picture amongst an array of four pictures depicted on a computer screen that includes the target picture, a related distractor picture, and two unrelated distractor pictures. While looking for the target picture, children's eye gaze was recorded using an eye tracker. By examining children's looks towards the related distractor pictures, researchers can investigate the development and activation of children's knowledge about relationships between different things.

### The Look Alike Game

Learning to identify category membership is theorized to involve detecting the features shared by items in the same category, such as *pointy ears* and *long tail* for the category



of cats, and ignore features that vary within a category, such as *color*. The purpose of this study by Dr. Anna Fisher and Layla Unger is to investigate the effect of category knowledge on perceived similarity. In the Look Alike game, children are asked to choose which of the two animals in the bottom row looks like the animal on the top by pressing one of two buttons on a response box. On every trial, the animal on the top looks similar to one of the animals on the bottom and dissimilar from the other animal on the bottom. On some rounds (No Conflict Trials, left example above), the similar animal also belongs to the same category; whereas, on other rounds (Conflict Trials, right example above), the correspondence between similarity and category membership was reversed. Each of these sets of animals was presented both with all animal pictures upright and with all pictures upside down. The researchers predict that category knowledge will influence children's responses on this task such that they take longer to identify the animal that looks like the one on the top when it belongs to a different versus the same category, but ONLY for rounds in which all animals are presented upright. We predict that presenting animals upside down will interfere with access to category knowledge, so that it will not impact similarity judgments.

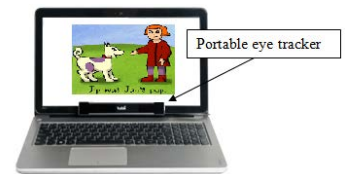
### The Odd One Out Game

In a similar study, children are shown an array of 16 pictures of animals arranged in a 4x4 grid with a dividing line down the middle on a computer screen. 15 of the pictures are identical *Distractors*, and one was a different, *Oddball* picture. The images were designed so that the Distractors and Oddball either looked very similar, or very different. The category membership of the animals was also manipulated so that the Distractors and Oddball belonged to either the same or different categories. Arrays were presented with animal pictures either upright or upside down. Researchers predict that children will identify the Oddball more quickly overall when it is dissimilar from the Distractors and when it belongs to a different category, but only when the images are upright.

## Research Spotlight, continued ...

### The Reading Game

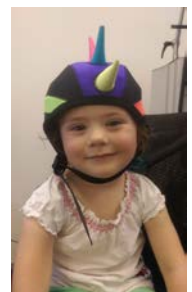
Professors Anna Fisher and Ken Koedinger are beginning a new line of research on the development of reading. Undergraduate June Walitzer is conducting an initial investigation of how reading comprehension relates to different patterns of eye gaze in beginning and fluent readers. In the reading game, each child is asked to read a short story book displayed on the screen of a laptop computer. If the child is a beginning reader, the researcher helps the child read the story to ensure a positive experience in the study. After reading the book, the child answers several comprehension questions. While the child is reading, the researcher monitors the eye gaze patterns using a portable eye tracker, depicted below. The research team is interested to determine how eye gaze patterns of children who are beginning and fluent readers differ from each other. Specifically, they aim to learn whether beginning readers are more likely than mature readers to shift their gaze between text and illustrations, and whether these frequent gaze shifts are negatively related to children's comprehension and memory of the stories they read. If we observe this pattern of results, it would suggest that the layout of the books designed for beginning readers can be improved by reducing the competition between text and pictures, in order to enhance children's reading experience and reading comprehension.



## New Research Paradigm

### functional Near Infrared Spectroscopy (fNIRS)

Dr. Anna Fisher and graduate student Layla Unger are the first to begin using *functional Near Infrared Spectroscopy* (fNIRS) techniques for research at the Children's School. This technique has been approved by CMU's IRB as a minimal risk procedure for use with young children, but the research permission form that families signed for the 2015-16 school year does not cover its use. Thus, all fNIRS studies require separate parental permission. fNIRS records brain activity by measuring changes in blood flow in a given region of the brain. Changes in blood flow are measured by emitting infrared light into the scalp and underlying tissues, including the surface of the brain, at a frequency that is primarily absorbed by blood. By detecting the amount of light that is absorbed, we can infer changes in blood flow over the course of a cognitive task. Light is emitted and detected by diodes positioned on the scalp and held in place with a soft cap. The benefit of fNIRS is that it allows the child to sit and move comfortably while doing the task. The near infrared light exposure is comparable to sun exposure MINUS the UV wavelengths. The researchers also have health and safety protocols to ensure that the caps are free from lice and that the light never shines in the children's eyes.



During the parent orientation meeting, each family received a permission form for the use of fNIRS while children do a task requiring inductive inference. One theory about how children do the task involves using category inclusion rules that would be processed in the *Prefrontal Cortex* (PFC), rather than simple perceptual cues that would be processed elsewhere. To test this hypothesis, researchers compare the fNIRS readings for versions of the task that require more rule use to see if the prefrontal cortex is more active for those that can be solved perceptually. The permission slip describes the study in much more detail. Please contact Dr. Carver if you have any questions about fNIRS or would like another copy of the permission form.

## Research Spotlight

### The Thinking about Animals Game

Things can be related to each other in a variety of ways. For instance, living organisms may be similar in shape or mode of locomotion, belong to the same biological taxonomic group, or live in the same habitat. Biological taxonomic relationships are particularly useful for thinking because they divide the domain of living organisms into clear categories that can form a reliable basis from which to acquire new knowledge. For instance, biological taxonomic categories can reliably guide inductive inferences about biological features, because organisms that belong to the same biological taxonomic category also share many features in common. However, education research suggests that students' knowledge of other, more easily observed relationships, such as those based on shared perceptual features or habitat interferes with their understanding of biological taxonomic categories (e.g., linking bats with birds or dolphins with fish because of locomotion types rather than understanding the features that bats and dolphins share because of being mammals).



The purpose of this study by Dr. Anna Fisher and graduate student Layla Unger is to test whether providing perceptual input that connects organisms that belong to the same biological taxonomic category fosters both the organization of knowledge into these categories, and the formation of inductive inferences about biological features that are consistent with these categories. The perceptual input we are assessing is a "Taxonomic Co-Occurrence Stream": a stream of images of organisms in which organisms that belong to the same biological taxonomic category simultaneously co-occur, and organisms that belong to different categories do not co-occur. These co-occurrence regularities are specifically designed to counter interference from other types of relationships. To test the effectiveness of the Taxonomic Co-Occurrence Stream, participants are randomly assigned to either an Experimental group, that observes the taxonomic stream, or a Control group, that observes a stream in which animals linked by familiar non-taxonomic relationships (e.g., shape, habitat, or locomotion) co-occur. Participants in both groups are asked to complete pre- and post-tests that measure knowledge organization and inductive inferences about biological features.

For this study, children participate in a pre-test session, a training session in either the experimental or control condition as explained above, and a post-test session. For the pre- and post-tests, children complete two short tasks. The first involves arranging pairs of blocks that are each labeled as a different organism on a grid so that children put organisms that are the "same kind of thing" close together. On each trial, the pair of organisms used to label the blocks belonged to the same or different biological taxonomic categories. Some pairs consisted of organisms that children commonly correctly judge to be the same or different kinds of things, whereas others consisted of organisms that children commonly judge incorrectly. In the second task, children see triads of organisms on a computer screen consisting of a Target, a Match from the same category as the Target, and a Mismatch from a different category. Some triads included Match and Mismatch organisms that children commonly correctly judge to be the same or different kinds of things as the Target, whereas others included organisms that children commonly judge incorrectly (as in the triad here). In either case, children hear about a novel biological property of the Target, such as "plaxium blood", and have to decide which of the two other organisms also shares the property.



## Research Spotlight, continued ...

### The Letter Finding Game

The goal of this study by students in the Research Methods class is to examine the degree to which different types of music (i.e., instrumental music, music with English lyrics, and music with lyrics in French, as well as a no music control condition) acts as a distraction or stimulation for a task that requires focus and attention. Being able to focus is important for children, and recognizing what can enhance or hinder that focus can be a valuable tool. This project uses a letter cancellation task that is patterned after a kindergarten activity in which children are asked to look at an array of letters and circle all of the "target" letters (both upper and lowercase). They are scored on accuracy (how many they find and how many they miss), and speed (how quickly they finish). Researchers expect children to do the task more accurately and complete the task quicker in conditions with no background music. This project is aimed at determining the influence of music as a distractor or stimulator. Gaining insight into what distracts children and what can help them focus can help researchers and educators design better solutions for helping children to focus and pay attention.

target: Aa

A	b	D
f	a	x
a	B	U

## Recruiting more NIRS Participants

### functional Near Infrared Spectroscopy (fNIRS)

Because Dr. Anna Fisher's and graduate student Layla Unger's initial tests of the *functional Near Infrared Spectroscopy* (fNIRS) techniques with Children's School students has been going so well, they are interested in recruiting more participants. This technique has been approved by CMU's IRB as a minimal risk procedure for use with young children, but the research permission form that families signed for the 2015-16 school year does not cover its use. Thus, fNIRS studies require separate parental permission. fNIRS records brain activity by measuring changes in blood flow in a given region of the brain. Changes in blood flow are measured by emitting infrared light into the scalp and underlying tissues, including the surface of the brain, at a frequency that is primarily absorbed by blood. By detecting the amount of light that is absorbed, researchers can infer changes in blood flow over the course of a cognitive task. Light is emitted and detected by diodes positioned on the scalp and held in place with a soft cap. The benefit of fNIRS is that it allows the child to sit and move comfortably while doing the task. In fact, the next study involves collecting baseline data about fNIRS readings while children engage in free play with simple toys.

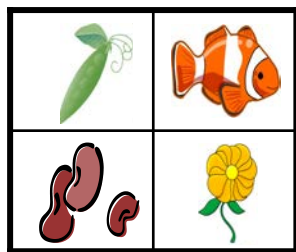


Note that the near infrared light exposure in these studies is comparable to sun exposure MINUS the UV wavelengths. The researchers also have health and safety protocols to ensure that the caps are free from lice and that the light never shines in the children's eyes. Please sign and return the enclosed permission form if you grant permission for your child to participate in fNIRS studies.

## Research Spotlight

### The Read Aloud Game / The Classroom Game

The purpose of Drs. Anna Fisher and Karrie Godwin's research is to investigate how children allocate their attention in learning environments. These researchers are particularly interested in examining how physical features of the environment (e.g., posters, art work, etc.) can contribute to or hinder children's ability to attend to the content of a lesson and whether the distribution of attention changes over time. They are also examining whether children's ability to effectively distribute their attention has consequences for learning new content. In the *Read-Aloud Game*, kindergarten children listen to a short story and then answer questions about the content of the story by choosing one of four pictures (see example below). After learning how to answer comprehension questions in this manner, kindergartners will participate in the *Classroom Game* daily over a 3-week period (for a total of 15 sessions). In this study, researchers are teaching children 15 mini-lessons in a small group format, very similar to our circle time. For 10 of the lessons, the physical environment includes items that are typically found in early childhood classrooms but



that may be potential sources of distraction (e.g. posters, artwork, learning materials, etc.). For the remaining 5 lessons, the physical environment only includes visual aids and materials directly relevant to the lesson. Each lesson lasts 10 to 15 minutes. Each time, children listen to a short story and then answer questions about the story content. Researchers also videotape the sessions in a manner that does not show the presence or absence of the potentially distracting materials so that assistants can code the children's on- and off-task behavior and then relate it to their comprehension scores.

## Functional Near Infrared Spectroscopy (fNIRS)

Children with permission to participate in fNIRS studies are taking part in a study in which Dr. Anna Fisher and her researcher associates measure brain activation in the left and right prefrontal cortex during free play. They offer children the set of toys depicted below and ask them to play with the toys for 3 to 5 minutes. The ultimate goal of this project is to understand how developmental increase in coordination among different brain regions relates to development of a number of core cognitive capacities, including language and attention. The free play fNIRS recording is the first small step towards addressing this question because researchers are developing a methodology for collecting 'resting state' brain activation – in other words, brain activation in the absence of an externally prescribed goal or task. Better insights into resting state brain activity and developmental changes in this activity across the age 3-6 span (such as improved coordination among different brain regions) can enable psychologists to later compare resting state activation to that evident during more structured tasks. If you have not yet registered your child for



fNIRS research participation and wish to do so, please contact Miss Drash for a permission form ([adrash@andrew.cmu.edu](mailto:adrash@andrew.cmu.edu)). If you have questions about fNIRS procedures or safety protocols, please contact Dr. Carver ([sc0e@andrew.cmu.edu](mailto:sc0e@andrew.cmu.edu)).

## Research Spotlight

### Former CMU Student Impacts Developmental Psychology



**Dr. Haley Vlach** is an Assistant Professor in the Department of Educational Psychology and director of the Learning, Cognition, & Development Lab in the University of Wisconsin-Madison, School of Education. She did her undergraduate research with Dr. Carver at the Children's School (see reference and abstract below), graduating in 2006. She earned her Ph.D. in Psychology from UCLA in 2012. Her research is on children's learning and cognitive development. <https://sites.google.com/site/haleyvlach/welcome>

Vlach, H. A., & Carver, S. M. (2008). The effects of observation coaching on children's graphic representations. *Early Childhood Research & Practice*.

"Education programs have fostered advanced levels of graphic representation ability in young children but have not detailed the specific mechanisms responsible for the accelerated growth. Research suggests that between 6 and 8 years of age children begin to observe more carefully before drawing and that observation prompts aid children's development of graphic representations. This study experimentally investigated the effects of observation coaching on the graphic representations that children produce when looking at models of animate and inanimate objects. Drawings were collected from 22 kindergartners once a week for a month. Half of the children received observation coaching that instructed them to look at objects from multiple angles before, during, and after drawing an object; the remaining half of the children did not receive observation coaching. Both casual inspection and statistical analyses of data from the videotaped sessions revealed that the coaching was effective at encouraging children to look at objects more frequently during the drawing process. Additionally, each child's drawings were evaluated using a detailed scoring system. This rating system revealed that children receiving observation coaching had significantly greater improvements in drawing scores than children who did not receive coaching. All children receiving coaching had improvements in their drawing scores, with advances primarily involving enhanced detail and conceptual accuracy."

In May of 2015, Dr. Vlach received CMU's **William Chase Memorial Award**, an early career honor in cognitive science that is given biennially to a young scholar who conducts research that exemplifies the scientific values of the late Bill Chase. Chase "spent 15 years as a professor of psychology at Carnegie Mellon University and is credited with demonstrating that good memory is an acquired skill. He also made important contributions to a range of areas in cognition and left behind seminal publications on sentence comprehension, perception and chess, and memory span." Vlach's "work resonates with Chase's emphasis on a deep understanding of processes underlying learning and performance. In particular, Vlach's research has outlined how children's rapid forgetting of information supports, rather than deters, their ability to learn language, categories and concepts." Vlach argues that, "forgetting acts as a form of abstraction, which promotes children's ability to generalize knowledge across contexts. In essence, she claims that, "what makes children incredible learners is not simply that they learn to encode information in the world, but that they rapidly forget the large amount of irrelevant information they learn." Vlach will give the Chase Memorial Lecture at CMU on Monday afternoon, April 4<sup>th</sup> at 4:30pm. The lecture is free and open to the public.

<https://www.education.wisc.edu/soe/news-events/news/2015/05/29/uw-madison-s-vlach-receives-william-chase-memorial-award>



## Research Spotlight

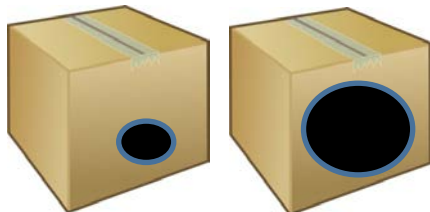
### Research Methods Class – The Mouse Game

Students in Dr. Stephanie Siler's Developmental Research Methods class will start the semester with a lab entitled **The Mouse Game**.

They will work in pairs and small groups to conduct a study of whether very young children are able to test a simple hypothesis.

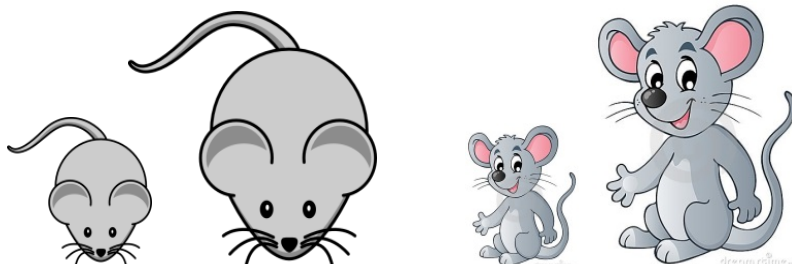
Children in first- and second-grades have been found to be able to test a simple hypothesis in a well-structured task. However, it is unclear whether younger children are able to do so and when this ability first emerges. Previous research has shown that, in tasks in which children are asked to test a hypothesis, they often instead adopt the goal of creating a practical outcome, i.e., more of an engineering goal than a science goal. In fact, even older children—those in late elementary and middle school—often apply practical goals when given lessons on science inquiry, which impedes their learning of key experimental principles, like the importance of controlling variables.

To assess whether children are able to test a hypothesis, in this project, children are read a story in which a pair of siblings discover that a mouse is living in their house. However, they disagree on whether the mouse is big or small. They decide to try to determine whether the mouse is large or small by leaving mouse food in a box that has either a small entrance (where only a small mouse could enter to eat the food) or a box that has a larger entrance (where either a small or a large mouse could enter).

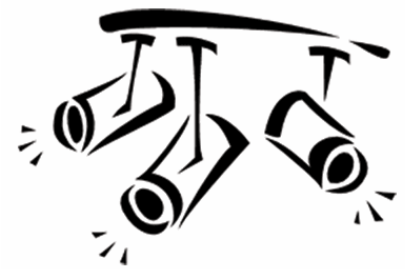


The child's task is to choose the box that will allow the siblings to discover whether they have a small or large mouse. Afterward, the child is asked which box to use in order to feed the mouse (regardless of whether it is large or small). This last question assesses the child's ability to apply a practical goal.

A secondary question investigated in this study is whether the amount of detail included in pictures shown to children in this task affects their performance. To address this question, in one condition, children are shown pictures that are minimally detailed (e.g., see the pair of mice shown to the left below). In a second condition, children are shown pictures that included more potentially-distracting detail (see the pair of mice shown to the right below).



Because hypothesis testing is a fundamental aspect of science inquiry, the findings of this project may inform educational practices designed to support learning of science inquiry skills, in particular, how much detail to include in instructional images. Results from this study may also inform theories of cognitive development and inform educational practices, such as when it is feasible to introduce hypothesis testing in the school curricula.



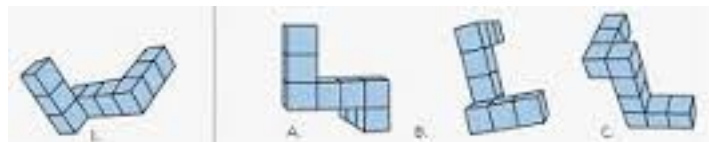
## Undergraduate Researchers in Training

Students in Dr. Stephanie Siler's **Developmental Research Methods** class are preparing their final projects for the semester. Though the research protocols are still being developed, the students are planning to study many educationally relevant early childhood tasks. Learning the impact of the variables studied on children's performance and learning can help parents and educators better choose approaches for supporting their progress.

- **The Tower of Hanoi Game** – Testing whether providing subgoals for challenging tasks will increase kindergartners' persistence in solving them.



- **The Line Game** – Experimenting with factors that influence the likelihood that 3, 4, and 5-year-old children will change their answers on an open-ended line comparison task when adults offer contrasting perspectives.



- **The Block Game** – Determining whether demonstration and feedback during practice will improve 4 and 5 year olds' performance on a 3-dimensional mental rotation task.

- **The Storytelling Game** – Testing whether gender and/or sibling status influences 3, 4, and 5-year-old children's responses to stories in which there is a conflict, such as how to share one toy, between characters who appear to be of equal status (left) vs. differential status (right).



- **The Letters and Numbers Game** - Determining whether gender-biased theming of letter and number games (e.g., color and image type) impacts 4 and 5 year olds' preferences when given choices of which to play, compared to games with similar content but gender neutral themes.

- **The Toy Sharing Game** - Testing whether 3 and 5-year-old children are able to integrate another's perspective into their decisions about which toys to offer for sharing.

Families whose children participate will receive fuller parent descriptions via the child's backpack. Everyone can read the study descriptions on the Research Bulletin Board to the left of the Children's School office. What an interesting set of developmental psychology topics!

## Research Spotlight

### The Thinking About Animals Game

Different things can be related to each other in many ways, such as by sharing features or by being seen together in the environment. For instance, living organisms may be similar in shape or mode of locomotion, belong to the same biological taxonomic group, or live in the same habitat. Biological taxonomic relationships are particularly cognitively useful because they divide the domain of living organisms into clear categories that can form a reliable basis from which to acquire new knowledge. For instance, biological taxonomic categories can reliably guide inductive inferences about biological features, because organisms that belong to the same biological taxonomic category share many features in common. However, education research suggests that children's knowledge of other, more easily observed relationships, such as those based on shared perceptual features or habitat, interferes with their understanding of biological taxonomic categories, causing misconceptions about taxonomic relatedness. The purpose of graduate student Layla Unger's research is to test whether, in the absence of misconceptions about relationships, providing **perceptual "Co-Occurrence" input** in which real-world organisms that belong to the same biological taxonomic category simultaneously co-occur fosters both the organization of knowledge into these categories and the formation of inductive inferences about biological features that are consistent with these categories. To ensure that children have no existing misconceptions about relationships between these organisms, each pair of organisms consists of one organism familiar to young children (e.g., snake) and one organism unfamiliar to young children (e.g., soft shelled turtle).



To assess the degree to which taxonomic relationships influence children's knowledge organization and inductive inferences before and after Co-Occurrence Input, children are asked to complete two short tasks during both pre-test and post-test sessions. In the first task, children are shown triads of organisms on a computer screen consisting of a familiar Target organism (e.g., snake), one unfamiliar "match" organism from the same biological category as the Target (e.g., soft shelled turtle), and one unfamiliar "mismatch" organism from a different category (e.g., mudskipper). For each triad, the experimenter attributes a novel biological property such as "plaxium blood" to the Target, and asks the child to decide which of the two other organisms also shares the property. In the second task, children are asked to arrange sets of three pictures corresponding to the three organisms from the triads described above such that they put organisms of the "same kind" close together.

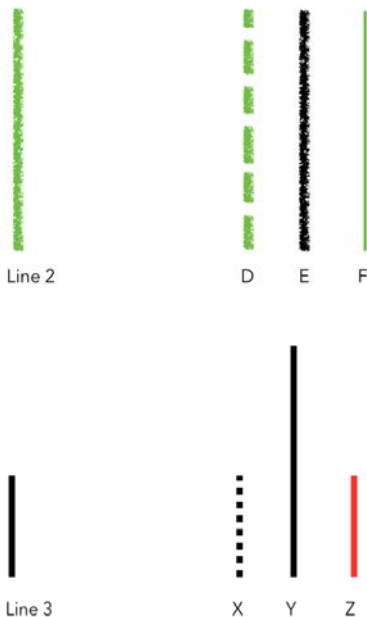


In between the pre- and post-tests, children take part in two Co-Occurrence Activities: A Co-Occurrence stream, in which children observe a sequence of images that each simultaneously present two organisms together, and a Co-Occurrence matching cards game, in which children play a card game depicting pairs of organisms. Half of the pairs consist of a familiar Target organism and its taxonomically unfamiliar "match" from the same triad, and the other half consist of a familiar Target organism and the unfamiliar "match" from a different triad to which it is unrelated. In this way, we can test the effectiveness of experiencing co-occurrences between taxonomically related organisms by seeing whether, from pre- to post-test, participants make more taxonomic responses only for triads in which they experienced the familiar Target and its taxonomically related unfamiliar "match" from the same triad co-occur.

# Research Spotlight

## The Line Game

One of the groups in Dr. Stephanie Siler's Research Methods course is studying whether young children are more likely to conform and change their answer to an ambiguous matching question if they are told that others present in the room gave a different answer, in contrast to whether the alternative answer was given by people who are not present, but whose photos were shown. Previous research has suggested a couple of things. One is that younger children are less likely to conform than older children, and another is that adults acting in a "child" position (not as an authority figure) lead children to be more independent. These findings prompted these undergraduates to assess the effect adult presence has on younger children's conformity. In the task, a child is asked which line (A, B, or C, for example) is most similar to the target line ("line 1"). The sample lines (A, B, C) vary in length, width, color, or format (dashed, dotted, solid, etc.), but every line has exactly two characteristics in common with the target line (see below). After choosing an answer, children in the "presence" condition are told that the two other researchers in the room made a different choice from the child's, and children in the "non-presence" condition are told that two other adults whose photos are shown but who are not present in the room made a different choice. Children are then asked again which line is most similar to one target line, just to see if the child will switch to a different answer. After making the second choice, children are asked to explain their choice to assess their rationalization of their answer on this ambiguous task, and give researchers further insight into why the children may or may not have conformed with the adult answer. Conformity is an important area of study, especially in children, because it tells us what factors may make children reconsider their own views. This type of information is used in legal cases involving children as well as in other fields in which child reliability may be necessary. Determining whether presence of the adult with a different viewpoint influences children may help adults develop a method of teaching that will encourage children to be more independent and less prone or more resistant to conforming to group or authority expectations.



Five additional groups of students in Dr. Siler's class are studying other interesting topics, including 1) testing whether providing subgoals for challenging tasks will increase kindergartners' persistence in solving them, 2) determining whether demonstration and feedback during practice will improve 4 and 5 year olds' performance on a 3-dimensional mental rotation task, 3) testing whether gender and/or sibling status influences 3, 4, and 5-year-old children's responses to stories in which there is a conflict, such as how to share one toy, between characters who appear to be of equal status vs. differential status, 4) determining whether gender-biased theming of letter and number games (e.g., color and image type) impacts 4 and 5 year olds' preferences when given choices of which to play, compared to games with similar content but gender neutral themes, and 5) testing whether 3 and 5-year-old children are able to integrate another's perspective into their decisions about which toys to offer for sharing.

## Research Spotlight

### Psychology Department's 100<sup>th</sup> Anniversary

During the 2015-16 academic year, the Psychology Department has been celebrating its 100<sup>th</sup> Anniversary with a series of events culminating in a two-day celebration of our Ph.D. graduates on May 20<sup>th</sup> and 21<sup>st</sup>. The department was founded as the Division of Applied Psychology by Walter Van Dyke Bingham in 1915, but in 1924 it became the Department of Psychology and Education. Interestingly, the first course in Developmental Psychology was not offered until 1966.



The Children's School originally served as the Child Development Laboratory for the Margaret Morrison Carnegie College, the women's college for Carnegie Technical Schools. During the 1968-69 school year, the vision of Dr. Ann Baldwin Taylor, the administrative support of Dr. John Sandberg, and a grant from the Esso Foundation converged to provide space and funding for the program to move from a house on Margaret Morrison Street to its current location and to expand from approximately 12 to 45 preschool children. At that time, the school functioned as a site for teaching experience and behavioral observation, and it was the hub of the Early Childhood Cooperative Teacher-Education Program. In the 1970-1971 school year, the school's name changed to the "Children's School," as a purposeful reminder of its commitment to the progressive education principles of John Dewey. When MMCC closed in 1973, with the administrative support of Dr. Erwin Steinberg, the school became part of the Department of Psychology. Dr. Taylor continued as the director until her retirement in 1993, at which time Dr. Sharon M. Carver (CMU '86) returned to the university to assume the leadership role.



As the Children's School approaches its 50<sup>th</sup> year of excellence and innovation as an early childhood laboratory school, we pause to appreciate our strong roots in developmentally appropriate practice and to affirm our commitment to all aspects of our mission, including active involvement in preschool and kindergarten education, developmental research, undergraduate teaching, and training of both pre-service and practicing educators. We applaud the educators, administrators, and faculty whose vision, dedication, and creativity have contributed to making our school environment into a caring community with opportunities for vibrant learning at all ages. Many thanks to Carnegie Mellon, the Dietrich College, and the Psychology Department for making it all possible.

For more information on the Psychology Department's 100<sup>th</sup> Anniversary, see the commemoration web site at <http://psy.cmu.edu/100years/index.html>.