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.

Observations for Psychology Assignments: Students from Dr. David Rakison’s Child Development class have already begun their periodic observations this 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 Erik Thiessen’s Developmental Research Methods class will start with a lab entitled the The Doll Game to explore children’s developing theory of mind, which is the ability to attribute mental states to oneself and others, as well as to understand that others have beliefs, desires, and intentions that can be different from one’s own. Specifically, they will test whether they can help children better understand the perspective of a character who doesn’t know something has been moved while she was out of the room by having them cover their eyes while listening to a similar story being read and enacted by a researcher. Later in the semester, students will work in groups to conduct a study of their own design, which will be approved both by their teacher and by Dr. Carver.

Feel free to contact Dr. Carver to discuss any questions you have about research.

Research Spotlight

The Kris Koala Game

Senior Matt Mastricova and his advisor, Dr. Anna Fisher are investigating how context clues affect language acquisition. There is debate over which methods are most effective in teaching children new vocabulary. One prevalent theory is that we learn new words by using context clues from the phrases and sentences in which we encounter the word. For instance, we might learn that frigid means cold because it is in the same sentence as chilly or frozen. The Kris Koala game investigates whether synonymous context clues or example context clues are more helpful to children when they encounter unknown words. For example, a synonymous context clue would be using the word nervous in the same context as the word timid. An example context clue would be saying that someone who is nervous might stutter or worry about small problems. In this task, children listened to a story including words created by a researcher. These words were introduced using one of these context clues. Researchers then asked children which of two possible definitions was correct for each word. Researchers expected the children to be more accurate at choosing the correct definition for words that were paired with a synonymous context clue. Educators and parents can use the results of this experiment to decide the best ways to teach children new vocabulary words.
Research Spotlight, continued …

Testing Reasoning Skills

Graduate student, Karrie Godwin is working with Dr. Anna Fisher and several other research assistants to investigate young children's reasoning skills. In particular, they are interested in investigating the relationship between young children’s reasoning skills and other general cognitive processes such as memory, attention, processing speed, and language ability. Because the study involves diverse measures for Karrie’s dissertation, our children will participate in multiple research sessions with Karrie over the course of the fall semester. As usual, parents will receive descriptions of each session on the day the child participates.

• The Thinking Game: In the Thinking Game, children are presented with a variety of reasoning tasks from the Weschler Preschool and Primary Scale of Intelligence (WPPSI). They are presented with various objects and asked to answer questions about the objects or physically manipulate the objects (e.g., rearrange, build, or sort the objects). Children are also asked to label various pictures, complete a puzzle, and build a block tower.

• The Memory Game: In the Memory Game, children will listen to a list of words. Subsequently, children will be asked to remember the words from the list. In the first part of the game, children will be read a series of familiar nouns and be asked to repeat them in the same order they were presented. For example, children may be presented with the words "duck, house, chair" and then asked to recite the words in order. In the second part of the game, children will be asked to repeat the items but in the reverse order in which they were presented. For instance, if children are given the words, "duck, house, chair", the correct response would be "chair, house, duck".

• The Animal Game: In the Animal Game, children are presented with a series of word pairs. Children are asked if the second word of the word pair is an animal. For example, children might hear the word pair "bunny – rabbit" and then decide if the second word ("rabbit") is an animal or not. Children respond by pressing a yes or no button on the computer.

• The Button Game: In this task, researchers are measuring children’s sustained attention and inhibitory control via a computer game that presents a series of pictures. Children are asked to press a button in response to specific pictures and not to press the button when they see other pictures. For example, children may be asked to press the space bar whenever the picture of a ball appears.

The Picture Finding Game

Early childhood is a time when children discover many new words. In this study, Layla Unger and Wyatt Demilia, both of whom work with Dr. Anna Fisher, are interested whether children are familiar with the words we plan to use in a follow-up study on conceptual development. In this task, children are shown slides of pictures. Then, children are asked to find the picture representing the target word on each slide. For example, we might ask children to find a ‘moose’ among four animal images.
Research Spotlight, continued …

The Help Zibbo Game

Layla Unger, a graduate student working with Dr. Anna Fisher, is investigating the ways that children organize plants and animals based on a variety of different relationships between them. For instance, children might organize these concepts based on whether they appear in the same kind of environment, whether they belong to the same biological group (such as mammals, fish, birds, or plants), whether they’re big or small, whether people eat them as food, and so on. In the Help Zibbo Game, children are asked to help Zibbo “organize his favorite things”. Zibbo’s favorite things include twelve plants and animals that are depicted in black and white pictures, like those below. During the task, children receive cards depicting these pictures and are asked to sort them on a game board four times. The purpose of sorting the same pictures multiple times is to test whether children can group the pictures in a variety of ways, and, if so, to see what these grouping strategies are.

![Help Zibbo Game pictures](image)

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

The Look Alike Game

This game involves pictures of novel bug-like creatures. The top animal has lots of features in common with one of the animals on the bottom of the picture (for example, body, tail, and wavy ‘fingers’) and only one feature in common with the other animal on the bottom (can you find it? here is a hint: look at the top of the antennae!). Researcher Dr. Anna Fisher is interested in how children perceive such images. Specifically, she would like to know whether children always judge two pictures with multiple features in common as looking more similar, or whether single features can sometimes determine whether two things looks similar. The research involves novel objects to eliminate the possibility that factors other than feature overlap would influence children’s judgments (prior knowledge of object names, for example).

The Discovery Game: Ocean

Audrey Kittredge, a post-doctoral researcher working with Dr. David Klahr, is comparing the effect of different teaching styles on children’s goal-directed search. During the Discovery Game, the child is asked to find animals in an ocean (pictured below) and put them in a special bag. Each child will get a specific kind of instruction: (1) instruction that simply describes the goal of the game, (2) instruction that additionally demonstrates one way to find animals, (3) instruction that demonstrates one way to find animals while reminding the child that there could be many other ways to find animals, or (4) instruction that simply tells the child there could be many ways of finding animals. Depending on how much the child searches, s/he might discover just one hiding location (e.g. finding fish under sea-shells) or multiple hiding locations (e.g. finding fish under sea-shells and starfish under logs). After exploring the ocean, a friendly puppet (pictured below) will ask children questions about the game. Will the instructions that children hear impact how much they explore and how many animals they find? The results of this research may reveal the ability of different instructional techniques to encourage independent exploration in early childhood. This, in turn, would allow educators to choose curricula and instructional techniques in a more informed manner.
Research Spotlight, continued …

The Fraction Identification Game

Teachers face two challenges when teaching a new concept to their students. If the new concept is either intimidatingly unfamiliar or uninteresting, students may fail to apply their mental resources to the task of learning it. To overcome these challenges, teachers may present new concepts in “concrete” forms that convey extra details beyond the abstract core. Some details convey real-world information that is relevant to the concept to render it more familiar, which, in turn, can allow students to apply their prior knowledge to the learning task. For example, fractions are often depicted as slices of pizza, which may allow children to access prior knowledge, like the fact that slices become smaller as the pizza is divided into more slices. Alternately, details that are perceptually rich (e.g., bright colors) can engage students’ attention and render the concept more interesting. However, this approach may come at a cost: The students’ mental representations of the concept can become cluttered with these details, making it hard to recognize and interpret the concept in new situations that are superficially distinct from the situations in which they were learned. The purpose of Dr. Anna Fisher and graduate student Layla Unger’s study is to test the impact of these types of details when they are varied in a controlled and independent manner. In this study, children are taught how to identify fractions based on the total number of parts into which a whole is divided, and the number of parts within this whole that are highlighted. Instruction materials appear in one of four levels of concreteness that convey a specific amount of real-world and/or perceptual detail (see example below). The impact of each level of concreteness on a subsequent test of learning is then assessed.

Coming Soon … Near InfraRed Spectroscopy (NIRS)

Carnegie Mellon researchers interested in the neurological mechanisms underlying developmental change have acquired the technology for functional NIRS studies. NIRS is a non-invasive brain imaging method based on measures of light absorption (similar to pulse-oximetry). The portable NIRS apparatus allows subjects to move freely during the research tasks so it can be used with even very young children. The NIRS method poses minimal risk to children, but it is not currently included in the Children’s School permission form, so studies involving NIRS will require additional permission from parents. Watch for specifics of new studies in 2014!
Research Spotlight

The “Feel the Stories” Game
Investigating the Influence of Haptic Stimulation on Story Listening

Siyan Zhao is a senior at Carnegie Mellon University, majoring in Cognitive Science and Human-Computer Interaction. Together with psychologist Dr. Bobby Klatzky and researchers at Disney Research, she is studying whether children ages four to six can relate haptic stimulation (tactile or touch) to verbal materials, and whether haptic sensations paired with verbal descriptions affect children’s responses to stories. For children ages four to six, story listening is an important method for building vocabulary, grammar rules and social knowledge. As a learning process, story listening mostly takes place with children listening to adults reading to them while, sometimes, with children looking at pictures from the book as well. Therefore, traditional story listening mainly involves 2 sensory modalities, visual and auditory. As past studies have suggested that multisensory input has an effect on learning, we want to integrate haptic input in story reading. How can the new sensory input influence children's understanding, recall and preference of verbal materials? To understand the influence, we will read verbal materials, such as short stories, to children while they wear a vest that produces gentle and short vibrations on their back, similar to cell phone vibrations. The vibration can be felt through the clothing on their back. Children will listen to stories while feeling vibratory patterns related to the stories. For example, while listening to a story in which there is light rain, children may feel a vibratory pattern intended to resemble the feeling of rain. After feeling vibrations, children will complete simple tasks, such as naming the sensation suggested by a vibration or comparing vibrations to one another; or, after hearing a story with key words accompanied by vibrations, children may retell the story, indicate their liking for it, or answer questions about its content. Audio recordings will be made for the tasks so that researchers can transcribe them in the future. The audio will be used to assess how accurately and in what detail children remember the story.

The Chinese Words Game

Dr. Erik Thiessen and his research team are testing how easily children can learn new second language words in a game context by having children play an iPad learning game (uTalk) with Chinese words and pictures of simple colors and body parts. They hypothesize that although the task will be harder for children than adults, the children will show learning of new Chinese words. In addition, they hypothesize that older children will learn more due to increases in memory and attentional capacity. Finally, they hypothesize that the greater simplicity of the color labels (compared to more complex pictures for body parts) will lead to better learning in this limited training context. There is little exploration of the effectiveness of training techniques for adult language learners on learning in children. However, the fact that children are more successful language learners in general means that providing useful and age-appropriate language learning experiences before puberty is an important goal. Therefore, the researchers aim to modify existing training approaches for younger learners. Ideally, instructed practice like this game would be only one component of a richer, more interactive second language learning environment.
Research Spotlight, continued ...

A Series of Science Content Games

The purpose of Karrie Godwin’s dissertation study is to investigate the relationship between learning and other general cognitive processes such as attention, memory, processing speed, executive function, and general reasoning ability (see the Reasoning Skills description in the October 2013). In this series of science games, she and her research team are examining how children allocate their attention in different learning environments. In particular, they are interested in examining whether children’s ability to effectively distribute their attention has consequences for learning new science content.

In the *Monkey and Ape Game,* children are presented with a series of pictures of monkeys and apes on a computer. Children are told the name for each picture. At the end of the game, a memory assessment is administered to see which items the children learned. For example, after learning the names of different types of monkeys and apes children may be asked to identify the vervet (e.g., “Point to the vervet”). It’s the one in the top right corner of the display.

In a second computer task called the *Bird Game,* children are presented with a series of pictures of birds. Children are told the name for each picture. At the end of the game, a memory assessment is administered to see which items the children learned. For example, after learning the names of different types of birds, children may be presented with a picture of a bird and asked to recall the bird’s name (e.g., “What was the name of this bird?”). The one pictured here is called a lilac-breasted roller (commonly found in the open woodlands and savannas of sub-Saharan Africa and the southern Arabian Peninsula).

Perhaps you wondered … why children occasionally participate in the same study twice.

There are several reasons researchers might administer the same task to a child on more than one occasion. There might be technical problems with research equipment or the research session might be interrupted (for example, due to a fire drill). If this happens, you will find the exact same study description in your child’s backpack on two separate occasions. Another possibility is that the researchers are testing research stimuli or calibrating the time elements of a task, so it is helpful to compare the same child’s performance in two slightly different versions before deciding which way to run the study; that approach also reserves the largest number of children as subjects for the final version. Lastly, some studies are longitudinal, meaning that they involve monitoring children’s performance over time to measure their maturation or learning. In these cases, the multiple sessions are planned in advance and the study descriptions are labeled “Session 1 of x”, “Session 2 of x”, etc.
Research Spotlight, continued …

The Tricky Monkey Game

Alexandra Ossowski is an undergraduate student working with Dr. Marlene Behrmann (Department of Psychology) to examine the development of left hemisphere specialization for word reading ability. In adults, the left hemisphere of the brain has a much stronger ability to recognize letters and words than the right hemisphere. This ability can be observed by measuring accuracy in matching words and letters in the right visual field and in the left visual field. Normally, due to the fact that information in the right visual field has access to the left hemisphere before the right hemisphere, adults show superior accuracy for word recognition when the information is presented to the right visual field. This right visual field advantage grows over the course of development. It is often not present until the age of 6 or 7, when children solidify their letter knowledge. The researchers are interested in investigating what about the left hemisphere leads it to be strongly involved in word recognition. The hypothesis is that the left hemisphere is superior at identifying words because of its superior ability to recognize high spatial frequency information. They are interested in seeing whether children who are not yet reading show left hemisphere/right visual field superiority for high spatial frequency visual stimuli. If so, this may indicate that the left hemisphere becomes specialized for word reading due to its bias to high spatial frequency information.

• In Session 1 of 3 – The Stripes Game, children will play a computer game to find where a sneaky monkey is hiding. One grating (an image of varying light and dark lines) of high or low spatial frequency will be presented. The children will be told that if they want to find the monkey, they will press the green button when they see the picture with wide stripes (low spatial frequency), and the red button when they see the picture with thin stripes (high spatial frequency).

• In Session 2 of 3 – The Letters Game, children will play a similar game, measuring the degree of left hemisphere/right visual field superiority for letter matching. The children will be told that the way to find the monkey is to indicate whether two letters are the same or different. One letter will appear in the center of the screen and disappear. Immediately after, another letter will appear briefly at either the left or the right of the screen. The child will be instructed to press the green button if the second letter is the same as the one that was in the center, and to press the red button if the second letter is different from the first. The hypothesis is that children with greater letter knowledge (as measured in Session 3) and greater right visual field advantage for high spatial frequency information (Session 1) will be more accurate in the right visual field for matching letters.

• In the final session – The Words Game, the researchers assess each child’s level of reading ability and letter knowledge, as their hypothesis is that children with a higher level of letter knowledge and reading ability will also show a greater right visual field/left hemisphere advantage for high spatial frequency gratings (Session 1) and letters (Session 2). The CORE Phonics Survey will be used in this session. In this survey, children will be asked to name uppercase and lowercase letters, then tell the sound each letter makes, and finally “read” real and non-real words.

Examples of word stimuli used:

- sip  mat  let  bun  hog (real)
- rut  fit  bat  hot  set (real)
- nop  sut  dit  pem  fap (nonreal)
Young Kyoung Lee
Junior
Young 3’s / Extended AM

Jeonghyo Kim
Junior
Older 3’s / PM 3’s

Soobin Lee
Senior
Older 4’s / PM 4’s

Jin-Hee Kim
Masters Student
Kindergarten

Research Spotlight

The Hearts & Flowers Game

Graduate student Karrie Godwin and her advisor, Dr. Anna Fisher, are investigating the relationship between learning and other general cognitive processes such as attention, memory, processing speed, executive function, and general reasoning ability. In the Hearts and Flowers Game, they are measuring children’s cognitive control and their ability to inhibit a behavioral response. In this computer game, children are presented with a series of hearts and flowers. Children are instructed to respond to each object as follows: When children see a heart on the computer screen, they are told to press the response button on the same side that the heart was presented (e.g., if the heart appears on the left hand side of the screen, the correct response would entail pressing the left response button). However, when children see a flower, they are instructed to press the opposite response button (e.g., if the flower appears on the left hand side of the screen, the correct response would entail pressing the right response button). Next, children are shown pictures depicting the sun or the moon. Children are asked to provide a verbal response that conflicts with the picture. For example, if children see a picture of the sun, they are instructed to say “night”; and when children see the picture of the moon, they are instructed to say “day”. In other studies, children’s skill at tasks that require such inhibition of the common response predicts their learning ability. Discovering the precise correlations will help researchers and educators know how to best facilitate children’s learning foundations.
Research Spotlight, continued …

The Similarity Game

In this study, Dr. Anna Fisher and graduate student Karrie Godwin are investigating how young children learn synonyms. They present children with reasoning tasks in which children must rely on their knowledge of labels to solve the problem. They are interested in the degree to which children utilize their knowledge of labels in various reasoning tasks. In the Similarity Game, children are shown identical pictures of doors, trees or rocks similar to the ones presented below. The children are told about objects that are hidden behind the pictures. For example, we might tell children that there is a bunny, a rabbit and a squirrel behind each door (or tree or rock). The children learn that one of the objects has a particular property. Then children must decide whether this property can be generalized to the other two objects. Having the doors, rocks, or trees as hiding places provides an engaging context for the game, but the objects remain hidden during the task and are never revealed because the researchers do not want the perceptual similarity to influence the children’s decisions. Learning to better understand how children reason about similar objects in the absence of visual images can help researchers and educators more effectively prepare instruction that will support children’s learning most effectively.
Research Spotlight

The Classroom Game

The purpose of this study by Dr. Anna Fisher and graduate student Karrie Godwin is to investigate how children allocate their attention in learning environments. We are particularly interested in examining how physical features of the environment (e.g., toys, posters, artwork, etc.) can contribute to or hinder children’s ability to attend to the content of a lesson. We are also examining whether children’s ability to effectively distribute their attention has consequences for learning new content. In this study, a researcher is teaching kindergartners a series of mini-lessons in a small group format. For half of the lessons, the physical environment includes items that are typically found in early childhood classrooms that may be potential sources of distraction (e.g. posters, artwork, manipulatives, etc.). For the remaining lessons, the physical environment only includes visual aids and materials directly relevant to the lesson. Each lesson lasts approximately 10 to 15 minutes. During each lesson, the children listen to a short story as a group. Then, each child answers questions about the content of the story. For example, after a story about plants, the child might be asked to circle which of four pictures was shown in the book.

The Listening Game

In this study by Dr. Erik Thiessen and graduate student Lucy Erikson, researchers are investigating how young children discover words in fluent speech, which lacks reliable pauses between words. One cue that may help children segment speech is its statistical structure. For instance, syllables within words tend to have a higher probability of co-occurrence than syllables that span word boundaries (e.g., the syllables in ‘pre-tty’ and ‘ba-by’ occur together more frequently than the syllables between those two words, ‘ty-ba’). Prior research with artificial languages stripped of all other cues to word-identity has demonstrated that both infants and adults are sensitive to this cue. Furthermore, this learning often happens after brief, passive exposure periods and without participants’ conscious awareness of learning. However, in studies where participants are asked to do a secondary task while listening to the speech, performance is disrupted. This finding suggests that attention is necessary for learning, but the specific role attention plays in the process is not yet known. In the present research, researchers are interested in exploring how performance on a task of sustained attention (the Moving Eyes Game) is related to performance on this word segmentation task. In the Listening Game, children listen to an audio recording of a speech stream while using a coloring app on an iPad. Before listening to the language, children were introduced to a stuffed dog and told they would be listening to a pretend language spoken by dogs. After the exposure phase, they are presented with sets of two words and asked which word sounded more like a word they heard in the dog language while playing on the iPad. All of the words they hear are syllable combinations that were present in the stream, but within each pair one of the words is characterized by higher statistical coherence than the other (i.e., the syllables predicted each other 100% of the time compared to 33% of the time).
Research Spotlight, continued

Research Methods Class Studies

Students in Professor Anna Fisher's Developmental Research Methods class will start the semester with a lab entitled the **The Remember What and Where Game** (see below). Later in the semester, students will work in groups to conduct a study of their own design, which will be approved both by their teacher and by Dr. Carver.

**The Remember What and Where Game**

The Research Methods students will work in pairs and small groups to conduct a study of spatial working memory capacity. *Working memory* refers to our ability to hold in mind information intended for immediate use, such as dialing a phone number someone just told you. *Spatial working memory* refers to the ability to remember locations of objects in space, such as remembering locations of landmarks on a map.

Information stored in working memory is forgotten relatively quickly unless we make a special effort to retain it, for instance by repeating it several times. The amount of transient information one can hold in mind increases with development. For instance, a 2-year-old may not be able to remember a sequence of three random instructions (for example: touch your nose, clap 3 times, and shake your head), but a kindergartner should be generally able to do so.

In the **Remember What and Where Game**, students in the Developmental Research Methods class will investigate the age-related increase in spatial working memory capacity. In this task, each child will see a 4-by-3 grid with 1 to 6 objects placed in random locations on the grid (see example below). The child studies the target grid for 30 seconds and then is asked to recreate the position of each object on another grid. The correct locations are marked on the testing grid in grey, but the child must remember which object belongs where.

![Example grid](image)

Each child will play the **Remember What and Where Game** twice within one session, once with familiar objects (as in the example above) and once with novel nonsense objects that can’t be easily labeled with words. This contrast allows the students to test the hypothesis that children use a mixture of visual and verbal encoding strategies on this task. Verbal encoding strategies (such as saying to oneself ‘car goes here’) should be difficult when unfamiliar objects for which the child does not have a name are used in the game; therefore, the students expect the game to be more challenging to children of all ages with novel objects rather than familiar objects.
Research Spotlight

The Picture Finding Game

Early childhood is a time when children discover many new words. Word recognition tasks are often used to determine the average age of acquisition for these words. These data can then be applied to the study of other cognitive topics, including generalization or inductive inference, when using words and pictures. Dr. Anna Fisher and graduate student Layla Unger are particularly interested in the degree to which children utilize this knowledge in various reasoning tasks. In the Picture Finding Game, children are shown black and white slides of pictures. Then, children are asked to find the picture representing the target word on each slide. For example, we might ask children to find the picture of the rose among the set below.

The Numbers Game

Kindergarten is also a time when children learn many new math skills and concepts, such as identifying numerals, counting, and comparing sets of different sizes. The purpose of the Numbers Game is to develop an age-appropriate assessment of Kindergarten students’ math skills and knowledge. During this task, participants are presented with problems like the one depicted in the example below, and the experimenter reads the instructions for how to complete the problem. Kindergarten students who take part in this assessment are only given generalized positive feedback (e.g., “You did a great job!”); they are not told whether their responses are correct or incorrect. The data collected from this study will only be used to contribute to the evaluation of math instruction materials that are being investigated in other studies being conducted this year. These data will not be used as an academic evaluation of participants in any way.

Experimenter instructions: “Please circle seven of these bunnies.”
Research Spotlight, continued …

The Reasoning Game

In this study, Dr. Anna Fisher and graduate student Karrie Godwin are investigating young children’s understanding of categories and the development of category-based reasoning. In particular, they are interested in examining the role of conceptual and perceptual information on category-based reasoning and induction in early childhood. Specifically, they are interested in the degree to which children utilize their knowledge of categories and perceptual similarity in a reasoning task where these sources of information are in conflict. They are also interested in whether labels help children make inferences. In the Reasoning Game, children are shown sets of three pictures similar to the ones presented here. For example, we might show children a lemon, a tennis ball, and a lemon slice. For half of the trials, children may be told the object labels. For the other half of the trials, no labels will be used. Children will learn that one of the objects has a particular property, and then the children must decide whether this property can be generalized to the other two objects.

The Naming Game

In a related study, Dr. Anna Fisher and graduate student Karrie Godwin are investigating young children’s understanding of categories and the development of category-based reasoning. In particular, they are interested in examining the role of conceptual and perceptual information on category-based reasoning and induction in early childhood. Specifically, they are interested in the degree to which children utilize their knowledge of categories and perceptual similarity in a reasoning task and whether familiarity with labels helps children make inductive inferences during a reasoning task. In the Naming Game, children are shown a series of pictures similar to the one presented below. Then, children are asked to identify the animal or object pictured.

Example trial: “We are going to play a game with pictures. I am going to show you a picture and I want you to tell me what the picture is called. Okay, let’s play the game. What is this called?”

Undergraduate Researchers in Training

Students in Dr. Anna Fisher’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. For example, groups are studying whether children share more when an adult models generosity, whether children persist longer on challenging tasks when adults comment on their effort, whether children’s stated preferences are swayed by knowing what peers or older children have previously chosen, how children resolve discrepancies between a character’s words and facial expression, and what type of counting experience helps children learn to recognize numerals. 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 outside the Children’s School Office. What an interesting set of developmental psychology topics!
Research Spotlight

The Flower Game

Professor Anna Fisher and graduate student Karrie Godwin are investigating the relationship between learning and other general cognitive processes such as attention, memory, processing speed, executive function, and general reasoning ability. In the Flower Game, they are examining how children allocate their attention in different learning environments. In particular, they are interested in examining whether children’s ability to effectively distribute their attention has consequences for learning new science content. In this computer game, children are presented with a series of pictures of flowers. Children are told the name for each picture. At the end of the game, a memory assessment is administered to see which items the children learned. For example, after learning the names of different types of flowers, children may be presented with a picture of a flower and asked to recall the flower’s name (e.g., “What was the name of this flower?”).

The Fish Game

Fisher and Godwin’s Fish Game is a similar computer game in which children are presented with a series of pictures of fish. Children are told the name for each picture. At the end of the game, a memory assessment is administered to see which items the children learned. For example, after learning the names of different types of fish children may be asked to identify the barb (e.g., “Point to the barb”).

The Math Game

Graduate student Jing Tian is working with Dr. Robert Siegler to investigate whether individual differences and cross-country differences in early mathematical achievements are influenced by spontaneous focusing on numerosity. To determine children’s spontaneous focusing on numerosity tendency, the experimenter tells children several stories and asks comprehension questions regarding the information in the stories, including some questions about numbers mentioned in the stories. After the story task, the experimenter will play an imitation game with children. The experimenter puts a certain number of red chips into the Teddy Bank and asks children to do exactly the same afterwards, noting whether the child imitates the correct number of chips.

Then, the researchers use three short tasks to determine children’s early mathematical abilities.
- Asking children to give the experimenter a certain number of toys.
- Finding the proper place for numbers on a 0 to 10 number line.
- Comparing two numbers and indicating which is bigger.

Jing will calculate the correlation between the children’s math skills and spontaneous focus on numerosity, as well as comparing the performance of American and Chinese children. This study will add to our understanding of individual and cross-country differences in early mathematical abilities. Also, it has implications for improving the abilities of children with poor mathematical skills and helping them catch up with their peers.
Research Spotlight, continued …

The Hide and Seek Game

A math study being run by students in Dr. Anna Fisher’s Developmental Research Methods class is designed to investigate whether using concrete or abstract objects for counting has an effect on symbolic understanding of numbers in preschoolers. A **concrete object** refers to an object that is perceptually rich (colorful and visually stimulating) and familiar, such as a photograph of a farm animal. An **abstract object** refers to an object without a concrete existence that is perceptually poor (neither colorful nor visually stimulating), such as a black dot. It has been shown that counting concrete objects influences the counting performance of 4-year-old children. It is harder for children to count perceptually rich objects than it is to count perceptually poor objects. These student researchers are interested in whether this effect generalizes to the symbolic understanding of numbers.

In the Hide and Seek Game, researchers showed the child five small boxes with different numbers of either farm animals or black dots on them. The child was shown a small teddy bear being placed into one of the boxes and then told that the big teddy bear likes to copy whatever the small bear does. Then a screen was removed from the table, revealing 5 big boxes that have numerals on them that correspond to the number of black dots or farm animals. Children were asked to find the big bear. The bear was hidden in the box with the numeral that corresponds to the number of black dots or farm animals on the small box where the small bear was hidden. After the Hide and Seek trials, researchers conducted a post-test to examine children’s numerical knowledge in the range of 1-10. This was tested with a sheet of paper with four numerals on each page, where the child pointed to the correct numeral out of four options when the researcher said a number.

![3](image1) ![5](image2)

It is important to understand how children learn symbolic representations of numbers. In many cases, teachers may use perceptually rich objects as an aid to hold the attention of young children, but this may actually hinder the process of understanding symbolic representation of numbers by acting as a distractor. The results of this study will help educators and parents better support young children’s math learning.

**NOTE:** Four other project groups from the Developmental Research Methods class are still finalizing their studies, but families will receive study descriptions via the children’s backpacks on the day they participate as usual.
Research Spotlight

The Fruit & Vegetable Game

Professor Anna Fisher and graduate student Karrie Godwin are investigating the relationship between learning and other general cognitive processes such as attention, memory, processing speed, executive function, and general reasoning ability. In the Fruit & Vegetable Game, they are examining how children allocate their attention in different learning environments. In particular, they are interested in examining whether children's ability to effectively distribute their attention has consequences for learning new science content. In this computer game, children are presented with a series of pictures of fruits and vegetables. Children are told the name for each picture. At the end of the game, a memory assessment is administered to see which items the children learned. For example, after learning the names of different types of fruits and vegetables, children may be presented with a picture of a fruit and asked to recall the fruit's name (e.g., “What was the name of this fruit?”).

The Butterfly Game

Fisher and Godwin’s Butterfly Game is a similar computer game in which children are presented with a series of pictures of butterflies. Children are told the name for each picture. At the end of the game, a memory assessment is administered to see which items the children learned. For example, after learning the names of different types of butterfly children may be asked to identify the morpho (e.g., “Point to the morpho”).

The Remember That Game

In a series of games like the Fruit & Vegetables Game, the Butterfly Game, the Flower Game, and the Fish Game, children learn about novel science content by reviewing a series of pictures of animals or plants and practicing the name for each picture. In the Remember That Game, experimenters examine whether children’s ability to engage in sustained attention during those initial games affects their long-term retention of the science material. In the Remember That Game, children are asked questions about the animals and plants they learned about over the semester. For example, children are presented with a series of pictures and asked to recall the name of the objects (e.g., “What was the name of this Butterfly?”). Children are also asked about educational displays that were present in the classroom to see if children remember the classroom visual environment. For example, children may be presented with pairs of objects and asked to identify which object he or she saw in the classroom previously.
The Shape Sorting Game

Shira Bauman, Isabella Daher, Michael Tyler, and Travis Andring, students in Professor Iliah Nourbakhsh and Professor Reid Simmons’ Human-Robot Interaction class, are conducting an experiment examining the trust Kindergarten children place in a robot. The children are given 20 blocks of assorted color, size, and shape, and then they are asked to sort the shapes in any way they choose. The children experience one of three conditions: in one of the conditions the child is in the room on their own, and in the other two conditions a pretend “robot” will be in the room with them. The fake cardboard robot has a person inside, and the children are told that the researchers are designing a real robot and need their help so they pretend that the cardboard robot is real. The two robot conditions differ in that the children are either exposed to a silent robot or a robot that encourages the child to change the sorting method.

The purpose of the experiment is to see if the children trust the robot's advice to change their sorting method from their initial inclination. By doing this study, the researchers hope to learn more about how children might interact with robots in a classroom setting. For example, a robot might be used in a teaching position, giving examples and helping children work on math problems, for example. If a child is working on a problem but begins to have trouble, the robot might explain the problem in a different way than the student was originally attempting to solve it, or provide explanations that approach the problem from a different angle. This advice could be confusing for a young child. In designing such education systems, it is necessary to understand how the child would react when presented with different options for completing a task. Will the student continue to try to solve the problem the original way? Or would they stop what they are doing and try to solve the problem in the manner being presented by the robot? The researchers hope to begin to answer this question through their experiment.

Scientific American Reporter

On Wednesday, April 9th, Barbara Kantrowitz, a professor Columbia University Graduate School of Journalism and a reporter for Scientific American, toured the Children’s School to better understand the role of laboratory schools in supporting scientific research in education. Ms. Kantrowitz was commissioned to do a story about using evidence-based curricula, particularly related to the practice guide on Teaching Math to Young Children (for which Dr. Carver was a panelist), but she got interested in the many roles that laboratory schools play in the field of learning sciences. During Ms. Kantrowitz’s visit, she toured the school, watched Dr. Carver’s child development students record data for an upcoming paper, observed students in the research methods class collecting data, joined Dr. Carver’s practicum students for a discussion of autism led by Mrs. Rosenblum, and watched graduate student Karrie Godwin conduct several research sessions. We will share her article with you when it is published.