Music & Movement Classes

Welcome back, Lauren Hraber! Mrs. Hraber conducts Music and Movement classes with all of the children at the Children’s School every other week. Our first classes for the fall were held on September 28th and will continue approximately every other week for the rest 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/childrensschool) 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 I Spy Game to investigate children’s attention and distractibility while finding all instances of a certain object (e.g., strawberries) on a sheet with about 100 diverse objects. Children play the game twice, once with the secondary researcher sitting and observing quietly (as is typical in studies with multiple researchers) and once with the secondary researcher playing “Fruit Splash” on a smart phone with the volume set to low. The distracting effects of background television on children’s play are well established, but there is little research on the impact of other electronic devices in children’s environment. Later in the semester, the 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. Watch for their research questions in the November newsletter!
The iPad Game

Cassandra Eng, a second year graduate student working with Dr. Erik Thiessen, is studying the vocalizations young children make in response to stories presented in typical book format and via iPad with animations embedded within the story. In collaboration with children’s author and illustrator Thacher Hurd, the research team aims to determine if the animations encourage children to vocalize more frequently than would a normal storybook. During each session, a researcher reads the child two stories on an iPad, *Cat’s Pajamas* (Hurd, 2000) and *Zoom City* (Hurd, 1998). One of the iPad stories was interactive: the pictures animated whenever the child vocalized. For example, if the child repeated the researcher after she read “boom, bang, boom!”, the experimenter in another room with a one-way observation window would activate an animation of the illustration of a drum beating. In other words, the child’s vocalizations caused the animations. The other iPad story was not interactive: the pictures animated before the researcher read the page regardless of whether or not the child vocalized. The order of the two story types varies, and children’s responses are videotaped so the researchers can compare their vocalizations across the two conditions. Because literacy skills are closely linked to a child’s earliest experiences with books and stories—and there is increasing use of electronic books accessible through computers, apps, and tablets—the researchers are investigating whether the addition of interactive features in an e-book could support children’s understanding of the story.

In between stories, a researcher played an I Spy game with the child. The researcher asked the child to find all of the bowling pins in the picture below. Through this game, the research team is investigating how children develop the ability to ignore distractions while working on a task. They want to determine whether the interactive iPad story is especially useful for young children who are still developing the ability to ignore distractions. They hypothesize that the animations in the interactive iPad book will draw the child’s attention to the important elements of the story, thus increasing comprehension. The study results may inform the development of future electronic books for children.

The Matching Line Game

Dr. Erez Freud, a postdoctoral researcher in the Department of Psychology, is working with Dr. Marlene Behrmann, on a research study that aims to characterize the development of visual object perception. The ability to accurately perceive objects is crucial for every aspect of our lives from childhood through adulthood. To shed light on the emergence of this ability, researchers play the “matching-line game” with the children. In this game, the children are asked to match the length of a line presented on a computer screen to the size of a real object using a mouse to adjust the line length. Researchers then measure the accuracy and variability of the estimates. This study will help determine the extent to which precise shape sensitivity exists in children aged 5-6 years old.
Seeking Host Families

The Children’s School will be hosting 2 undergraduate students from Duksung Women’s University in Seoul, South Korea for an International Practicum Program. A total of 8 Early Childhood Education students will be in Pittsburgh for practicum experiences at our school, Falk, Carlow’s Campus School, or Pitt’s University Child Development Center. To help the students experience family life in Pittsburgh, we are recruiting two host families who live close to the university to provide housing and some meals for one male or one female practicum student from Sunday, January 28th through Sunday, February 11th. Proximity to CMU is essential so that the students can use public transportation or rides from teachers to travel to and from school. Please contact Dr. Carver at sc0e@andrew.cmu.edu if you are interested in this hosting opportunity. Former host families will be happy to share their experiences with you, and student photos and bios will be available soon.

Undergraduate Research

Dr. Anna Fisher’s Developmental Research Methods students are preparing their final projects for the semester. They are beginning to pilot test their projects on the topics listed below. 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 near the office door. Notice the interesting range of important topics in early childhood development!

• Does clutter on the activity table impact children’s speed and accuracy when completing iSpy tasks that vary in difficulty? (The Pictures Game, AM 4’s and K)

• How do children consider merit vs. need when suggesting fair distribution of extra goods? (The Story Game, PM 3’s, PM 4’s & K)

• How well can children of different ages identify emotions and link them to the situations that might trigger them? (The Matching Faces Game, AM 3’s, AM 4’s & K)

  Which child below looks sad? What situation might have made the child sad? Why?
Research Spotlight

functional Near Infrared Spectroscopy (fNIRS)

Dr. Anna Fisher’s research team is using functional Near Infrared Spectroscopy (fNIRS) techniques for research with children whose parents have given permission. 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 2017-18 school year does not cover its use. Thus, participation in fNIRS studies, like the one described below, requires 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.

Each family received a permission form for the use of fNIRS during the enrollment process. Please contact Dr. Carver if you have any questions about fNIRS or would like another copy of the permission form so you can enroll your child.

The Brain @ Play Study

This year, the fNIRS team is conducting several sessions to measure children’s brain activation in the left and right prefrontal cortex during free play. In Session #1, they provide a set of toys and ask children to play with them for 5 to 8 minutes. This procedure allows the team to measure the ‘resting state’ brain activation, i.e., brain activation in the absence of an externally prescribed goal or task. As children develop, the different brain regions that are involved in a common set of tasks become more coordinated in their activity, even when the brain is ‘at rest’. To obtain a reliable measurement of the resting state brain activity, the researchers ask each child to participate in this task several times in one week.

Next, the researchers measure children’s prefrontal brain activity during The Opposites Game. This game is often used by researchers around the world to investigate the development of inhibitory control in young children. Inhibitory control refers to one’s ability to suppress responses that are not appropriate in a given moment (such as eating cookies before dinner, answering a teacher’s question out of turn, or taking a toy that another child is using). This ability is crucial to successful functioning in many areas of life, including academic
Research Spotlight … continued

success, health and wellbeing, and social relationships. In the Opposites game, children are instructed to say “day” when given a picture of the moon, and “night” when presented with a picture of the sun. This game requires children to suppress responses that are not appropriate based on the rules of the game (such as saying “day” when shown a picture of the “sun”).

In another session, researchers measure children’s prefrontal brain activity during The Memory Game, which involves reading children strings of familiar but unrelated words (for example: cat, bottle, truck). First, the children are asked to repeat the words in the same order in which they were spoken, and then during the second round of the game, children were asked to repeat the words in reverse order (truck, bottle, cat). The game with short 2-word sets and increases the number of words up to 6 words if children can successfully repeat the words backwards. This game measures an aspect of working memory: one’s ability to hold and manipulate information in memory until a task is completed. People use this ability when following directions to a new place or calculating tip amount in a restaurant.

Another session involves two games: The Sorting Game and The Fish Game. Many researchers around the world use these games to investigate the development of inhibitory control in young children. Although inhibitory control skills keep developing well into adolescence, there are marked changes to this ability during the preschool years. In the Sorting Game, researchers present children with a set of cards depicting familiar objects that differ on two dimensions (such as color and shape). They first ask children to sort cards into bins according to one dimension (for example, shape), and upon completing the task, they sort the cards again according to the other dimension (color). Then, children have to alternate between sorting by shape and color based on a cue provided by the experimenter for each sorting card. This game requires children to suppress responses that are not appropriate based on the rules of the game (such as sorting a card based on color when asked to sort by shape) in order to provide correct responses.

In the Fish Game, researchers show a picture of fish on a computer screen, and ask children to point in the direction the middle fish is facing. Sometimes the middle fish is facing in the same direction as all the other fish, and sometimes the middle fish is facing in the opposite direction. To play this game, children have to ignore all the fish except for the middle fish – something that is much harder to do (and thus may lead to increased blood flow in the prefrontal cortex) when the middle fish was facing in the opposite direction.

Researchers are interested in documenting developmental changes in inhibitory control that occur during a school year, so they will repeat these games at the end of the school year. The broader aim of the research program is to understand how developmental changes involving increases in coordination among brain regions relate to development core cognitive capacities, including inhibitory control and working memory. By involving children in a variety of different activities that they hypothesize to differ in brain activation, they can compare the activation during inhibitory control and memory tasks to the resting state activation they measured.
Research Spotlight: Undergraduate Training

Dr. Anna Fisher’s Developmental Research Methods students conducted their final projects during the month of November and will be doing their public poster presentations on December 7th. We will then share their posters in the Children’s School hallway throughout December.

• Does clutter on the activity table impact children’s speed and accuracy when completing iSpy tasks that vary in difficulty? (The Pictures Game, AM 4’s and K)

Undergraduates Rebecca Ahmad, Patrick Dykiert, and Jordan Romah are studying the effect of cluttered tables on a child’s ability to stay attentive to a task. Various sources of distraction exist for children and adults alike, and it is commonly thought that one’s workspace affects their performance. Indeed, there are a number of studies regarding office workers about this topic. To investigate the effect that clutter has on children, this research team made a “Pictures” game about finding specific objects amongst a number of objects, much like typical “I Spy” or “1001 Things to Spot” activities.

The team randomly assigned children to either have a table cluttered with common objects from the classroom or a table without anything on it, and then they asked each child to use a pen to circle specified objects from the pictures (e.g., a basketball, bird, and bowling pin in the picture below left). The team measured children’s speed and accuracy on finding specific objects in four different pictures with either 30 or 50 objects. They hope to determine whether or not cluttered tables have a noticeable impact on the performance of the children.

• How do children consider merit vs. need when suggesting fair distribution of extra goods? (The Story Game, PM 3’s, PM 4’s & K)

Undergraduates Jiwon Ban, Jonathan Kim, and Sophia Weisma are interested in children’s perceptions of fairness. In the past, researchers believed this ability developed slowly. However, recent studies suggest otherwise. The latest literature on children and fairness supports the belief (to be continued …)
Research Spotlight, continued …

that children are able to follow the logic of fairness pretty well, even in early preschool years. Some of this literature included studies examining how children distribute goods, such as cookies, in pretend scenarios and found that preschoolers allocate resources to the individuals who contributed more in the scenarios, which indicates an understanding of merit. Other studies examined how preschoolers distribute resources in scenarios where there were certain individuals who needed a good more than others, such as a friend who had not eaten breakfast and is hungry. This research team investigated how children value merit and need when they are in conflict. To address this question, they asked children to make judgements after hearing two types of stories. One type presented need and merit in conflict with each other, where one child did more work (merit) but the other child needed the item more (need). For example, one conflict story involved two friends who were planting flowers. One friend had a garden at home and knew how to plant and, therefore, helped a lot (merit). The other friend just moved to Pittsburgh and had an empty garden at home but did not know how to garden and, therefore, did not help as much (need). Potted plants were divided evenly between children, and there was one pot left over. Researchers asked each child which character in the story should get the extra flower pot and why they made their choice. One example of a no-conflict story had two friends chopping fruit to make a fruit salad. One friend took a break while the other friend kept working until all the fruit was done (merit). In the end, each child was asked who should get the extra bowl of fruit salad to take home. The results of this study should provide insight into children’s understanding of fairness and their preference for merit-based and/or need-based distribution strategies.

• How well can children of different ages identify emotions and link them to the situations that might trigger them? (The Matching Faces Game, AM 3’s, AM 4’s & K)

Undergraduates Tori Iatarola, Priscilla Medor, Saru Nanda, and Lucy Truschel are exploring children’s ability to recognize an emotion (happy, sad, surprised, or disgusted) and to contextualize each emotion in a particular setting that would likely trigger that emotion (e.g., linking a happy face with a birthday party, a sad expression with a fallen ice cream cone, a surprised face with a jack-in-the-box toy, or a disgusted expression with rotting food). The researchers presented multiple trials with new sets of children’s faces expressing the same four emotions and various sets of settings in which to contextualize the emotion. There is significant research in the field of developmental psychology exploring children’s ability to recognize emotion in facial expressions. This work has shown that typically developing children are generally able to categorize common emotions in this way. This team’s study extends that research by exploring the less frequently studied ability of emotional contextualization.
Research Spotlight

Remembering Games

Senior Lauren Yan will conduct her honors thesis research during the spring semester after pilot testing the experimental tasks during her study abroad semester in South Korea. Many thanks to Duksung Women’s University professor Tony Lee for helping her connect with the Purumi Children’s Center and with Duksung undergraduate early education majors to facilitate her pilot work.

Lauren’s research involves playing memory games with the children to assess their working memory abilities and test several approaches for using games to introduce strategies to improve children’s working memory, which refers to the type of memory that holds information as we use it. It is important to introduce memory strategies early, so children can become facile with using strategies to bolster their learning. The study consists of a pretest, three intervention gameplay sessions, and then a posttest. For the pretest and posttest, the children play three games with the researcher individually. In the Objects on the Table Game, eight objects (animal figurines and toy vehicles) are placed on the table for the children to identify. While the child closes their eyes, two are then taken off the table and hidden. The child is then asked to report which two objects were missing. This game is repeated five times with the same set of objects to see whether increased exposure will facilitate children’s memory. The Hide & Seek Game involves a picture of a cartoon room with flaps under which cartoon animals are hidden. The child watches the hiding process and is then asked to find each animal shown on a list by pointing to the flap where the animal is hiding. The child plays two rounds of the game to determine improvement or possible interference. In the Rule Game, a picture of a turtle and a pencil are used. In the first round, the child is instructed to raise their arms when they see the turtle, and to clap when they see the pencil. In the second round, the instructions are switched.

Three intervention gameplay sessions are played between the pretest and posttest. The same three games are played in each session but with different picture stimuli. In the Remembering Foods Game, the child is shown six different pictures of various foods for one minute. The pictures are then hidden and the child is asked to name as many foods as they can remember. In the Food Matching Game, players take turns revealing two cards looking for matching pictures. In the Picture Sorting Game, the child is given a set of cards with green and yellow bunnies and boats. The child is then asked to play either the Color Game or the Shape Game. If the Color Game is played, the child sorts the cards according to the color; if the Shape Game is played, cards are sorted according to shape. After playing with the first set of rules, the child is asked to switch to the other set. During all the games, the child is supported through gameplay with structured prompts to help their memory. For half of the children, the researcher also models the strategies while thinking aloud about them. We predict that performance on these games will improve over the three intervention sessions, as well as increase memory strategy usage during gameplay on posttest games, with children who receive additional modeling improving more than those whose instruction includes only strategy prompting.
Research Spotlight

Attention & Storybook Reading

Dr. Byungho Lee, a visiting scholar from Duksung Women’s University, will begin conducting research at the Children’s School during the second semester. His first study will examine children’s visual attention level during a story reading activity. He plans to record children’s eye movements as they watch two story reading videos, one with a teacher reading a traditional paper-based “big book” and one with a teacher reading a screen-based eBook, to compare the direction and duration of their focus. In addition, he will ask comprehension questions to compare their understanding of the stories’ content after the reading. The goal of the research is to determine the ways in which digital media supports and/or detracts from teachers’ efforts to engage children’s attention in storybook reading sessions. The prevalence of digital media in children’s lives is growing so understanding the impact is key.

Research in Practice

This month, there are two opportunities for parents to learn about research-based practices to support young children’s learning and development.

Animals: The Wonders of the Wild for Families

Educator / Parent Discussion
Friday, February 2, 2018
9:30 – 11:00 AM, Cohon University Center, Peter - Wright Room (2nd Floor)
Preschool 4’s and Kindergarten Children will be in school. Child Care will be provided for children 3 and under in the Red Room.

As we prepare for our Whole School Unit on ANIMALS IN THE WILD, let’s consider how we can foster children’s development of observation skills and natural empathy with animals so that they may begin to develop a lifelong friendship with nature. We will explore Dr. Deborah Kelemen’s research on the ways that children’s naturally developing intuitions about animals actually make some scientific concepts, such as adaptation by natural selection, challenging to learn, and review a book her research team has written to introduce scientifically accurate information at a young age.

Q&A with Educators
Wednesday, February 28, 2018 at 8:30am in Danforth Lounge
Thursday, March 1, 2018 at 12:30pm at the Children’s School
Infants and toddlers attend with their parents.

Perhaps you want to know what recent research says about building character, choosing media, teaching reading, responding to children’s questions about sensitive topics, etc. Anything is fair game, but we do suggest that you submit your questions in advance so we can prepare! Of course, your questions are always welcome in person or via email to Dr. Carver at sc0e@andrew.cmu.edu.
Research Spotlight: Undergraduate Researchers in Training

The Animals Game

The students in Dr. Anna Fisher’s Developmental Research Methods class are investigating how different materials may affect children’s performance on a counting task. Educators commonly use engaging, perceptually rich objects when working with young children. For example, when working on early counting skills, a child may be asked to count different kinds of objects, such as popsicle sticks (objects that are not perceptually rich) or toy animals (objects that are perceptually rich). Prior research shows that choosing engaging objects to motivate children (when working on new challenging skills) may have unanticipated costs to children’s performance if children get distracted by the object properties that are irrelevant to the task at hand. This study aims to further investigate whether perceptual richness per se or high perceptual variability among objects pose difficulty to young children when performing a counting task.

In the study, each child plays the game twice. One time, children are asked to give a certain number of objects to the experimenter from a set of objects that are high in perceptual richness but low in perceptual variability (10 small plastic penguins that are subtly different from one another). Another time, children are asked to give a certain number of objects to the experimenter from a set of objects that are both high in perceptual richness and in perceptual variability (5 pairs of different kinds of animals). By trying to more precisely understand what properties of perceptually rich materials might be particularly challenging for young children to handle, this study aims to provide useful information to parents and educators so that efforts to motivate children do not come at a cost to children’s performance.

Final Projects

These undergraduates are also working in small groups to prepare 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. Discovering the impact of the variables studied on children’s learning can help adults better choose approaches for supporting their progress.

- **The Playdough Game** – Exploring whether Preschool 4’s and Kindergartners are more likely to take implicit instructions about play activities from an adult or a peer.

- **The Spot the Difference Game** – Testing whether earning small rewards intermittently during a task is more motivating for Preschool 4’s and Kindergartners than one large reward at the end.

- **The Goldfish Game** – Investigating whether 3, 4 and 5-year olds are better able to delay gratification (wait for more goldfish crackers) when they are offered an interim drawing activity.

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 Bug Game

Psychology graduate student Emily Keebler is working with Dr. Anna Fisher to extend our understanding of the different instructional techniques that are better suited to helping young children learn different types of categories. The research team is interested in whether visual context affects children’s category learning. More broadly, they are examining the role of attention in learning more and less challenging topics and the possible implications for designing early education materials. In the Bug Game, kindergarten children learn about fictional bugs through verbal descriptions and visual examples. The researchers are not using actual academic content, such as real bugs, in order to conduct valid tests of learning (i.e., children’s answers in this game are related to how well they learn completely novel categories, rather than how much they know prior to playing the game). After the experimenter introduced a category of bug, children viewed a series of bug pictures and classified each picture as belonging or not belonging to that category. When preparing their materials, the researchers manipulated the visual context in which children learn about the bugs so that some categories are shown on an unembellished background, and some are shown on vibrant, patterned backgrounds with related features of the habitat. In the game, children learn different types of categories. In some categories, all of the bugs look fairly similar, such that children can rely on perceptual similarity for categorization. However, for the more difficult categories, membership relies on one pair of critical features with all other features being incidental, such that the children need to focus their attention more precisely to determine if a bug belongs to the category. The researchers’ goal is to determine whether the presence of visual embellishments differentially affects category learning for easier and harder categories, based on different attentional demands.

The Spot the Difference Game

One of the groups from the undergraduate Research Methods in Child Development course is examining whether the timing of reward affect children’s performance on a task, specifically whether getting partial rewards intermittently during a task is more motivating for Preschool 4’s and Kindergartners than one large reward at the end. Each child is shown three sets of two nearly identical drawings and instructed to point to the differences between them. The experimenters either give children 5 small stickers after each of the comparison tasks or 15 at the end of the set of tasks. Children then use the stickers to decorate a picture to take home with them. The researchers will be comparing the accuracy and speed with which the children locate the differences between the drawings to test whether it will vary based on whether they receive intermittent small rewards or one larger reward at the end. They will also test the children’s intrinsic motivation to continue the game without reward by asking if they want to do extra Spot the Difference tasks after they decorate their picture with stickers. Previous research suggests that intermittent rewards may increase task performance and that extrinsic rewards may decrease intrinsic motivation to do tasks purely for their enjoyment, challenge, etc. This study is the first to investigate both issues simultaneously.
Research Spotlight: The ExerGame

Psychology graduate student Cassondra Eng is working with her advisors, Dr. Anna Fisher and Dr. Erik Thiessen, and an interdisciplinary team of undergraduate research assistants to create a developmentally beneficial exergame. Exergames (a portmanteau of “exercise” and “games”) are a new generation of video games that stimulate a more active playing experience. The exergame for this study aims to improve inhibitory control in prekindergarten children through an experience that promotes both cognitive engagement and physical activity. Cassie and her team of undergraduate RAs built a custom-designed exergame and are now pilot testing the children’s enjoyment of and engagement with solving the narrative task the game involves.

The exergame is modeled after the traditional “Flanker Task.” Many researchers around the world use this task to investigate the development of inhibitory control in young children. Inhibitory control refers to one’s ability to suppress responses that are not appropriate in a given moment (answering a teacher’s question out of turn or taking a toy with which another child is playing). This ability is crucial to successful functioning in many areas of life, including academic success, wellbeing, and social relationships. Although inhibitory control skills keep developing well into adolescence, the development of this ability is especially flexible during preschool years.

In this exergame, children play a “gamified” version of the flanker task, meaning that specific game features were applied to the existing inhibitory control task by adding incentives (collecting ocean treasures) to encourage children to expend effort practicing the otherwise boring task. The flanker task itself, however, remains largely unchanged. The game is projected onto a wall with a connected non-slip game step mat. Children respond by stepping left or right on the physical game mat’s arrows, depending on the direction that the central fish—Frankie—is facing, with correct choices reinforced by helping Frankie collect ocean treasures. Frankie, the central fish, is either facing left or right but is flanked by four other fish. Children wear a pedometer (FitBit) during the game to record their steps as a measure of physical activity.

The long-term goal of this project is to investigate whether this exergame can potentially enhance inhibitory control skills in pre-kindergarten children.