

CDS2015

Official Full Conference Proceedings (10/10/15)

Date: Thursday, 08/Oct/2015

<p>8:00am - 5:30pm</p> <p>OSU Room 035</p>	<p>Companion Conference: Cultural Diversity in Social Learning Session Chair: Cristine H. Legare, The University of Texas at Austin; legare@austin.utexas.edu Session Chair: Tamar Kushnir, Cornell University; tk397@cornell.edu</p> <p>The dearth of systematic psychological research outside of Western cultural contexts is a major impediment to theoretical progress in the study of social learning. Recent ethnographic and experimental research has demonstrated that cultural differences in social interaction, social cognition, and childrearing practices have profound effects on children's learning. The effects occur both in the content of what children learn and in the processes by which new understanding is constructed. At the same time, there is also evidence for some fundamental similarities across cultures in children's social learning strategies when acquiring the practices and beliefs of their culture.</p> <p>Developmental research on cross-cultural similarities and differences has the potential to address some of these critical gaps in the scientific understanding of social learning. The goal of this preconference is to gather together leading examples of empirical research that explore social learning strategies in childhood across a variety of cultural contexts and caregiving settings. We will discuss cutting edge research that draws on insights from a variety of disciplines – including developmental and cultural psychology, biology, cognitive and evolutionary anthropology, and education – with the goal of facilitating cross-fertilization within and across these disciplines. Our emphasis will be on international research that utilizes innovative developmental, cross-cultural, and mixed-methodological approaches to studying the ontogeny of human cultural learning.</p> <p>For more information and to register for this preconference event, please visit: http://www.eventbrite.com/e/cds-preconference-cultural-diversity-in-social-learning-tickets-16600451397</p>
<p>8:30am - 6:00pm</p> <p>Elijah Pierce A</p>	<p>Preconference Event: Early Development, Conceptual Change, and Continuity: Insights from Cognitive Neuroscience Session Chair: Hilary Richardson, MIT; hilrich@mit.edu</p> <p>Evidence from neuroimaging studies has increasingly been brought to bear on age-old questions in cognitive development. Our goal is to discuss contributions of neuroimaging data to the study of cognitive development thus far, and to consider the contexts and questions in which neuroscience data will be useful moving forward: when are developmental hypotheses best teased apart by looking under the hood?</p> <p>For more information and to register for this event, please visit: https://sites.google.com/site/develneuro/</p>
<p>8:30am - 6:00pm</p> <p>Elijah Pierce B</p>	<p>Preconference Event: The Development of Spatial Thinking Session Chair: Shannon M. Pruden, Florida International University; sdick@fiu.edu</p> <p>This preconference will draw from both experts and emerging scholars interested in the science of spatial thinking, including developmental scientists, cognitive scientists, educational psychologists, linguists, and neuroscientists. The goal is to attract scientists (across different disciplines) interested in an integrative research approach to the science of spatial thinking, and thus, to create synergy between disciplines that normally do not collaborate. The preconference will: (1) highlight what we currently know about the development of spatial thinking both in and out of educational settings; (2) explore recent empirical advances on the ways to improve spatial thinking; (3) invite discussion about the best ways to educate spatial thinking; (4) increase discourse on how to translate what we know about the development of children's spatial thinking into effective interventions, curricula, and policy, and; (5) stimulate new research on the development of spatial thinking.</p> <p>For more information on attending the event or submitting to it, please click here.</p> <p>To register for this event, please visit: http://www.eventbrite.com/e/cds-pre-conference-on-development-of-spatial-thinking-registration-17082155186</p>
<p>1:00pm - 5:30pm</p> <p>Private Dining Room</p>	<p>Preconference Event: Coding, Sharing, and Reusing Video Data with Databrary Session Chair: Karen Elizabeth Adolph, New York University; karen@databrary.org</p> <p>Across age, context, and culture, children produce an extraordinary array of behaviors—speech, gestures, visual exploration, facial expressions, motor actions, and social interactions. Video captures much of the richness and complexity of children's behavior. But most developmental researchers don't take advantage of all that video has to offer. The Databrary project, led by Karen Adolph and Rick Gilmore, provides the software, cyber-infrastructure, and policy framework to fulfill the promise of video and thereby accelerate the pace of discovery in developmental science.</p> <p>This free workshop will teach researchers—from principle investigators to undergraduates—how to exploit the richness inherent in children's behavior by coding, sharing, and reusing research videos. We will show how Datavyu, a free video-coding tool, helps researchers to mine the richness of their videos. With the right tools, video coding can be easy, efficient, and enlightening. We will provide case study examples of how videos have been reused to address new questions beyond the scope of the original study or outside the purview of the original researchers. In addition to research studies, attendees will learn how videos can be reused as illustrations in teaching, to see procedures and methods, to verify coding rules, and to provide inspiration and satisfy curiosity.</p> <p>Videos are valuable to other researchers and capable of yielding new insights into the causes and consequences of learning and development. Thus, we will urge attendees to consider openly sharing their videos among a community of like-minded researchers. We will describe how our policy framework alleviates concerns about participants' privacy, how to obtain participants' permission to share identifiable data and amend their IRB protocols, and how open sharing benefits the original data contributor with increased citations, attention, and prospects for federal funding. Attendees will learn how to use Databrary to manage their own studies and students, and to monitor progress in data collection and coding.</p> <p>Prior to open sharing, Databrary operates as a free, secure backup and lab server. Lab members and collaborators can</p>

	<p>easily access videos, which can be uploaded as they are collected. This “upload-as-you-go” functionality organizes and prepares appropriate videos for open sharing—only when the data contributor is ready—with merely the click of a button.</p> <p>Throughout the workshop, attendees will get hands-on experience exploring Databrary’s functionality and datasets. Attendees will leave with in-depth understanding about how to code, reuse, and share video data with Datavyu and Databrary.</p>
7:00pm - 9:00pm	Welcome Reception and Registration
Emerson Burkhart A and B	Light hors d’oeuvres, a cash bar, and the company of colleagues
9:00pm - 11:00pm	Student Pub Night
Bucks & Pucks	Reconnect with old friends and colleagues, and meet some new ones. Meet in the hotel lobby after the Welcome Reception to proceed to the bar.
Date: Friday, 09/Oct/2015	
8:00am - 8:30am	Light Continental Breakfast and Registration
Bellows Prefunction	
8:30am - 9:00am	Honoring 15 Years of CDS
George Bellows DEF	Peter Ornstein and Henry Wellman
9:00am - 10:15am	Plenary Address by Carol Dweck: What do Babies Want?
George Bellows DEF	Session Chair: Andrei Cimpian , University of Illinois; acimpian@illinois.edu
10:15am - 10:30am	Coffee Break
Bellows Prefunction	
10:30am - 12:00pm	Plenary Symposium: Beyond WEIRD Science: Broadening our Cultural Perspective on Cognitive Development
George Bellows DEF	Session Chair: Amanda Lea Woodward , University of Chicago; woodward@uchicago.edu
12:00pm - 1:15pm	Lunch on your own I
	For information on local restaurants, including those within walking distance, please visit http://meetings.cogdevsoc.org/travel-lodging or stop by the registration desk.
12:00pm - 1:15pm	Lunch Workshop II: Government Funding Opportunities (registration required)
	Session Chair: Laura L. Namy , National Science Foundation; lnamy@nsf.gov Session Chair: Kathy Mann Koepke , National Institutes of Health/NICHD; KMK@nih.gov Chair: Erin Higgins , Institute of Education Sciences, Erin.Higgins@ed.gov
Emerson Burkhart A	Organized by Institute of Education Sciences (IES), National Institutes of Health (NIH), National Institute of Child Health and Human Development (NICHD), and National Science Foundation (NSF) Please join Erin Higgins (IES), Kathy Mann Koepke (NIH/NICHD) and Laura Namy (NSF) for an in-depth question and answer session on the ins and outs of government funding. Come and learn how to advance your research with federal support.
12:00pm - 1:15pm	Lunch Workshop I: The Open Science Framework (registration required)
	Session Chair: Courtney K. Soderberg , Center for Open Science; courtney@cos.io CDS participants are welcome to join the CoS for a workshop designed to introduce you to the Open Science Framework (OSF) and reproducible research practices. Free and open source, the OSF is part project management and collaboration software and part version control system. The OSF helps researchers manage the entire research lifecycle: document and archive studies, share materials, collaborate efficiently with research partners, increase transparency, and manage the scientific workflow. As part of this hands-on workshop, attendees will learn how to utilize the features of the OSF to increase the reproducibility of scientific research projects. Participants will create a reproducible project from start to finish, and learn how to tailor the OSF experience to work most efficiently for their research needs. For more information on the Center for Open Science, please visit http://cos.io/stats_consulting and http://osf.io . Participants must bring a laptop with them to this event.
Emerson Burkhart B	
1:15pm - 2:30pm	PS-I: Poster Session I
George Bellows ABC	
2:30pm - 4:00pm	Are Children Effective Active Learners?
George Bellows DEF	Session Chair: Zi Lin Sim , University of California, Berkeley; me.zilin@gmail.com Session Chair: Fei Xu , UC Berkeley; fei_xu@berkeley.edu
2:30pm - 4:00pm	Oral Papers I: Attention, memory, and symbols
Elijah Pierce A and B	Session Chair: Andrei Cimpian , University of Illinois; acimpian@illinois.edu
2:30pm - 4:00pm	Developing representations of the self
Emerson Burkhart A	Session Chair: Rachel Magid , MIT; rwmagid@gmail.com Session Chair: Habiba N. Azab , University of Rochester; hazab@mail.bcs.rochester.edu
2:30pm - 4:00pm	Early Math Matters: Development of Number, Shape and Pattern Knowledge in Early

Emerson Burkhardt B	Childhood Session Chair: Bethany Rittle-Johnson , Vanderbilt University; bethany.rittle-johnson@vanderbilt.edu
4:00pm - 4:15pm	Coffee Break
Bellows Prefunction	
4:15pm - 5:45pm	The Development of Moral Judgment: From the descriptive to the normative Session Chair: Sydney Levine , Rutgers University; levine@ruccs.rutgers.edu
George Bellows DEF	
4:15pm - 5:45pm	Oral Papers II: Infant cognition and comparative cognition Session Chair: Stephanie Mia Denison , University of Waterloo; stephanie.denison@uwaterloo.ca
Elijah Pierce A and B	
4:15pm - 5:45pm	Language matters for more than talking: How language influences cognitive development in childhood Session Chair: Catarina Vales , Indiana University; cvalues@indiana.edu
Emerson Burkhardt A	
4:15pm - 5:45pm	Learning outside the lab: Factors that contribute to memory and learning in informal learning environments Session Chair: Megan Geerdts , UNCG; msgeerd@uncg.edu
Emerson Burkhardt B	
5:45pm - 7:00pm	PS-II: Poster Session II
George Bellows ABC	Cash bar and light snacks
Date: Saturday, 10/Oct/2015	
8:00am - 8:30am	Light Continental Breakfast
Bellows Prefunction	
8:30am - 9:00am	Announcements and Awards Introduction and awards - Amanda Woodward Election results - David Uttal Presentation of CDS Book and Journal Awards - Judy DeLoache and Angel Lillard
George Bellows DEF	
9:00am - 10:15am	Plenary Address by Janet Werker: Critical Periods in Speech Perception Development Session Chair: Lisa Michelle Oakes , University of California, Davis; lmoakes@ucdavis.edu
George Bellows DEF	
10:15am - 10:30am	Coffee Break
Bellows Prefunction	
10:30am - 12:00pm	Plenary Symposium: Living in Pasteur's Quadrant: Four examples of advancing cognitive development by researching real educational problems Session Chair: David Uttal , Northwestern University; duttal@northwestern.edu
George Bellows DEF	
12:00pm - 1:15pm	Lunch on your own II For information on local restaurants, including those within walking distance, please visit http://meetings.cogdevsoc.org/travel-lodging or stop by the registration desk.
12:00pm - 1:15pm	Lunch Workshop IV: Research and Museum Partnerships Session Chair: Helen Shwe Hadani , Center for Childhood Creativity; hhadani@centerforchildhoodcreativity.org Session Chair: Marta C. Biarnes , Museum of Science; mbiarnes@mos.org Over the past decade, developmental researchers and museums of all types have developed collaborative, mutually beneficial partnerships. In the Living Laboratory(R) model, researchers conduct studies with children in the museum and families learn about the science of child development from the researchers. Funded by the National Science Foundation, the National Living Laboratory (NLL) initiative currently supports collaborations at 25 museums in the U.S. and is committed to expanding this model to new sites. In this workshop, participants will learn how to initiate museum partnerships in their own communities, see examples of Living Laboratory research studies in a variety of museum settings, and hear from scientists who have established successful collaborations with museums in their community. In addition, participants will learn about the <i>Distance Research Project</i> , a new program at the Center for Childhood Creativity (CCC) that allows researchers from across the country to collect data at the Bay Area Discovery Museum. The CCC is a research-focused educational institute within the Bay Area Discovery Museum and has an on-site testing lab that provides access to a large and diverse population of young children. The CCC launched the <i>Distance Research Project</i> in early 2015 to benefit developmental researchers with limited access to young participants—extending its impact beyond the Museum.
Emerson Burkhardt A	
12:00pm - 1:15pm	Lunch Workshop III: The Open Science Framework (registration required) Session Chair: Courtney K. Soderberg , Center for Open Science; courtney@cos.io A second OSF workshop is now being offered on Saturday in addition to Friday's workshop. CDS participants are welcome to join the CoS for a workshop designed to introduce you to the Open Science Framework (OSF) and reproducible research practices. Free and open source, the OSF is part project management and collaboration software and part version control system. The OSF helps researchers manage the entire research lifecycle: document and archive studies, share materials, collaborate efficiently with research partners, increase transparency, and manage the scientific workflow. As part of this hands-on workshop, attendees will learn how to utilize the features of the OSF to increase the reproducibility of scientific research projects. Participants will create a reproducible project from start to finish, and learn how to tailor the OSF experience to work most efficiently for their research needs. For more information on the Center for Open Science, please visit http://cos.io/stats_consulting and http://osf.io .
Emerson Burkhardt B	

	Participants must bring a laptop with them to this event.
12:00pm - 1:15pm	Lunch Workshop V: Professional Development Luncheon (registration required) Session Chair: Jasmine M. DeJesus , University of Michigan; jasmine.dejesus@gmail.com Session Chair: Joshua David Rottman , Boston University; rottman@bu.edu
Robert King	The lunch workshop will provide an opportunity to network with new and established scientists and ask them your burning questions about the field, the job market, publishing, obtaining funding, and related topics.
1:15pm - 2:30pm	PS-III: Poster Session III
George Bellows ABC	
2:30pm - 4:00pm	Social-cognitive development: Disposition influences theory of mind and social competence across infancy, early childhood, and adulthood Session Chair: Jonathan D. Lane , Vanderbilt University; jonathan.lane@vanderbilt.edu Session Chair: Lindsay Caroline Bowman , Harvard Medical, Boston Children's Hospital; lindsay.bowman@childrens.harvard.edu
George Bellows DEF	
2:30pm - 4:00pm	Oral Papers III: Language Session Chair: David Barner , UCSD; barner@ucsd.edu
Elijah Pierce A and B	
2:30pm - 4:00pm	How Children Reason About Events at the Cusp of Possibility Session Chair: Andrew Shtulman , Occidental College; shtulman@oxy.edu
Emerson Burkhardt A	
2:30pm - 4:00pm	Objects in a social world: Interactions between object cognition and social cognition in infancy Session Chair: Melissa M. Kibbe , Boston University; kibbe@bu.edu
Emerson Burkhardt B	
4:00pm - 4:15pm	Coffee Break
Bellows Prefunction	
4:15pm - 5:45pm	The Development of Social Categories: Insights from Understudied Populations Session Chair: Kristina Olson , University of Washington; kr Olson@uw.edu Session Chair: Kristin Shutts , University of Wisconsin - Madison; kshutts@wisc.edu
George Bellows DEF	
4:15pm - 5:45pm	Oral Papers IV: Math and number Session Chair: Nicole M. McNeil , University of Notre Dame; nmcneil@nd.edu
Elijah Pierce A and B	
4:15pm - 5:45pm	Vocabulary and cognitive development: Crossing the basic-applied divide. Session Chair: Nora M. Isacoff , New York University; nisacoff@gmail.com
Emerson Burkhardt A	
4:15pm - 5:45pm	Ritual, Religious, and Cultural Practices Shape Cognitive Development Session Chair: Rebekah Richert , University of California, Riverside; rebekah.richert@ucr.edu
Emerson Burkhardt B	
5:45pm - 7:00pm	PS-IV: Poster Session IV
George Bellows ABC	Cash bar and light snacks

Presentations

[Single Presentation of ID 809]

Time: Friday, 09/Oct/2015: 9:00am - 10:15am · *Location:* George Bellows DEF

Session Chair: Andrei Cimpian, University of Illinois

ID: 809 / [Single Presentation of ID 809]: 1

Plenary Address

Plenary Address by Carol Dweck: What do Babies Want?

Carol Dweck

Stanford University, United States of America; dweck@stanford.edu

In this talk, I will present a motivational framework for early development. I will propose that all infants are born with basic needs, I will specify what they are, and I will show how early development is both motivated and shaped by these needs.

[Single Presentation of ID 811]

Time: Friday, 09/Oct/2015: 10:30am - 12:00pm · Location: George Bellows DEF
Session Chair: Amanda Lea Woodward, University of Chicago

ID: 811

PlenarySymposium

Plenary Symposium: Beyond WEIRD Science: Broadening our Cultural Perspective on Cognitive Development

Chair(s): Amanda Lea Woodward (University of Chicago)

This symposium brings together three elegant research programs that use findings from across diverse cultures to shed new light on basic aspects of cognitive development.

Presentations of the Symposium

The ontogeny of cultural learning

Cristine Legare

University of Texas, Austin

Humans are a social species and much of what we know we learn from others. To be effective and efficient learners, children must be selective about when to innovate, when to imitate, and to what degree. In a systematic program of interdisciplinary, mixed-methodological, and cross-cultural research, my objective is to develop an ontological account of how children flexibly use imitation and innovation as dual engines of cultural learning. Imitation is multifunctional; it is used to learn both instrumental skills and cultural conventions such as rituals. I propose that the psychological system supporting the acquisition of instrumental skills and cultural conventions is driven by two modes of interpretation: an instrumental stance (i.e., interpretation based on physical causation) and a ritual stance (i.e., interpretation based on social convention). What distinguishes instrumental from conventional practices often cannot be determined directly from the action alone but requires interpretation by the learner based on social cues and contextual information. I will present evidence for the kinds of information children use to guide flexible imitation. I will also discuss cross-cultural research in the U.S. and Vanuatu (a Melanesian archipelago) on the interplay of imitation and innovation in early childhood.

Thinking about nature: Across culture, across languages, and across development

Sandra Waxman

Northwestern University

How do our most fundamental concepts of the natural world – living thing, animal, human -- unfold? How do we view the relations among these concepts? Until recently, research in this arena focused predominantly on children from Western, urban, technologically-advanced communities. But to discover which notions are universal and how they are shaped by experience, we have adopted a cross-linguistic, cross-cultural approach. I'll describe (decades of) evidence illuminating how young children from diverse cultural and language communities acquire fundamental concepts of the natural world and how their knowledge is shaped by the communities in which they are immersed (including children from the US (native and non-native Americans) and Argentina's Chaco rainforest). This basic research, which underscores the challenges facing young children in learning about the natural world, has implications for theories of cognitive development, science education and children's media. To teach effectively, we need to understand the systems of knowledge that children bring with them to their increasingly diverse US classrooms.

Cultural development of mathematical ideas: Situating cognitive analyses in historical time

Geoffrey Saxe

University of California, Berkeley

Psychological studies of cognitive development are often conducted without attention to relationships between the cognitive activities of individuals and historical developments in communities. In my talk, I sketch a framework that illuminates these relations. My focus is on the Oksapmin, a remote Papua New Guinea group that traditionally use a 27-body part counting system, and I illustrate the framework's utility through longitudinal research on shifts in forms and functions of the body system over 36 years. I show that, as Oksapmin people engage with collective practices of economic exchange and schooling, the cognitive constructions that they produce with the counting system are unwitting alterations of the traditional system. As everyday collective problems shift over time, counting forms are altered in ways that become constitutive of new conventional forms in the community adapted to changing practices of daily life. The framework and empirical techniques are useful for investigating shifting representational forms and functions through historical time in any community and in varied knowledge domains.

PS-I: Poster Session I

Time: Friday, 09/Oct/2015: 1:15pm - 2:30pm · Location: George Bellows ABC

ID: 411 / PS-I: 1

Poster

Topics: Communication, Language

5-year-olds' Sensitivity to Disfluency and Speaker Identity in Referential Communication

Justine Thacker¹, Susan Graham¹, Craig Chambers²

¹University of Calgary, Canada; ²University of Toronto, Canada; jthacker@ucalgary.ca

Children can use filled pauses (“uh” or “um”) to make referential predictions, but it is not clear if this use reflects a sophisticated understanding of speakers’ production difficulties. If this is the case, children should adjust their interpretation of filled pauses dependent on speaker-specific information. Using an eye-tracking paradigm, listeners were introduced to a male and a female character with gender-typed colour preferences. These characters instructed children to look at pink or blue objects in a display using fluent (“Look at the X”) and disfluent (“Look at thee, uh, X”) instructions. Results indicated that 5-year-olds ($n=31$) and adults ($n=38$) anticipated reference to gender-typed objects during the baseline interval (“Look at”). This expectation persisted during fluent instructions, however it was disrupted by disfluent instructions: Upon hearing “thee, uh,” listeners looked significantly less at speaker-preferred objects. These results suggest that children use disfluency as a marker to adjust their speaker-specific referential predictions.

ID: 787 / PS-I: 2

Poster

Topics: Infant Cognition, Neuroscience Approaches, Social Cognition

A developmental analysis of behaviors related to the mirror neurom system in 6-24 months infants

Alba Juliana Arenas-Castellanos, Zachery Ryan Hernandez, Jesus Gabriel Cruz-Garza, Murad Megjhani, Berdakh Abibullaev, Sri R.P. Maddi, Teresa Tse, Carlos Armstrong, Wanxia Long, Jose Luis Contreras-Vidal

Laboratory for Noninvasive Brain-Machine Interface Systems, Department of Electrical and Computer Engineering, University of Houston, Houston, TX, USA; juarenas16@hotmail.com

It has been proposed that a mirror neuron system (MNS) may help explain how humans interact and learn by imitating others. However, little is known about the emergence of the MNS during development. We present behavioral data from a mobile brain imaging experiment with 6-24 month-old infants. A 64-electrode active EEG-cap measured brain activity during freely behaving interactions with an experimenter. Inertial measurement units monitored bodily movements. The distribution of the observed behaviors varied as a function of age: the occurrence of ‘reach-offer’ and ‘imitate’ actions increased, whereas ‘explore’ and ‘reach-grasp’ actions decreased with age. Our findings suggest a baseline of age-specific behaviors that relate to the emergence of MNS actions and developmental milestones. We discuss these findings in regard to biomarkers for early diagnosis of developmental disorders.

Supported in part by Eunice Kennedy Shriver National Institutes of Child Health & Human Development Award P01 HD064653-01.

ID: 534 / PS-I: 3

Poster

Topics: Social Cognition

Keywords: causal reasoning; emotion

A fine-grained causal understanding of emotions: Toddlers and children match within-valence emotional expressions to their causes

Yang Wu¹, Paul Muentener², Laura Schulz¹

¹Department of Brain and Cognitive Sciences, MIT, USA; ²Department of Psychology, Tufts University, USA; yangwu@mit.edu

Previous research suggests that a fine-grained understanding of emotions emerges gradually over development. However, such studies have looked primarily at infants’ first-person responses to emotional expressions or at children’s ability to use emotion labels. Here we asked whether children could link emotional responses to their probable causes. Our results suggest both an early emerging ability to understand within-valence emotions and rapid development. In a forced-choice task (Experiment 1), two-year-olds were significantly above chance in identifying the causes of positive vocal expressions elicited by exciting, delicious, adorable, funny, and sympathetic events, and four-year-olds’ performance mirrored that of the adults. Using a preferential looking paradigm (Experiment 2), 18-24-month-olds preferentially looked at the matched causes when they heard these vocal expressions. This suggests that very early in development, children have a rich representation of emotions that allows them to link distinct within-valence emotional expressions to their probable causes.

ID: 631 / PS-I: 4

Poster

Topics: Number, STEM Learning

Keywords: arithmetic, income groups

Achievement Gap in Basic Arithmetic: What do strategies have to do with it?

Joanna Schiffman, Elida V. Laski

Boston College, United States of America; schiffmj@bc.edu

This study investigated the income gap in kindergartners' and first graders' ($N = 161$) arithmetic by examining the link between accuracy and strategy use on addition problems. Experimenters used a combination of observation and children's explanations to code the strategy children used for each problem. Low-income children were substantially less accurate than high-income children, both in terms of percentage of correctly solved problems (20% vs. 81%) and the magnitude of errors (12 digits from correct vs. 1 digit from correct), with low-income first graders being less accurate than high-income kindergartners. Higher-income children also used sophisticated strategies, including count on, decomposition, and retrieval, on a greater percentage of problems (81%) than their lower-income peers (25%). This difference in strategies mediated the relation between income group and addition. Examining underlying strategies has implications for understanding the nature of the income gap in mathematics and potential means of remedying it via instruction.

ID: 517 / PS-I: 5

Poster

Topics: Concepts/Categories, Social Cognition, Social Learning

Active Collaborative Learning in Early School-Aged Children

Andrew Gilbert Young, Martha Alibali, Charles Kalish

University of Wisconsin - Madison, United States of America; agyyoung2@wisc.edu

Understanding effects of collaboration on learning is a topic of long-standing interest in the developmental and learning sciences. However, little is known about children's active, or self-directed, learning with peers. This work explores children's individual and collaborative learning in an active category-learning task. Five-to-8-year-old children played a board game in which they queried a continuous two-dimensional category space in order to learn classification boundaries. In a collaborative condition, dyads jointly selected exemplars. In an individual condition, children completed the search alone. We additionally manipulated turn taking policies in an effort to vary how children constructed joint-action plans. Analyses connect children's learning outcomes to exploration in the category space and spontaneous planning and explanatory talk. Children were quite successful in the task, demonstrating relations between exploration and learning, and profiting greatly from coordinating talk. However, collaboration was only superior to individual learning for 7-to-8-year-olds. Five-to-6-year-olds demonstrated superior learning when acting alone.

ID: 753 / PS-I: 6

Poster

Topics: Executive Function, Language

Adapted Trails-Making Task: A Developmentally Sensitive Measure for Children with Diverse Language Experiences

Emilia Motroni¹, Sibylla Leon Guerrero², Christiana Butera², Charles Haynes¹, Gigi Luk²

¹MGH Institute of Health Professions; ²Harvard University; emotroni@mghihp.edu

The Trail-Making Task (TMT) is a language-independent executive function measure in adults. However, it is challenging for children because of their developing automaticity in identifying letters and numbers. We have adapted the TMT for children on a tablet: connecting trails in ascending numbers either attached to a single representation or alternating between two representations. To test efficacy, we administered the adapted TMT to 42 children (ages 5-9) with varying English proficiency levels and 25 adults as comparison. Both children and adults displayed longer response times in conditions with alternating representations versus conditions with a single representation, indicating increased cognitive demand in conditions with alternating representations. Mean response times correlated with age in both children and adults while the coefficient of variation correlated with age in children only. Results suggest that the adapted TMT is sensitive to developing executive function in children with diverse language backgrounds.

ID: 549 / PS-I: 7

Poster

Topics: Social Cognition

Keywords: Stereotype; Explanation

An Inherence Heuristic in Explanation Promotes Stereotype Formation

Lin Bian, Andrei Cimpian

University of Illinois, United States of America; linbian2@illinois.edu

What are the cognitive origins of stereotypes? Here, we propose that these judgments emerge in part due to people's reliance on a basic explanatory heuristic that often leads people to explain regularities in the world in terms of inherent features (Cimpian & Salomon, 2014). Consistent with this proposal, individual differences in reliance on this "inherence heuristic" predicted (1) the tendency to generate stereotypes about a novel social group given sparse information, and (2) endorsement of current stereotypes about real social groups (Study 1), above and beyond other competing variables (e.g., participants' essentialism) (Study 2). Moreover, reliance on the inherence heuristic was related to stereotyping even in 6- to 8-year-olds (Study 3). Finally, reducing adults' (Study 4) and children's (Study 5) reliance on inherent reasoning directly decreased their tendency to form stereotypes. Together, these findings suggest an important role for a basic explanatory heuristic in the formation of stereotypes.

ID: 423 / PS-I: 8

Poster

Topics: Moral Cognition, Social Cognition

Keywords: Social Exclusion, Sympathy, Empathy

And justice for all: Preschoolers are sympathetic toward excluded peers

Kelsey Irvin, Hyesung Grace Hwang (Diversity Fellow), Lori Markson
Washington University in St. Louis, United States of America; hwang.h@wustl.edu

Previous research suggests 4-year-old children evaluate social exclusion based on gender or race as wrong (Killen & Stangor, 2001). However, little is known about how children view victims of social exclusion. In the current study, 4-year-old children were told a story about a child who is excluded by a group. Children were then asked who they want to play with: the child who was excluded or the child from the group who did the excluding. Children chose the excluded child significantly more often (18/24, binomial test, $p=.02$), and further, 72% (13/18) of the children reported that they chose the excluded child because s/he was left out and did not get to play. These findings are in line with children showing sympathy and justice toward victims of social exclusion. Further studies currently underway are investigating how children view victims of social exclusion based on category membership, such as race.

ID: 364 / PS-I: 9
Poster

Topics: Number
Keywords: Numerical Cognition

Approximate Number System (ANS) Acuity Training in Preschoolers from Low-Income Homes

Connor D. O'Rear¹, Mary W. Fuhs², Nicole M. McNeil¹, Elena Silla¹

¹University of Notre Dame, United States of America; ²University of Dayton, United States of America; corear@nd.edu

Recent research suggests that approximate number system (ANS) acuity training may hold promise as an early math intervention. However, research has focused on children from middle-to-high SES backgrounds, leaving open the question about generalizability to children from low-income backgrounds, who may stand to benefit most from such training. In this study, Head Start children were randomly assigned to ANS acuity training or to a shared book reading control intervention. Children who received ANS acuity training outperformed children in the control condition on a measure of acuity, but differences were driven by trials where surface area cues conflicted with numerosity. Moreover, there was no evidence that training affected math knowledge. Training may simply have taught children to attend to the relevant aspects of the ANS acuity task. These results question whether training on an ANS acuity task is a promising avenue for math intervention in children from low-income backgrounds.

ID: 698 / PS-I: 10
Poster

Topics: Concepts/Categories, Media and Technology

Are prompts provided by electronic books as effective as those provided by adults?

Gabrielle A Strouse, Patricia Ganea

University of Toronto, Canada; gabrielle.strouse@gmail.com

Prior research indicates adult questioning during reading enhances children's story understanding. Electronic touchscreen books may mimic adult questioning. Is book questioning as supportive as that provided in person? Ninety-one 4-year-olds were read an electronic book about camouflage in 3 conditions. We varied how prompts were provided: 1) text read by the book, 2) text read by a researcher, or 3) extra-textual prompts provided by the researcher. There was no effect of condition on children's camouflage-related responses at post-test. However, there was an interaction between initial vocabulary level and condition, $F(2,82) = 3.39$, $p = .039$. After adult prompts, all children gave a similar number of camouflage responses. However, after navigating the book that read itself children with higher initial vocabularies provided more camouflage responses than those with lower initial vocabularies, $F(1,29) = 19.63$, $p < .001$. Children with low vocabularies may particularly benefit from adult-led prompting during reading.

ID: 621 / PS-I: 11
Poster

Topics: Executive Function, Memory
Keywords: preschool children

Assessing Executive Functions of Preschool Children: Important Lessons for Future Research

Darlene DeMarie, Laura Mockensturm, Jennifer Bugos, Nader Jamaledine, Heather Stewart

University of South Florida, United States of America; demarie@usf.edu

Research on children's executive functions (EF) is of considerable interest. Yet, researchers still do not agree about the factors that comprise EF, and whether they are unitary and/or diverse for preschoolers. Sixty four- to six-year-old children (17 Caucasian, 21 Hispanic/Latino, 8 Black, 9 Asian, 5 unidentified) from two different preschools completed the Day/Night Stroop Task, Block Span, Backward Block Span, Matching Familiar Figures Test, Simon Says, and the Musical Nuance Test. We coded and scored working memory, inhibition, planning, and shifting, and examined how decisions resulted in consistent or inconsistent performance within as well as between trials or tasks. We noted contextual differences that may have influenced performance as well as differences when children performed tasks alone or as a small group. Many of these factors have not been discussed in previous research and affect conclusions about children's EF. Recommendations will be provided for assessing preschool children in future research.

ID: 601 / PS-I: 12
Poster

Topics: Attention, Executive Function, Number

Associations between Executive Functioning Skills and Spontaneous Focusing on Number in Preschoolers

Kelsey A Clayback, Mary W Fuhs

University of Dayton, United States of America; claybackk1@udayton.edu

Spontaneous Focusing on Number (SFON, similar to Spontaneous Attention to Number, SAN) describes a child's tendency to attend to numerical information even when not explicitly directed to do so. Negen and Sarnecka (under review) distinguished SFON and SAN by noting that SAN does not imply an intentional focus of attention on number, whereas SFON typically does. If this ability to spontaneously attend to number is intentional in preschoolers and requires attention to number amid other irrelevant information, then we would expect that executive functioning skills (EF) would be related to children's performance. We found that preschoolers' T2 EF was associated with T2 SFON/SAN after controlling for T1 performance on both variables. Children's spontaneous attention to other variables (shape/color) at T2 was not associated with T2 EF. These results suggest that EF skills facilitate the development of an intentional focus on number in children's environment.

ID: 582 / PS-I: 13

Poster

Topics: Media and Technology, Number

Keywords: Education

Boosting children's math achievement by doing bedtime math

Talia Berkowitz, Marjorie Weber Schaeffer, Lori Peterson, Sian Beilock, Susan Levine

University of Chicago, United States of America; mschaeffer@uchicago.edu

Bedtime stories are a ubiquitous part of children's nighttime routine, but less attention is paid to math education in the home (Cannon & Ginsburg, 2008). The amount of number talk uttered by parents predicts kids' grasp of important number concepts at 4 and 5 years of age (Levine et al., 2011). We recruited parents and their 1st grade children. Each family was randomly assigned to a math or reading group and given an iPad mini with a math or reading app preloaded onto it, which parents were asked to engage in with their children. Parent-child dyads in the math group who used the app grew the equivalent of 1.19 grades in math, significantly different from those who engaged with the reading app (mean reading group = 0.77; $t(116) = 2.85$, $p = 0.01$). Furthermore, we see a larger impact of app usage in children of high-math-anxious parents.

ID: 668 / PS-I: 14

Poster

Topics: Media and Technology, Social Cognition, Theory of Mind

Children Adopt the Traits of Fictional Characters in a Narrative

Rebecca A Dore¹, Eric D Smith², Angeline S Lillard³

¹University of Virginia, University of Delaware; ²Murray State University; ³University of Virginia; rebeccadore@virginia.edu

After reading a fictional narrative, adults think and behave like the main character, especially when they are highly engaged. Whether or when children, with their less developed narrative processing skills, also adopt protagonists' traits is unknown. Seven- and ten-year-olds listened to a narrative about a professor or a cheerleader and their subsequent adoption of the characters' traits was assessed. At both ages, children who heard the professor narrative rated themselves higher on professor-relevant characteristics (e.g., smart, good at teaching) and spent longer playing with an analytical toy (a Rubik's Cube) during a play period than children who heard the cheerleader narrative; these findings were strongest when children were highly engaged in the narrative. Thus, even by age 7, narratives can have immediate consequential effects on self-concepts and real-world behavior. This finding has important implications for the creation of children's media, and for the choices parents make about children's narrative exposure.

ID: 732 / PS-I: 15

Poster

Topics: Infant Cognition

Children use statistical learning to track sequences of actions and extend to a new actor

Natalie Giles Brezack¹, Maya Anette Marzouk¹, Roberta Michnick Golinkoff¹, Kathy Hirsh-Pasek²

¹University of Delaware, United States of America; ²Temple University, United States of America; nbrezack@udel.edu

Children often encounter predictable, sequential events (e.g., bedtime routine with mom: pajamas, getting into bed, reading a storybook) that they segment through statistical learning. However, children must extend their knowledge of statistically learned sequences to new situations (e.g., bedtime routine with grandma instead of mom). Here we assessed whether 14- to 20-month-olds ($N = 21$) could track statistical regularities in an animated character's motion events (e.g., *bending*, *twisting*, *spinning*) and extend to a new actor. Children looked longer to identical than non-identical event sequences; this familiarity preference suggests that they learned and extended their event knowledge to the new character. Such statistical learning and extension may underlie children's ability to make sense of actions and intentions of new actors, furthering efficient processing and event segmentation.

ID: 402 / PS-I: 16

Poster

Topics: Language

Keywords: discourse, argumentative strategies

Children's early use of argumentative strategies. A study with urban marginalized population in Argentina

Celia Renata Rosemberg, Maia Migdalek, Alejandra Stein (International Fellow)

National Council of Scientific Research, Argentina, Argentine Republic; crrose@hotmail.com

The study analyzes the argumentative strategies used by 3 to 5 year old children living in urban-marginalized populations in Buenos Aires (Argentina) during play disputes in preschool, kindergarten and family settings. We analyzed 154 disputes: 32 between 3- year-olds, 59 between 4-year-olds and 63 between 5-year-olds. We identified the use of verbal argumentative strategies -reiteration, narration, description, generalization, appeal to authority, courtesy and alternative proposition-, as well as the use of non verbal strategies for reinforcing the point of view, providing evidence, and to convince the other person. Analyzes showed that while at 3 years old children tend to merely express their point of view without the support of an argumentative strategy, at 4 years old there is a significantly increase in the use of argumentative strategies. Analyzes also showed that at kindergarten and preschool children used significantly more descriptive and generalization strategies than at home.

ID: 574 / PS-I: 17

Poster

Topics: Memory

Children's interest in talking about the past

Shaina F. Rowell¹, Vikram K. Jaswal¹, Tracy Riggins²

¹University of Virginia; ²University of Maryland; srowell@virginia.edu

Adults vary in how important they think sharing memories is for maintaining relationships. How do they come to see memory in these different ways? One possibility is that this begins to develop in childhood through parent-child reminiscing. As an initial exploration, we asked whether children are interested in talking about the past and whether this interest is related to their parent's goals for reminiscing. Parents of 180 3- to 6-year-olds completed a questionnaire about their child's memory. 81% of parents reported that their child initiates half or more of their conversations about the past, and this increased from age 3 (68%) to 6 (96%). Importantly, parents whose reminiscing goal was to share experiences had children who initiated more of these conversations compared to parents whose goal was to test their child's memory. Parents with social goals may be showing their children that sharing memories is a valued social experience.

ID: 701 / PS-I: 18

Poster

Topics: Decision Making and Reasoning, Number, STEM Learning

Children's Understanding of Probability and Proportionality

Natalie Branch, Brandon Poston, Ty Boyer

Georgia Southern University, United States of America; nb01397@georgiasouthern.edu

Much of the research on children's reasoning about relative quantities has been conducted using proportionality and probability interchangeably. Though it is assumed that these measure the same thing, just with trivially different problem formats and cover stories, no studies have scrutinized the relations between them. This study examines individual stability and performance differences on a proportionality task (i.e., a match-to-sample relative juice concentration task) and a probability task (i.e., a spinner gamble choice task), administered to elementary school students (N = 32). The results indicate that though accuracy on the two tasks was positively correlated, performance was significantly higher on the probability task, despite identical item structures. This suggests that though they are similar, the differences in the format and cover story of these tasks plays some role in conveying relative quantity processes to children.

ID: 575 / PS-I: 19

Poster

Topics: Decision Making and Reasoning, Social Cognition

Keywords: Deception

Children's ability to detect deception through nonverbal cues

Maliki Eyvonne Ghossainy (Diversity Fellow), Jacqueline D. Woolley

The University of Texas at Austin; malikiq@gmail.com

This study examines the development of children's ability to modulate trust in verbal testimony as a function of nonverbal behavior. Four-, 5-, and 6-year-olds were tasked with locating a toy hidden in one of two boxes. Prior making a decision, children watched a video of an adult providing verbal and/or nonverbal testimony about the location of the toy. Sometimes these were consistent, but other times they conflicted. Results revealed that, when sources were consistent, all children trusted the verbal testimony. However, when they were inconsistent, only 6-year-olds distrusted verbal testimony and chose in favor of nonverbal testimony; 4- and 5-year-olds continued to trust verbal testimony. Thus, at 6 years children able to modulate their trust in verbal testimony as a function of nonverbal information. This is not because younger children are unaware of non-verbal behavior; indeed, when nonverbal testimony was offered exclusively, all ages used it to find the object.

ID: 736 / PS-I: 20

Poster

Topics: Culture, Memory

Keywords: gender differences, autobiographical memory

Children's first autobiographical memories: Effect of gender and recency of the first memory on the amount of details reported by Estonian children

Pirko Tougu^{1,2}, Tiia Tulviste², Stiina Einasto²

¹Loyola University Chicago, United States of America; ²University of Tartu, Estonia; pirko.tougu@ut.ee

Estonian schoolchildren ($N = 312$; 151 boys 161 girls; aged 9-12, $M_{age} = 10.21$) were asked to recall their earliest memory, to provide as much information about the event as possible, and to indicate their age at the time. The specific memories ($N = 243$) were analyzed for the episodic memory details (*actions, place, time, cognition/emotion, perceptions*) and semantic memory details (*semantic knowledge, other events recalled, repetitions, commentary*). The age at the time of first memory did not differ for boys and girls ($M_{age\ at\ event} = 4.2$, $SD = 2.03$). Girls provided more episodic details regarding actions and cognitions/emotions; there were no gender differences in the amount of semantic details included in the recounts. Correlations between age at the time of first memory and episodic and semantic details were also studied. More recent first memories were more likely to include more details about cognitions ($r = .13$, $p < .05$).

ID: 347 / PS-I: 21

Poster

Topics: Social Cognition, Word Learning

Children's sensitivity to social dominance in a word learning task

Jennifer K. Duer, Erin R. Hahn

Furman University, United States of America; jennifer.duer@furman.edu

Preschoolers are selective about who they trust for information. They possess a variety of preferences, including ones based on an informant's attractiveness, accent, and accuracy. Here, we asked if preschool-age children consider nonverbal expressions of power when selecting between conflicting information in a word learning task. Thirty-six 3- and 4-year-old children (44% female) were presented with a novel object and videos of two informants who called the object by different novel labels. One informant assumed an expansive posture conveying dominance; whereas, the other informant assumed a restricted posture associated with submissiveness. Preferences were measured by asking children to select which informant to ask first, as well as which of the labels they endorsed. We found that boys, but not girls, preferred powerful informants. In addition to documenting a new cue children use to assess credibility, the results also point toward the importance of considering gender stereotypes in social learning contexts.

ID: 636 / PS-I: 22

Poster

Topics: Language, Theory of Mind, Word Learning

Children's understanding of subjectivity in language

Ruthe Jane Foushee, Mahesh Srinivasan

University of California, Berkeley, United States of America; foushee@berkeley.edu

Semantic compositionality, the power to combine words to create new meanings, poses a challenge to children in part because some word meanings are subjective. Using a hallmark of subjectivity in language—that people can disagree about the use of a word without fault—we explored children's developing sensitivity to the differential subjectivity of three types of adjectives: absolute (e.g., "spotted"), relative (e.g., "tall"), and subjective (e.g., "pretty"). When asked to judge disagreements between two characters who had been exposed to distinct sets of a novel object (small, densely-spotted *pimwits* vs. tall, lightly-spotted *pimwits*), adults ($n=25$) gave faultless-disagreement judgments for relative and subjective adjectives (whether a *pimwit* is "tall"/"pretty"), but not for absolute adjectives (whether a *pimwit* is "spotted"). Preliminary results suggest that while 3-7-year-olds are reluctant to give faultless-disagreement judgments for relative and subjective predicates, they increasingly appeal to individuals' personal experiences and preferences to explain their disagreements.

ID: 800 / PS-I: 23

Poster

Topics: Attention, Executive Function, Reading

Classroom-based measures of executive function predict academic achievement in young children.

Sammy F. Ahmed¹, Benjamin Kats¹, Nicholas Waters¹, Sarah M Stilwell¹, Jennie K Grammer², Frederick J. Morrison¹

¹University of Michigan, United States of America; ²University of California, Los Angeles; sammyfa@umich.edu

The relationship between children's executive function (EF) and academic achievement has been the focus of considerable research. Findings suggest the need to examine separate components of EF as they relate to academic outcomes. However, few studies have examined separate classroom-based measures of EF and how they relate to math and literacy achievement in young children. In our own recent work, we have found that classroom-based assessments of EF are more differentiated than lab-based measures in young children. In the present study we examine the relation between three classroom-based measures of EF with math and literacy skills in 81 kindergarteners ($m_{age}=5.9$ years). Although classroom measures of working memory, response inhibition, and attention individually predicted math and reading achievement, in the full multivariate model only attentional control remained a significant predictor of all achievement measures; indicating that attentional control might play a critical role in the achievement of students at this age.

ID: 727 / PS-I: 24

Poster

Topics: Attention, Language
Keywords: motor development

Contingencies Between Motor and Vocal Behaviors Over the Transition to Crawling in Infancy

Sarah E. Berger¹, Marian Cunsolo², Jana M. Iverson³

¹College of Staten Island and the Graduate Center, City University of New York, United States of America; ²College of Staten Island, City University of New York, United States of America; ³University of Pittsburgh, United States of America; sarah.berger@csi.cuny.edu

To examine the organization of attention in infancy, we documented simultaneous motor and language development over the transition to crawling. Using a naturalistic, longitudinal design, we observed 20 infants at play at 2 weeks pre-crawling, crawling onset, 2 weeks post-crawling, and 4 weeks post-crawling. We coded on- and offsets for each vocalization and posture frame-by-frame from video to capture timing relative to each other and to locomotor status. Vocalizations contingent with crawling more than doubled from crawling onset (11% of crawling bouts) to later sessions (24% and 25%). From crawling onset to 2 weeks post, proportion of time spent crawling decreased, whereas proportion of time spent vocalizing increased. From 2 to 4 weeks post crawling, the opposite pattern occurred. Thus, infants allocation of attention during skill acquisition prompts behavioral trade-offs. With experience, attentional load for the new skill decreases and performance of simultaneous behaviors in other domains can occur.

ID: 394 / PS-I: 25

Poster

Topics: Culture, Social Cognition, Social Learning

Cultural Differences in the Teaching and Learning of Unexpected Information

Corriveau Kathleen¹, Cara Jean DiYanni²

¹Boston University, United States of America; ²Rider University, United States of America; cdiyanni@rider.edu

The current study explores cultural differences in the imitation of inefficient actions, and in the transmission of inefficient tool use to others. Chinese-American and Caucasian-American preschoolers ($N=111$) viewed either one or 3 models using two inefficient tools to perform two different tasks. Next, children were invited to complete each task with either the inefficient tool or an efficient alternative. Results showed that the two cultural groups imitated a single model at similar rates, but Chinese-American children imitated significantly more after viewing a consensus. Children next taught a naïve learner how to solve the task. The Chinese-American children were significantly more likely than their Caucasian-American peers to instruct using an inefficient tool when they had initially viewed a consensus demonstrate it. This suggests that these children privileged the conventional nature of the tool, while their peers were more likely to engage in innovation and teach with the functionally-optimal tool.

ID: 493 / PS-I: 26

Poster

Topics: Communication, Culture, Infant Cognition

Culturally-mediated contingent responsiveness during breastfeeding interactions

Emily E. Little, Cristine H. Legare, Leslie J. Carver

University of California, San Diego, United States of America; elittle@ucsd.edu

The suck-pause pattern of nursing in human neonates is reinforced by mothers jiggling the infant during pauses to encourage sucking. When mothers refrain from jiggling, 8-week-old infants protest the lack of feedback by vocalizing, suggesting an early preference for contingent responsiveness similar to the still-face effect ubiquitously observed in older infants. We examined whether the tendency for contingent jiggling during nursing shows cultural variation (Study 1) and whether variation in jiggling behavior was associated with infants' expectations for social feedback (Study 2). In Study 1, maternal behavior in Guatemala and the U.S. was observed while nursing their 2- to 8-week-old infants and the frequency of jiggling was compared across cultures. In Study 2, mothers were asked to refrain from responding (i.e., jiggling) during nursing, and infant response to this lack of communicative feedback was analyzed. Potential implications of culturally-mediated breastfeeding behavior on the development of social expectations will be discussed.

ID: 667 / PS-I: 27

Poster

Topics: Decision Making and Reasoning, Executive Function

Keywords: decision making, sequential events, executive function

Decision Making Processes and its relation to Executive Function in Sequential Events

Seho Maeng, Yoonkyoung Jeong

The Catholic University of Korea, Korea, Republic of (South Korea); birth1019@gmail.com

The present study investigated children's ability to employ probabilistic thinking in a task involving sequential events and its relation to executive function (EF). In the sequential probability task (SPT), two boxes were presented in each trial and participants had to choose the one that had a higher probability of getting a reward. SPT had three stages with different probabilities, and each stage had 15 trials. Flanker task was also conducted to assess EF.

Our results indicate that even preschool children could employ probabilistic thinking similar to that is used by adults whose decision was based on their experiences in sequential events. Both children and adults tended to select more frequently the box with a higher probability of getting a reward over the trials of sequential probability task. Finally, both children's and adults' performance in Flanker task was significantly related to their performance on the sequential probability task.

ID: 318 / PS-I: 28

Poster

Topics: Decision Making and Reasoning

Decision Making Under Uncertainty: Evolution of Strategy Use Across Development

Rista C. Plate, Jacqueline M. Fulvio, Kristin Shutts, C. Shawn Green, Seth D. Pollak

University of Wisconsin-Madison; rplate@wisc.edu

How do people use vast amounts of information in their environments for decision-making? How do decision-making strategies change over ontogeny and with experience? Our complex, novel task required individuals to track reward rates of multiple options over many trials. Mimicking real-world learning, participants (N=30 children 4-12 years-old; N=32 adults) made choices, observed outcomes, and used experience to inform decision-making in our task. To examine participants' strategy changes over time, we extended data-analytic techniques from adult probability-learning literature. Over the course of the task, children's strategies changed; they ultimately made optimal choices and engaged the same strategy as adults. However, children required more experience with the task to demonstrate optimal decision-making compared to adults ($b=-33.47$, $R^2=0.12$, $F(1,46)=6.00$, $p=0.02$). Children exhibit incredible skill navigating decision-making; however, efficiency to change strategies improves across development. In ongoing research, we are introducing additional complexity by examining how adding social information affects learning in our task.

ID: 705 / PS-I: 29

Poster

Topics: Language, Reading, Word Learning

Developing sensitivity to the statistical regularities of subword orthography: Bigrams come first.

Quintino Mano, Christian Jones, Amanda Convey, Zjanya Arwood, Heidi Kloos

University of Cincinnati, United States of America; cdjones5@aggies.ncat.edu

Accumulating evidence suggests that children begin to develop sensitivity to the statistical regularities of subword orthography early in reading acquisition and that such sensitivity correlates significantly and uniquely with reading outcomes. Little is known, however, about whether such sensitivity is influenced by the grain size of subword orthographic structures. The present study (N=44) examined this idea by testing whether native English-speaking children (mean age = 5 years, 0 months) were able to explicitly identify frequency patterns among subword structures that varied in size (i.e., single letters, two-letter combinations, three-letter combinations, 4-6 letter pseudoword structures). Correlational analyses indicated that children demonstrated sensitivity to two-letter structures and that such sensitivity correlated significantly and positively with age whereas no such correlations with age were observed with other conditions of subword sizes. Though preliminary, results suggest that early orthographic development may begin with developing sensitivity to two-letter structures. Implications for reading development are discussed.

ID: 742 / PS-I: 30

Poster

Topics: Communication, Social Cognition, Theory of Mind

Development of preschoolers' understanding of common ground and its relation to theory of mind

Hao Liu, Douglas Frye

Graduate School of Education, University of Pennsylvania; hao6@gse.upenn.edu

Common ground is the sum of two people's mutual knowledge. It has been questioned when preschoolers recognize common ground in communication (Glucksberg,1975;Nadig and Sedivy, 2002). In the current study, a new paradigm was designed to investigate young children's understanding of common ground. Twenty-eight 4-, 28 5-, and 26 6-years-olds were tested with common ground stories to see if they could take another's perspective by using mutual knowledge; and to what degree irrelevant information would affect their ability to use common ground. The children were also tested on standard theory of mind tasks. The results indicated that by 5 years, children were able to select mutual knowledge from other information in order to take another's perspective. However, information that conflicted with the common ground significantly affected preschooler's recognition of ambiguous references in the conversation. These findings show a link between the development of theory of mind and egocentrism in language comprehension.

ID: 443 / PS-I: 31

Poster

Topics: Attention, Concepts/Categories

Development of Selective Attention in Category Learning

Samuel Rivera, Vladimir M. Sloutsky

The Ohio State University, United States of America; rivera.162@osu.edu

Category learning is an essential component of knowledge that supports inference, language, and thought, among other functions. An open problem is to understand the specific mechanisms underlying category learning and its development from infancy to adulthood. In our study, children from 5-7 years and adults learned to discriminate a pair of artificial categories while a perfectly diagnostic feature was not cued (baseline), cued endogenously with instructions noting the importance of the feature, or cued exogenously without instruction. While adults benefited from either type of cue, children showed a clear benefit of the exogenous cue over the baseline. Results suggest that children may have difficulty selectively attending to features when making category judgments, but will readily do so if attention is drawn by low-level stimulus properties. Our research suggests that the development of executive functioning, especially selective attention, is a key mechanism underlying the development of category learning.

ID: 544 / PS-I: 32

Poster

Topics: Communication, Language, Word Learning

Differing Effects of Socioeconomic Status on Infants' Reported Receptive and Productive Vocabulary

Elika Bergelson¹, Daniel Swingley²

¹University of Rochester, United States of America; ²University of Pennsylvania, United States of America;

elika.bergelson@gmail.com

Parental report is widely used to assess infants' lexicons. The CDI measure includes comprehension and production checklists for ~400 words (Fenson et al, 1994). Here we characterize infant vocabulary (CDI) as a function of SES (maternal education; Bornstein et al, 2003). Lower-SES babies have reportedly smaller production vocabularies, and weaker comprehension (Fernald et al., 2012, Hoff, 2003).

We linked CDIs from 570 infants (6-16 mo., M=10) with mothers' education (four levels from "high school or less" to "advanced degree"; n=114-212 per group).

We find opposite effects in comprehension and production: less-educated mothers report *higher* comprehension vocabularies than more-educated mothers, but *lower* production vocabularies. Age and mother's education are opposite-valence predictors of comprehension vocabulary ($p < .01$). In-lab word comprehension aligns more closely with productive than receptive vocabulary in its relation to SES.

These results underscore the potential confounds in parental report, highlighting in-lab and corpus research's roles in understanding the early lexicon.

ID: 341 / PS-I: 33

Poster

Topics: Social Cognition

Keywords: cognition, mind wandering, intentional reverie

Do Children and Their Parents Enjoy "Just Thinking"?

Jessica Taggart, Julia Rauen, Angeline Lillard, Timothy Wilson

University of Virginia, United States of America; jt2bb@virginia.edu

One way that we can entertain ourselves is with our own thoughts and imagination. This activity should be enjoyable, as opportunities for pleasant thoughts are endless. However, Wilson and colleagues (2014) found that adults who had just spent 5 to 20 minutes entertaining themselves with their thoughts typically reported disliking the experience. Do children, who routinely entertain themselves with pretend play, like it more? Preschoolers were asked to sit and think for 5 minutes, and then were given enjoyment and executive function assessments. Children did not enjoy thinking more than did Wilson's adults, but controlling for age, greater executive function predicted greater enjoyment. Fantasy orientation was unrelated. We also tested parents of young children. Parents enjoyed thinking more than children or other adults. Hence, enjoyment of just thinking appears to depend in part on executive function, and in part on the context of one's everyday life.

ID: 447 / PS-I: 34

Poster

Topics: Communication, Language, Word Learning

Keywords: Cognitive development

Do children attend to people's non-verbal cues when overhearing conversations?

Neda Namirani, Jackson Peter Tolins, Jean E Fox Tree, Nameera Akhtar

University of California, Santa Cruz, United States of America; nnamiran@ucsc.edu

Children can learn new words overheard in the conversation of others (e.g., Floor & Akhtar, 2006). Previous vicarious word learning studies emphasized speaker behaviors, with addressees providing minimal agreement with the speakers' presentations. But even minimal addressee responses can affect speakers' developing discourse, as well as affect how overhearers understand dyadic communication (Tolins & Fox Tree, 2014, in press). Do children make use of collaboratively-produced information in learning words? Children observed videos in which a speaker labeled new objects for an addressee who either agreed or disagreed, nonverbally, with the speaker. Children learned novel words better when communicators disagreed. The results are discussed in terms of what might facilitate children's word learning when they overhear contributions by speakers and addressees engaged in conversation.

ID: 794 / PS-I: 35

Poster

Topics: Language, Word Learning

Keywords: time words, language acquisition, cross-linguistic research

Do some languages tell time better than others?: Acquisition of time words in English- and Chinese-speaking children

Katharine Tillman¹, Pierina Cheung², Nestor Tulagan^{1,3}, David Barner¹

¹University of California, San Diego; ²Wesleyan University; ³University of California, Irvine; cheung.pierina@gmail.com

While languages such as English mark temporality via morpho-syntactic cues on verbs (e.g., I ate fish vs. I will eat fish), languages such as Chinese lack verb tenses. Past/future time can also be conveyed using deictic time words, like "yesterday" and "tomorrow," which are present in both languages. Although children produce these words at age 2, they do not show adult-like comprehension until years later. In two studies, we asked whether linguistic cues facilitate children's comprehension of time words. Experiment 1 found that Chinese- and English-speaking children acquire these terms on a similar developmental trajectory, neither showing comprehension until age 5. In Experiment 2, we asked whether the presence of tense cues allows English-speaking children to better interpret these words. Results showed that children performed similarly with or without tense cues. Together, these results suggest that linguistic markers may not play a major role in children's acquisition of time words.

ID: 504 / PS-I: 36

Poster

Topics: Decision Making and Reasoning, Number

Keywords: Probability

Does the Approximate Number System Help Children Make Judgments About Probability?

Shaun M. O'Grady, Fei Xu

University of California Berkeley, United States of America; shaun.ogrady@berkeley.edu

In this study we test the hypothesis that the Approximate Number System (ANS) underlies probability judgments based on proportion (ie. decision-makers estimate the number of different elements and then compute the ratio in order to estimate the probability of drawing a particular type of element). Children play a computer game in which they are presented with two bags containing different amounts of red and white marbles and are asked which bag is more likely to help Big Bird get his favorite color marble. Results indicate that 6 and 7-year-old children perform the task above chance and older children can make more accurate discriminations. Accuracy decreased as the difference in the proportions of red and white marbles decreased, consistent with the hypothesis that children's probability judgments may be informed by the ANS. Future studies will investigate whether performance on our task is correlated with performance on a Panamath test.

ID: 798 / PS-I: 37

Poster

Topics: Concepts/Categories, Decision Making and Reasoning, Infant Cognition

Domain-general negation in infants' reasoning

Shilpa Mody, Susan Carey

Harvard University; shilpa@wjh.harvard.edu

Do infants reason using abstract, domain-general concepts like negation? The process of elimination potentially involves negation, and infants appear to use it in word learning at 17 months (Halberda, 2003). Is the PoE available for reasoning in other domains?

In our search task, an experimenter hid a toy in one of two buckets, and showed that one bucket was empty. Seventeen-month-olds, but not 15-month-olds, consistently approached the non-empty bucket ($M=71\%$, $p<.001$).

In our causal reasoning task, infants saw that two blocks together made a toy light up, but that one of those did not make it light up alone. 17-month-olds consistently selected the other block ($M=60\%$, $p=.034$). Testing with younger infants is ongoing.

These results indicate that when 1.5-year-olds begin to use the PoE for word learning, they are also able to use it in other domains, suggesting that their reasoning is supported by an abstract, domain-general concept of negation.

ID: 598 / PS-I: 38

Poster

Topics: Memory

Effect of early nutrition on later cognition: human milk nutrients at 3 months of age predict declarative memory abilities at 2 and 3 years of age

Carol L. Cheatham, Kelly W. Sheppard, Andrea L. Armer, Grace Millsap

University of North Carolina at Chapel Hill Nutrition Research Institute, United States of America; kelly_sheppard@unc.edu

We hypothesized that docosahexaenoic acid (DHA) and free choline intake in exclusively breastfed 3-month-olds would predict the ability to recall ordered sequential steps in toddlerhood. Participants ($n=89$) from a study of human milk nutrients and cognition returned for follow-up at 2 and 3 years. Using an imitation paradigm, toddlers were tested for declarative memory abilities immediately, after 20 minutes, after one week, and after relearning at the one-week session. Multivariate regressions were conducted controlling for months exclusively breastfed and predicting the four recall scores by DHA, free choline, and DHA X free choline. For 2-year-olds, immediate ordered recall and relearning ordered recall were related to DHA and DHA X free choline (all $p<0.05$). In 3-year-olds, DHA, free choline, and DHA X free choline predicted (all $p<0.05$) relearning of the steps with no significance in ordering the steps. Early human milk nutrients have long-lasting effects on declarative memory abilities.

ID: 713 / PS-I: 39

Poster

Topics: Concepts/Categories, Neuroscience Approaches, Social Cognition

Keywords: action-perception, motor learning, conceptual learning, infant cognition, developmental cognitive neuroscience

Effects of Training on Neural Measures of Action Perception Across the Lifespan

Sarah A Gerson^{1,2}, Marlene Meyer², Harold Bekkering², Sabine Hunnius²

¹University of St Andrews, School of Psychology & Neuroscience, United Kingdom; ²Radboud University Nijmegen, Donders Institute for Brain, Cognition, and Behaviour, The Netherlands; sg233@st-andrews.ac.uk

Research indicates that, early in life, involvement of the motor system during action perception is modulated by both motoric experience and our conceptually-informed predictions. As yet, findings have been correlational in nature, leaving open the question of causality. In an EEG training experiment with adults (N = 29), we independently manipulated motor experience and conceptual knowledge and found that motoric training with kinematically challenging actions (e.g., chopstick use) increased motor activity during perception of the trained action, whereas altering participants' expectations about the outcome of an action (e.g., telling them a person used pliers to eat) decreased motor activity during the perception of an initially surprising action outcome. In a second experiment, we trained 10-month-old infants (N = 17) to produce new actions and found similar increases in motor activity during action perception. We speculate about the distinct roles of motoric and conceptual knowledge on action perception across development.

ID: 358 / PS-I: 40

Poster

Topics: Decision Making and Reasoning, Number

Keywords: metacognition

Elementary school children accurately monitor and control their performance during number line estimation

Jenna Wall, Clarissa A. Thompson, John Dunlosky, Bill Merriman

Kent State University, United States of America; cthomp77@kent.edu

Metacognitive awareness is important for effectively controlling performance. The present studies are the first to investigate children's ability to monitor and control their performance during a number line estimation task. In Experiment 1, 1st, 2nd, and 4th graders (N=59) estimated the location of numbers on a number line and judged their confidence in each estimate. Children were more confident when they produced a linear as compared to a logarithmic series of estimates. Experiment 2 replicated this finding in a new sample of 1st, 2nd, and 4th graders (N=54). In addition, when asked which estimates they wanted the experimenter to evaluate for a reward, children tended to select estimates associated with lower error and higher confidence and to withhold estimates associated with higher error and lower confidence. Thus, children are sensitive to their own uncertainty, and educators could capitalize on this understanding during mathematical instruction and intervention.

ID: 467 / PS-I: 41

Poster

Topics: Comparative Cognition, Decision Making and Reasoning, Spatial Cognition

Keywords: virtual reality, navigation, landmarks, chimpanzees, bonobos, humans

Examining chimpanzees', bonobos', and humans' navigational decision-making strategies in virtual small- and large-scale space

Francine L. Dolins¹, Christopher Klimowicz², John Kelley³, Charles Menzel³, Jared Tagliatela^{4,5}, William Hopkins^{3,5}

¹University of Michigan-Dearborn, USA; ²University of Michigan-Ann Arbor, USA; ³Georgia State University, USA; ⁴Kennesaw State University, Georgia, USA; ⁵Ape Cognition and Conservation Initiative, Iowa, USA; fdolins@umich.edu

Primate foraging entails localizing resources across ecologically complex landscapes. Species exploit feeding sites distributed both in large- and small-scale space, adapting their ranging based on nutrient balancing, seasonal availability, competition and group size. Efficient routes between resource sites are essential in reducing energy costs. Navigational strategies and spatial representations generated in large- and small-scale space were predicted to differ by distance between landmarks, geometric features, and encoded associations. Comparing navigational strategies in varied spatially scaled environments presents methodological challenges. This study compared four captive chimpanzees (*Pan troglodytes*), five captive bonobos (*Pan paniscus*) with 16 humans (*Homo sapiens*; ages 3-4, 5-6, 11-12 and adults) using computer-generated virtual environments differing in scale displaying parallel landmark information. Results indicate that chimpanzee, bonobo and human participants of all age groups applied topological strategies in both small- and large-scale space. They did not demonstrate shifts in spatial strategy in relation to scale or landmark distribution.

ID: 425 / PS-I: 42

Poster

Topics: Concepts/Categories, Executive Function, Theory of Mind

Keywords: Conceptual Development

Executive functioning and experience interact to promote preschoolers' theory of mind development

Jeannette E. Benson, Elizabeth G. F. McEwen, Mark A. Sabbagh

Queen's University, Canada; j.benson@queensu.ca

This study investigated the theory that executive functioning (EF) skills play a role in promoting the conceptual changes that underlie preschoolers' false belief understanding. Eighty-one 3.5-year-old children participated in a longitudinal study that involved two study phases. During phase 1, children were assessed on their false belief understanding and EF skills, as well as abilities that served as relevant controls (e.g., receptive vocabulary). Two types of naturalistic experiences that relate to false belief development were also measured: parent mental state talk and having child-aged siblings. All measures were re-administered at phase 2, 6 months later. Longitudinal analyses revealed an interaction whereby only children with advanced EF skills at phase 1 showed a positive effect of experience on later false belief task performance. These findings support the hypothesis that EF skills promote the

conceptual developments that are necessary for false belief understanding by enabling children to integrate experience in theory change.

ID: 406 / PS-I: 43

Poster

Topics: Executive Function

Executive Functioning Development in Preschool Aged Children

Nicole Bardikoff, Mark A. Sabbagh

Queen's University, Canada; 12nb42@queensu.ca

Theoretical perspectives differ over whether improvement in preschoolers' EF reflects a developing capacity for inhibition, or a developing ability to create and maintain hierarchical embedded rule structures. We investigated whether a novel game designed to scaffold the creation and maintenance of rules would facilitate performance on the Dimensional Change Card Sort (DCCS) task. Children in the focal training condition were given a multi-dimensional stimulus (i.e., red pentagon) and asked to find one card that matched its colour, and another that matched its shape. In a comparison condition, children were asked to find two cards that matched either the colour or shape. Children in the focal condition were more successful at the DCCS relative to those in the comparison condition, ($t = 2.979$, $p = 0.011$ – testing ongoing). These findings suggest that the capacity to create and maintain conditional rules may pace preschoolers' EF development as opposed to inhibitory abilities.

ID: 735 / PS-I: 44

Poster

Topics: Comparative Cognition, Social Cognition, Social Learning

Exploring the evolutionary origins of overimitation: A comparison across domesticated and non-domesticated canids

Angie Johnston, Paul Holden, Laurie Santos

Yale University, United States of America; angie.johnston@yale.edu

Human children have a robust expectation that teachers will provide relevant information. When learning how to solve a puzzle, children copy all of an adult's actions, even over-imitating irrelevant actions (e.g., Lyons et al., 2011). We examine the evolutionary origins of overimitation by testing a species with similar interest in human ostensive cues – domesticated dogs. We compared dogs' (N = 40) overimitation to that of a closely-related, yet undomesticated canid species – Australian dingoes (N = 13). In our overimitation task, an experimenter showed subjects how to solve a puzzle using two actions: one relevant and one irrelevant. In contrast to human children, neither dogs nor dingoes showed evidence of overimitation. Both species ignored the irrelevant action more often as they gained experience with the puzzle, suggesting that subjects were not blindly copying the teacher's irrelevant action. Additional analyses suggest that dingoes have a more sophisticated sense of relevance than dogs.

ID: 456 / PS-I: 45

Poster

Topics: Executive Function, Neuroscience Approaches

Exploring the Link Between Early Neural and Executive Function Development

Sammy Perone, Stephanie Carlson

University of Minnesota, United States of America; sperone@umn.edu

Executive function (EF) involves a set of neurocognitive processes underlying goal-directed behavior and undergoes rapid change between 3 and 5 years of age. The link between early neural and EF development during this period remains poorly understood. We present results from a study that probes relations between developmental change in neural oscillations and EF in 3 to 5-year-old children. High frequency gamma oscillations were of particular interest because recent evidence suggests that they are associated with the emergence of cognitive abilities during toddlerhood and begin to change about age 4, precisely when EF skills are ramping up. Children 2.5 to 5 years of age participated in a resting state EEG procedure and the Minnesota EF Scale. The results showed that resting gamma power over a frontal region was predictive of children's performance on the EF scale. We will also present analyses of developmental change in functional connectivity and network organization.

ID: 624 / PS-I: 46

Poster

Topics: Language, Word Learning

Exploring the Mutual Exclusivity Assumption in Different Types of Bilingual Children

Jessie-Raye Bauer¹, Kacky K. Brown², Amy E. Booth¹

¹University of Texas at Austin; ²University of Washington; jessie.raye@utexas.edu

This study aims to clarify the role of linguistic experience in the development of the Mutual Exclusivity (ME) Assumption. The 36 preschoolers who have thus far participated fall equally into three groups: mixed language bilingual (ML), one-parent, one-language bilingual (OPOL), or monolingual. Children participated in twelve ME trials where they were presented with familiar and unfamiliar objects. Each child was asked to hand the experimenter a familiar object referred to by its known label or an unfamiliar object labeled with a novel name. Choices of the novel object on novel name trials reflected reliance on ME. Ultimately, ML bilinguals adhered to the ME Assumption to a lesser degree than monolingual children, while the performance of children in the OPOL group

fell in between. As a whole, the results suggest that the ME Assumption is shaped by linguistic experiences in which speakers use a single word to refer to each referent

ID: 638 / PS-I: 47

Poster

Topics: Infant Cognition

Finding the Oddball: Factors that Facilitate Infants' Visual Search

Samantha Gail Mitsven, Lisa Michelle Cantrell, Lisa Michelle Oakes

University of California, Davis, United States of America; smitsven@stanford.edu

Infants' effective selection of objects in complex arrays is crucial for learning and predicts abilities such as perception of object unity (Amso et al., 2006). Little is known, however, about what factors influence selection. We evaluated 6- and 8-month-old infants' latency to fixate a target in arrays of 4 or 6 items (e.g., one clock with 3 or 5 identical bananas), in which the target was either more salient than the competitors or equally salient to the competitors. Infants were faster to fixate in small arrays ($M = 741$ ms) than in large arrays ($M = 1017$ ms), $F(1, 42) = 15.32$, $p < .001$, and to fixate salient targets ($M = 760$ ms) than less salient targets ($M = 998$ ms), $F(1, 42) = 10.88$, $p = .002$. Thus, infants' efficient selection of targets in arrays is jointly determined by factors such as set size and item salience.

ID: 573 / PS-I: 48

Poster

Topics: Infant Cognition, Social Cognition, Social Learning

First Impressions During Infancy: The Impact of Counter-information

Jacqueline Whitney Pospisil, Jessica Sommerville

University of Washington, United States of America; jwpospis@uw.edu

Infants form rapid impressions of others. We investigated whether infants change initial judgments about people when given counter information. The study of fairness is an ideal modality for investigating this question with infants, due to prior research indicating that infants form rapid impressions of fair and unfair agents and choose to associate with fair over unfair agents. We presented infants with initial information that one person was fair and another was unfair, and then conflicting information where the two actors reversed roles. Then we measured their preferences at both time points. Infants chose the fair agent after the initial set of information, replicating prior work, and then chose fair and unfair agents at chance after viewing conflicting information. This suggests that infants don't stick with their first impressions of people when exposed to information that conflicts with their initial impression.

ID: 750 / PS-I: 49

Poster

Topics: Number, Spatial Cognition, STEM Learning

Fraction Number Line Training Leads to Learning and Transfer in Early Elementary Students' Fraction Magnitude Concepts

Noora Hamdan¹, Alexander D'Esterre², Mahala Femovich³, Courtney Gray⁴, Lindsey Hildebrand¹, Conner Black¹, Elizabeth Gunderson¹

¹Temple University; ²University of Maryland; ³Ursinus College; ⁴St. Thomas Aquinas College; tuf05119@temple.edu

Fractions play a critical role in math learning, yet children and adults have persistent difficulties (e.g., Siegler et al., 2013). Researchers have suggested that number-line-based instruction might improve fraction magnitude concepts, but evidence for this is limited (Fuchs et al., 2013). We investigate whether a brief, 15-minute number-line-based (NL) training is more effective than a well-matched area-model-based (AM) training for typical 2nd- and 3rd-graders ($N=114$), using a pretest-training-posttest design. A third group received non-numerical control training. Children in the NL and AM conditions significantly outperformed the controls on the representation on which they were trained ($ps < .05$). However, only the NL condition had significantly higher fraction magnitude comparison scores – an untrained transfer task - than the other conditions, controlling for pretest scores, $F(2, 110)=4.56$, $p < .05$. This study provides the first direct evidence that number lines are a more effective tool for introducing fraction magnitudes to children than traditional area models.

ID: 316 / PS-I: 50

Poster

Topics: Spatial Cognition

Keywords: spatial cognition; mathematical cognition; spatial symbols; Euclidean geometry

From spatial symbols to Euclidean intuitions

Moira Rose Dillon, Elizabeth Spelke

Harvard University, United States of America; mdillon@fas.harvard.edu

Euclidean geometry is highly intuitive to adults from diverse cultures, but the sources of these intuitions remain unknown. The present study investigates whether children's understanding of Euclidean geometry is linked to their use of spatial symbols. Six-, 10-, and 12-year-old children were given tests of navigation by purely geometric maps, which required them to place objects in fragmented 3D environments using 2D maps highlighting the same or different geometric information as the 3D environments. Children also completed a test of abstract geometric reasoning focused on triangle completion. Performance on the geometric

reasoning test improved markedly with age, and this improvement was associated with more integrated interpretations of the geometric maps and environments. These findings connect the achievement of Euclidean intuitions to the mastery of spatial symbols.

ID: 758 / PS-I: 51

Poster

Topics: Concepts/Categories, Social Cognition, Social Learning

Generality and verifiability: Children's use of epistemic properties of testimony

Katherine Elizabeth Ridge¹, Melissa Koenig¹, Caitlin Cole¹, Meredith Meyer², Tamar Kushnir³, Susan Gelman²

¹University of Minnesota, United States of America; ²University of Michigan, United States of America; ³Cornell University, United States of America; katherine.ridge@gmail.com

We explored 3-to-8-year-old children's (N=270) and adults' (N=32) use of two basic testimonial properties used to appraise a speaker's knowledge: generality and verifiability. Participants were presented with a speaker who made general claims about a novel animal kind, and a speaker who made specific claims about the animal as an individual. We systematically varied whether the claim referred to a perceptually-obvious feature (e.g. "is brown") or a non-evident feature that was not visible (e.g., "eats insects"). Children's attributions of knowledge to generic speakers increased with age. Generic speakers were not reliably credited with knowledge until age 5, and only when claims were also verifiable. Three-year-old children were especially prone to credit knowledge to speakers who made verifiable claims, whereas 7-to-8-year-olds and adults credited knowledge to generic speakers regardless of verifiability. Children generalized speakers' knowledge to the biologically-related category of new animals, but not as readily to artifacts.

ID: 697 / PS-I: 52

Poster

Topics: Attention, Executive Function

Keywords: proactive control

Getting ready to use control: Advances in measuring a key developmental transition in how children engage executive function

Sabine Doebel¹, Jane Barker¹, Nicolas Chevalier², Laura Michaelson¹, Yuko Munakata¹

¹University of Colorado - Boulder, United States of America; ²The University of Edinburgh - Edinburgh, UK; sabine.doebel@colorado.edu

The ability to exercise control over thought, emotion, and action, termed executive function (EF), develops dramatically in childhood. A key transition occurs in how children engage EF: from reactively calling to mind task-relevant information as needed, to proactively maintaining information across time in anticipation of upcoming demands. This transition is important for understanding individual differences and developmental changes in EF; however, methods targeting its assessment are limited. We tested the possibility that Track-It, a measure of sustained selective attention, also indexes proactive control. In this task children must track a target shape as it moves unpredictably among moving distractors, and identify where it disappears, which may require proactively maintaining information about the target or goal. In two studies (5-6 year-olds, $N_s = 33, 48$), children's performance in Track-It predicted proactive control across two established paradigms. These findings highlight the promise of Track-It for investigating this key developmental transition in EF.

ID: 327 / PS-I: 53

Poster

Topics: Concepts/Categories, Language, Social Cognition

How Children and Parents Talk about Moral, Conventional and Personal Choice

Xin Zhao, Tamar Kushnir

Cornell University, United States of America; xz437@cornell.edu

Young children believe that, though some actions are matters of personal choice, moral actions are obligatory. We investigate this difference in a "Choice Stories" task: Thirty-four children ages 5 to 11 were asked to make up stories about three picture sets – moral (share vs take), conventional (umbrella vs a bucket for rain) and personal (playing with a ball vs truck). We compare to parents in the same community telling these stories to younger children (2-4 years). Children referred to desires at equal rates across all domains; parents referred to desires for personal choice only. Both children and parents used evaluative language the most and the words "choose/choice" the least when talking about moral choices compared to conventional and personal choices. Parents additionally used generalities and imperatives most in moral scenarios. Results support previously found domain differences in children's beliefs about choice, and suggest some links between children's beliefs and early parent-child interactions.

ID: 357 / PS-I: 54

Poster

Topics: Concepts/Categories, Language, Theory of Mind

How children reason about perception in people with different sensory experience: Evidence from verbs of perception

Giulia Valeria Elli (Diversity Fellow), Barbara Landau, Marina Bedny

Johns Hopkins University, United States of America; gelli1@jhu.edu

We investigated children's reasoning about perception by asking (1) when children acquire the modality associated with verbs of perception (e.g. *see, peek, sniff*) and verbs of emission (e.g. *sparkle, glow, beep*), and (2) how children make inferences about perception in people with different sensory capacities (i.e. blind individuals.) We found that 4 year-olds know the modalities associated with a range of verbs. However, extension of this knowledge to a blind person undergoes dramatic changes between 4 and 9 years-of-age. Although adults reason that a blind person can see with their hands or ears (ears: 18%; hands: 37.6%), 4 year-olds claim that a blind person uses their eyes to see (81.7%), flatly contradicting their own assertion that blind people's eyes "don't work". Six year-olds deny that blind people can see at all and 9 year-olds perform like adults. This developmental trajectory reveals major developmental changes in reasoning about perceptual experience.

ID: 385 / PS-I: 55

Poster

Topics: Language

Keywords: verbs

How well do children learn verbs from "noisy" data?

Jane B. Childers, Megan Dolan, Emily Donnan, Angela Carroll, Amanda Cantu

Trinity University, United States of America; jchilder@trinity.edu

Verb acquisition requires children to segment dynamic scenes and link different elements to specific verbs. Most prior verb studies have included only relevant events. Two studies ask 1) how well children learn verbs while seeing relevant and irrelevant events, and 2) if they can parse events, linking only relevant subevents to new verbs. Structural alignment (SA) theory (e.g., Markman & Gentner, 1997) predicts that events (or subevents) with few alignments will be discarded. In Study 1, 2 ½- and 3 ½-year-olds (n=32) saw a Target First (TTDDT) or Distractor First (DTDDT) set of events, and learned two verbs; they succeeded in both conditions. In Study 2, children (n = 30 to date) saw events with distractor and target subevents (either Target First or Distractor First), and performed best in the Distractor First condition. This is an important new direction for verb research, with links to SA and other emerging theories.

ID: 655 / PS-I: 56

Poster

Topics: Social Learning

Keywords: Mathematics, Early Childhood Education

Identifying aspects of pre-kindergarten classrooms that benefit mathematics achievement

Kimberly Turner Nesbitt, Dale Clark Farran, Karen S. Anthony, Deanna N. Meador, Caroline H. Christopher

Vanderbilt University, United States of America; kimberly.nesbitt@unh.edu

Prior evidence suggests an association between classroom quality and children's achievement in pre-kindergarten, but most of this work involved global ratings of the classroom rather than counts of behavior. With calls for universal pre-kindergarten and evidence that young children's early math skills predict later achievement, it is critical to identify specific, and potentially malleable, aspects of classrooms that are associated with greater mathematics gains. The study included 407 pre-k children from 26 pre-k classrooms assessed in the fall and spring of pre-kindergarten. Three day-long observations were conducted over the year to capture information on teacher and children's behaviors. Using multilevel modeling, the study has identified and will report on aspects of classrooms associated with children's mathematics gains, including positive emotional climate, quality of teacher instruction, and quantity of children's mathematics and social learning interactions. While correlational, this work helps identify specific behaviors to target in hopes of improving children's achievement.

ID: 658 / PS-I: 57

Poster

Topics: Decision Making and Reasoning, Social Learning

Keywords: motivation, persistence, learning

If at First You Don't Succeed: The Role of Evidence in Preschoolers' and Infants' Persistence.

Julia Anne Leonard, Laura Schulz

MIT, United States of America; julialeonard07@gmail.com

Perseverance, above and beyond IQ, predicts academic outcomes in school age children. However, little is known about how very young children learn the contexts in which persistence is valuable (or not). In Experiment 1, we show that preschoolers (n=52, mean: 57.6 months) persist twice as long after seeing an adult persist at a task than after seeing an adult succeed readily. However, there was no effect of adult persistence if the model failed to achieve the goal (Experiment 2, n=52). In Experiment 3, we extend these findings to infants and a generalization task. Infants (n=52, mean: 15.4 months) persisted twice as much on a novel task with a novel goal, given a model who persisted and succeeded on two separate demonstration tasks than a model who effortlessly succeeded on the same tasks. Thus, even infants are sensitive to adult persistence and use it to calibrate their own tenacity.

ID: 782 / PS-I: 58

Poster

Topics: Social Cognition, Theory of Mind

Keywords: Imaginary companions, theory of mind, emotion understanding

Imaginary companions in Brazilian children: An investigation of language and social cognitive development

Natália Benincasa Velludo, Debora de Hollanda Souza
Universidade Federal de Sao Carlos, Brazil; debhsouza@ufscar.br

The creation of imaginary companions is a frequent and healthy form of pretend play in childhood. Although the literature on the phenomenon is growing, little is known about possible cross-cultural variation. The present study was the first to investigate the phenomenon and its relation to language and social cognitive development in Brazil. Forty children (18 with imaginary companions and 22 without), between 6 and 7 years of age, participated. Three theory-of-mind tasks, the Test of Emotion Comprehension and a vocabulary test (PPVT) were used, as well as interviews exploring fantasy engagement. Parents were interviewed to explore their perspectives on children's fantasy activities. No differences were found in theory of mind or emotion comprehension between the two groups, but children with imaginary companions had significantly higher PPVT scores. Parents' interviews revealed distinct views (positive, negative or both) on the experience, influenced mainly by education level and religious background.

ID: 474 / PS-I: 59
Poster

Topics: Culture, Decision Making and Reasoning, Social Cognition

Imitating group for cultural transmission

Stella Christie, Ruth Talbot, Joseph Kim, Sona Kumar
Swarthmore College, United States of America; christie@swarthmore.edu

Imitation is a powerful learning mechanism for cultural transmissions. Idiosyncratic cultural actions (hand-shake or cheek-kiss greetings) are spread widely and efficiently because learners can imitate them. A critical component of cultural imitation is the cultural group itself—social imitation happens in the context of a group. Most imitation studies have employed the one-on-one paradigm; here we asked how the composition of the group affects imitation. Specifically, do 5-year-olds prefer to imitate a homogenous group (two similar people) or a heterogeneous group (two different people)? Groups of similar people allow more alignable comparison, giving the outcome of a tighter group. Diverse groups, on the other hand, imply larger inclusivity. After seeing two novel gestures modeled by a homogenous and a heterogeneous group, respectively, 5-year-olds preferred to imitate the homogenous group. This homogenous group preference also held when 5-year-olds taught the novel actions to someone else—akin to teaching a norm.

ID: 678 / PS-I: 60
Poster

Topics: Developmental Disabilities, Executive Function

Infant Behaviors Indicative of Risk for ASD Predict Executive Function in Early Childhood

Rebecca Stephens, J. Steven Reznick
University of North Carolina at Chapel Hill; rebsteph@live.unc.edu

Much research exists concerning the relationship between infant behaviors and later cognitive development. Further, there remains an emphasis on early identification of autism spectrum disorder (ASD), a disorder that is consistently associated with significant deficits in executive function (EF) across the lifespan.

The First Year Inventory (FYI) was designed to identify infants at risk for an eventual diagnosis of ASD and was administered to a large sample from our research area. A subset of FYI participants is completing a follow-up assessment at 42 months (ongoing; current N=124), which includes the Behavior Rating Inventory of Executive Function – Preschool Version (BRIEF-P), a measure of EF in children aged 2-5 years.

Regression analyses indicate that aspects of risk for ASD at 12 months significantly predict an overall EF composite and specific EF subscales at 42 months. This relationship further emphasizes the predictive value of early infant behaviors for both typical and atypical development.

ID: 533 / PS-I: 61
Poster

Topics: Infant Cognition, Moral Cognition, Social Cognition

Infants associate an agent's social disposition to its internal properties.

Erik Cheries, Ashley Lyons, Hernando Taborda
UMass Amherst, United States of America; echeries@psych.umass.edu

Adults' social reasoning is biased by an implicit belief that internal properties give rise to people's outward appearance and observable actions. We explored the developmental foundations of this bias by examining whether 13-month-old infants automatically associate an agent's sociomoral behavior with its 'insides'. Infants repeatedly witnessed an agent's goal being helped or hindered by two partially transparent characters that possessed contrasting internal and external features (e.g., one with a red 'hat' and red 'insides' vs. one with a yellow 'hat' and yellow 'insides'). Infants were then given a choice between two scrambled versions of the characters to see which they would rather play with—one that possessed the same color of the helpful character's 'insides' or one with the same color of the helpful character's 'outsides'. Our results indicate that a majority of infants associated an agent's social disposition to its internal properties, a possible precursor to later causal understanding.

ID: 509 / PS-I: 62

Poster

Topics: Infant Cognition, Social Cognition

Infants inferences about affiliation based on shared cultural actions

Zoe Liberman¹, Katherine D Kinzler², Amanda L Woodward¹

¹University of Chicago, United States of America; ²Cornell University, United States of America; zoeliberman@uchicago.edu

Do infants use shared cultural actions to make inferences about affiliation? Infants see using one's head to turn on a light as culturally-relevant: they imitate ingroup members (e.g. Howard et al., 2014). Infants also understand that using one's head is less culturally-relevant if it's the only way to turn the light on (e.g. Gergely, Bekkering, & Kiraly, 2002). Here, infants watched actors turn on a light differently: one used her hand, and one used her head. Half of the infants saw the head-action done by a woman wearing a blanket, meaning she couldn't use her hands. While both groups saw different actions, in the blanket case there were no interpretable cultural actions, but in the no-blanket case there were different cultural actions. Infants in the blanket condition, but not the no-blanket condition expected the actors to affiliate. Thus, infants' inferences about affiliation are guided by shared intentions and cultural actions.

ID: 466 / PS-I: 63

Poster

Topics: Infant Cognition, Social Cognition

Infants' expectations about resource distributions reflect dominance structures.

Elizabeth Ake¹, Julie Kim², Hyowon Gweon³, Jessica Sommerville¹

¹University of Washington, United States of America; ²Smith College; ³Stanford University; akee@uw.edu

Previous research has found that infants have a complex understanding of the social world: by 15months-of-age infants understand social dominance hierarchies and are sensitive to fairness in resource distribution tasks. The novel question addressed in this study is whether infants integrate their understanding of social dominance with their expectations regarding how resources should be distributed. Across two studies we replicated the finding that infants are sensitive to social dominance (Study 1), and that this sensitivity is not driven by lower level perceptual factors (Study 2). In Study 3, after receiving social dominance information, infants looked significantly longer at an equal distribution of resources (2:2) compared to an unequal distribution in which the dominant agent received more (3:1) than the submissive agent. This indicates that although infants expect equality in resource distributions when no background information about the recipients is given, infants adjust their equality expectations depending on social dominance information.

ID: 336 / PS-I: 64

Poster

Topics: Infant Cognition, Moral Cognition

Infants' interventions in socio-moral contexts

Talee Ziv, China R. M. Jarvis

University of Washington, United States of America; ziv@u.washington.edu

The current study asked whether infants would intervene after observing agents act fairly or unfairly in third-party resource distributions, and whether such interventions are unique to socio-moral contexts.

Sixteen-month-olds learned that one side of a touch screen emits positive sentences when touched, whereas the other screen side emits negative sentences. Infants then saw clips in which one actor distributed resources fairly and another actor distributed resources unfairly. Two 60-second test trials followed: in the Fairness condition (n=64), participants saw the face of the fair or unfair individual at the center of the screen, and in the Food condition (n=31) participants saw food items they liked or disliked, while screen touches were recorded.

Results showed that participants touched the positive side of the screen significantly more than the negative side only when the fair distributor was presented.

These results suggest that infants intervene specifically in socio-moral situations by rewarding positive actions.

ID: 339 / PS-I: 65

Poster

Topics: Concepts/Categories, Infant Cognition, Language

Keywords: goals, paths, motion events, spatial language

Infants' Representations of Goals in Motion events: The Relationship between Event Conceptualization and Language Development

Laura Lakusta, Danielle Spinelli, Kelsey Conlon, Moira Anthony, Amrita Bindra, Omaris Garcia, Jessica Ardis, Felicia Apito, Delores Ponton

Montclair State University, United States of America; lakustal@mail.montclair.edu

Two experiments explored the relationship between event conceptualization and language development in 18-month-old infants. Using the Preferential Looking Paradigm, Experiment 1 revealed that after being familiarized to different goal paths in motion events (duck moves next to tree, next to mailbox, onto box, onto block), infants (N = 24) generalize to new goal paths during test (duck moves into bowl) vs. events with source paths (duck moves out of bowl), suggesting goal categorization. Using a modified MCDI (N = 83) and the Intermodal Preferential Looking Paradigm, to directly test language comprehension (N = 13), Experiment 2

revealed that infants do *not* show robust comprehension of the spatial preposition “to” in English – a term that broadly marks all types of goal paths. Thus, the concept of goal path may precede the development of the spatial term “to”, shedding light on the nature of the interaction between conceptual and language development.

ID: 682 / PS-I: 66

Poster

Topics: Social Cognition, Social Learning

Keywords: Imitation, Cognitive Development, Cumulative Culture, Preschool

Innovation by Summative Imitation: Evidence from a tower building task

Francys Subiaul, Leah Gillon

George Washington University, United States of America; subiaul@gwu.edu

Can children innovate by combining different modeled responses? To address this question we presented children (N = 38) with a tower-building task. Children observed one or two models combine two hollow cubes (base) and two flat squares (top), creating two different tower elements. These tower elements were placed side-by-side, but never atop one another. A third group of children were provided with no demonstration (Baseline). Children were then given all the four pieces (dissembled) and encouraged across 3 trials to “build one super tall tower”. There was a trend for children in the demonstration groups to build taller towers, relative to Baseline (M_{cm} : Baseline = 14.6; One Model = 15.0; Two Models = 17.0). This trend was driven by children in the demonstration conditions (none in Baseline) building and combining the demonstrated tower elements ($p < .05$). These results suggest that innovation may result from imitatively combining responses across models.

ID: 424 / PS-I: 67

Poster

Topics: Number

Intergenerational Transmission of Numerical Ability: Evidence from Toddlerhood and Middle Childhood

Emily Braham, Monica Navarro, Melissa Libertus

University of Pittsburgh, United States of America; ejb67@pitt.edu

Starting in infancy, humans have access to an approximate number system (ANS), which allows for rapid processing of approximate quantities and supports the development of mathematical skills. Yet, little research has aimed at identifying the sources underlying individual differences in ANS acuity. Here we examine the influence of parents’ ANS acuity on children’s ANS acuity prior to (1-to 3-year-olds; $n=47$) and after (7- to 8-year-olds; $n=38$) the onset of formal math instruction. To measure ANS acuity, we assessed toddlers’ looking times to numerically changing dot displays while parents and older children completed standard versions of a non-symbolic number comparison task in which they chose the numerically larger of two quickly flashed arrays of dots. Parents’ ANS acuity significantly predicted their children’s ANS acuity in both age groups, providing the first evidence of intergenerational associations in an unlearned, numerical competence both prior to and after the onset of math instruction.

ID: 540 / PS-I: 68

Poster

Topics: Decision Making and Reasoning, Memory

Keywords: Interleaving, context, math

Interleaving Across Contexts

Rachael Danielle Todaro, Bradley Morris, Was Christopher

Kent State University, United States of America; rtodaro@kent.edu

Interleaving, or practice across a set of dissimilar problems, improves learning and transfer by increasing discrimination of problem features. Similarly, comparing problems across different contexts highlights relevant and irrelevant knowledge. We investigated the relative effects of problem and context comparisons in interleaved practice using two different math skills, across four problem types, placed in two different contexts. Fifty-nine fourth- and fifth-grade students were randomly assigned to one of four conditions: blocked by math skill, interleaved by math skill, interleaved by context, and interleaved by math skill *and* by context (i.e., hyper-interleaved). At immediate posttest, the blocked group demonstrated the largest change in percent correct. At transfer and delayed posttest, the blocked group had the largest decline in performance whereas the hyper-interleaved group had the smallest decline and demonstrated a slight increase in percent correct. The results suggest that learning with different problem types across contexts produces best transfer and long-term retention.

ID: 671 / PS-I: 69

Poster

Topics: Memory

Investigation of age-related differences in the fading affect bias in autobiographical memory

Leslie Rollins, Elizabeth Cloude, Jeffrey Gibbons

Christopher Newport University, United States of America; leslie.rollins@cnu.edu

Numerous studies in adults report the presence of a fading affect bias (FAB) in memory. Emotions fade faster for negative than positive memories. However, no published studies have examined this effect in children despite the importance of this effect for children’s long-term memory and the potential relevance of the FAB for clinical practice with children. The present study examines

age-related differences in the FAB in 8- to 12-year-old children and young adults. All participants described 3 pleasant and 3 unpleasant events and rated their affect during the event as well as how they currently felt about the event. Consistent with previous studies, changes in affect were larger for unpleasant ($M = 1.56$, $SE = .14$) than pleasant events ($M = .34$, $SE = .14$), $F(1, 189) = 35.3$, $p < .01$. However, the magnitude of the effect did not differ across age groups, $F(1, 189) = .24$, $p = .63$.

ID: 613 / PS-I: 70

Poster

Topics: Concepts/Categories, STEM Learning

It's Natural: Conceptual Change and Preschoolers' Science Learning in Playscapes

Rhonda Brown, Victoria Carr, Catherine Maltbie, Heidi Kloos, Rebecca Gasiewicz

University of Cincinnati, United States of America; Rhonda.Brown@uc.edu

The nature and development of preschoolers' understanding of living things has been debated in the literature, with some proposing that conceptual development occurs through a process of elaboration upon existing competencies through experience with biological entities, and language development. The current study investigated preschoolers' science learning in outdoor nature-based play environments, called playscapes, intentionally designed to engage children with natural phenomena. Sixty-four children ages three to five were administered a Science Curriculum Based Assessment, developed for this study, before and after six one-hour field trips to two playscapes. Results revealed an overall increase in scores from pre- to post-test. Furthermore, qualitative analyses indicated shifts from pre- to post-test in conceptual complexity for understanding plants as living things, and growth and change in nature. Verbal responses also increased in length and sophistication. This study demonstrates specific changes in preschoolers' concepts of living things related to their experiences in nature-based play environments.

ID: 551 / PS-I: 71

Poster

Topics: Language, Number

Keywords: large numbers, cardinal principle, one-to-one correspondence, counting principles, preschoolers

Limitations in children's induction of the cardinality principle: Evidence from the Give-A-Number task with larger quantities

Anna Shusterman¹, Pierina Cheung¹, Simoneil Sarbh¹, Jessica Taggart²

¹Wesleyan University, United States of America; ²University of Virginia; cheung.pierina@gmail.com

According to most accounts of number word learning, cardinal-principle knowers (CP-knowers) understand how to use counting to generate sets. However, previous studies rarely ask children to produce sets larger than six, and thus, their understanding of large numbers remains unexplored. The current study aims to fill this gap by testing CP-knowers (3;3-5;2) with large numbers in the Give-A-Number task. In a sample of CP-knowers whose highest count was 15 or above, almost all of them generated sets of 7, 8 and 10 objects with no error, but 42.9% of them failed to accurately produce 14 objects. We analyzed children's counting errors and found that while most of them understood the last word of a count denotes the cardinality of a set, only half of them followed one-to-one correspondence in counting. A follow-up study is investigating the nature of CP-knowers' counting errors. Implications for children's acquisition of counting principles are discussed.

ID: 460 / PS-I: 72

Poster

Topics: Memory

Memory Specificity on the Autobiographical Memory Test: The Impact of Memory Elicitation Method

Nicola Rodwell Herting², Sarah Loveland Bunnell¹, John Paul Legerski²

¹Ohio Wesleyan University, United States of America; ²University of North Dakota, United States of America; sbunnell@owu.edu

There is convincing evidence for the association between overgeneral autobiographical memory and psychopathological symptoms in adolescent and adult samples. The most commonly-used assessment of autobiographical memory specificity is the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986), although AMT elicitation methods are not standardized. Researchers vary in their use of verbal, handwritten, or computerized AMT administration, and there are good reasons to expect that recall method may differentially impact specificity. To address this issue, an experimental study was conducted with 177 late adolescents (Mage = 19.5 years) randomly assigned to complete a verbal, handwritten, or computer-prompted AMT. We found a significant effect of AMT elicitation method, such that lowest levels of specificity were observed in the verbal recall condition, and this effect was not explained by individual differences in executive control or psychological wellbeing. These findings have implications for interpreting the autobiographical memory specificity literature across development.

ID: 749 / PS-I: 73

Poster

Topics: Concepts/Categories, Moral Cognition, Social Cognition

Money has moral history: Children's and adults' attention to the moral source of physical currency

Arber Tasimi¹, Susan A. Gelman²

¹Yale University, United States of America; ²University of Michigan, United States of America; arber.tasimi@yale.edu

Money is intended to be freely substitutable, yet psychological research abounds with examples that deviate from the strict notion of fungibility assumed by traditional economic models. Here, we provide evidence that people construe money in terms of its source

and, importantly, attach significance to the moral history of physical bills themselves. In Study 1, adults and children 8-9 years of age willingly rejected proffered money with tainted moral history, whereas children 5-6 years of age did not. In Study 2, when self-interests were removed, participants of all ages held similar intuitions about what should be done with tainted money, indicating that with age, moral history trumps personal incentives. These findings suggest that, by 8 years of age, people do not always treat money as fungible and consider physical currencies (e.g., this token, that bill) as carrying traces of their moral history.

ID: 332 / PS-I: 74

Poster

Topics: Communication, Memory

Keywords: emotion

Narratives for understanding emotions: Internal states language in parent-child conversations about the past and future

Melissa Mae Burch, Isabel Tweedie

Hampshire College, United States of America; mburch@hampshire.edu

We examined relations between children's performance on emotion understanding tasks and parent-child use of internal states language when discussing past and future events. Because internal states reflect meaning making, discussion of future events may provide a distinct opportunity for socialization due to the need to anticipate experiences. Twenty-two five-year-old children (11 girls) and their parents discussed past and future events. To assess children's emotion understanding, we used labeling and emotion knowledge tasks. Parents mentioned internal states more frequently for past than future events; children's use of internal states did not differ. Children's use of internal states about future events was marginally related to their emotion knowledge. Parental contributions to both events related to children's emotion situation knowledge but not their ability to identify emotions. Thus, the two types of events serve similar roles with parental internal states providing a framework for children to understand their emotional reactions over time.

ID: 793 / PS-I: 75

Poster

Topics: Infant Cognition, Social Learning, STEM Learning

Keywords: causal learning

Now it works, Now it doesn't: Toddlers' use of probabilistic information to learn about cause-and-effect

Anna Waismeyer¹, Andrew N. Meltzoff^{1,2}

¹Institute for Learning & Brain Sciences, United States of America; ²University of Washington; awaismeyer@gmail.com

24-month-olds can learn new causal relationships by observing others' goal-directed acts, even in nondeterministic settings (outcomes are <100%). Previous work suggests that they can learn by tracking probabilities. Here we distinguished probability from frequency with two studies involving a pair of potential causal objects. Study-1 contrasted the *probabilities* of an effect with the *frequencies*. One of the causes led to an event happening 5 out of 6 times (83%); the other led to the event *more frequently* but with *lower probability* (8/12 times = 67%). At test, children chose the higher probability causal object, $p < .05$. Study-2 provided converging evidence by showing that results dropped to chance when the probabilities were equated and frequencies varied. These results demonstrate that toddlers can track probabilities when learning novel causal relationships, thus contributing to rapid causal learning despite real-world social variability.

ID: 321 / PS-I: 76

Poster

Topics: Concepts/Categories, Moral Cognition, Number

Keywords: prosocial behavior

Number-based sharing: Bridging numerical cognition and sharing behavior in early childhood

Nadia Chernyak^{1,3}, Beth Sandham^{2,4}, Paul L. Harris³, Sara Cordes⁴

¹Department of Cognitive, Linguistic, & Psychological Sciences, Brown University; ²Department of Psychology, University of Bath;

³Harvard Graduate School of Education; ⁴Department of Psychology, Boston College; chernyak@bu.edu

Young children share fairly and expect others to do the same. Little is known about the underlying cognitive mechanisms that cause fairness. We investigated the extent to which children's numerical competencies are linked with their sharing behavior. Preschoolers (aged 2.5-5.5) participated in two third-party resource allocation tasks. We coded whether children shared fairly as well as their sharing strategy: Either *division* (immediate splits) or *turn-taking* (taking turns giving each recipient 1 toy). Children's numerical cognition was assessed using a version of the Give-N-Task (Wynn, 1990). Give-N-Performance fully mediated age-related changes in fair sharing. While the majority of subset-knowers were still able to share fairly, they invoked non-numerical (turn-taking) strategies and failed to reference number in their explanations. Results suggest that numerical cognition serves as an important mechanism for fairness, and that children may be using different schemas of fairness (number-based fairness or turn-taking) depending on their level of numerical competence.

ID: 616 / PS-I: 77

Poster

Topics: Social Cognition

Perceptions of the Limits of Knowledge Across Development

Anne Fast¹, Sara Hagá², Rachel Horton¹, Reina Zhu¹, Kristina Olson¹

¹University of Washington, United States of America; ²Universidade de Lisboa, Portugal; afast@uw.edu

Can someone know everything? In three studies, we asked children (4- to 11-year-olds, N=243) and adults (N=20) how much they think people know about given domains. We hypothesized that the less knowledgeable a person is, the more likely she is to think that people can know everything there is to know. A similar pattern emerged across the three different methodologies and three cultures (US, Portugal, China), such that younger children (the least knowledgeable people) tended to say that a person can know everything about a given domain, more often than older children (or adults). This tendency in younger children was reduced when children were presented with possible facts people should know about a given domain if they know everything. Overall, these studies present a developmental shift in perceptions of the limits of knowledge—as people become more knowledgeable with age, they also become less likely to think one can know everything.

ID: 391 / PS-I: 78

Poster

Topics: Decision Making and Reasoning, Number, Spatial Cognition

Keywords: Proportional Reasoning; Numerical Reasoning; STEM

Proportional and Whole Number Reasoning

Ty W. Boyer, Natalie Branch

Georgia Southern University, United States of America; tboyer@georgiasouthern.edu

Elementary school-aged children have great difficulty reasoning about proportions, some suggest because proportions do not abide by the same principles as more familiar whole number quantities. This study examines individual differences in proportional reasoning and whole number operation skills. Pre-kindergarten through fifth-grade students completed a battery of computerized tasks, including a proportional equivalence judgment task, “which is more?” and “which is #?” whole number comparison tasks, and symbolic and non-symbolic numerical line-estimation tasks. The results indicate that though younger children’s performance on each of the whole number comparison and number line estimation tasks were significantly positively correlated, performance on each was negatively correlated with performance on the proportional judgment task. By contrast, older children’s performance on all tasks was positively correlated. These findings support a prediction that better counting abilities early in development might contribute to errors in proportional reasoning, although the two are positively related later in development.

ID: 508 / PS-I: 79

Poster

Topics: Neuroscience Approaches, Number, STEM Learning

Qualitative change in number processing upon learning to count

Iaria Berteletti, Yi Mou, Charline E. Simon, Daniel C. Hyde

Department of Developmental Psychology, University of Illinois at Urbana Champaign, USA; iaria.berteletti@gmail.com

Current theories diverge on whether the development of counting in children is better characterized as an incremental learning process or whether it involves qualitative conceptual change. Here, we compared neural processing, measured by event-related potentials during a number comparison task, in preschool-aged children who had or had not learned how counting represents number. The neural response of both groups showed sensitivity to the numerical differences in comparison pairs, but in qualitatively different ways: developing counters showed an increase in the neural response as comparison ratio decreased whereas proficient counters showed a neural response that increased as comparison ratio increased. The combination of these results and previous neurophysiological findings suggest that 1). the developing counters are representing, at the least, the approximate numerosity of spoken number words before fully understanding counting and 2). proficient counters come to construe the relationships between numbers in a qualitatively different way.

ID: 555 / PS-I: 80

Poster

Topics: Developmental Disabilities, Memory

Recall Memory in Children with Down Syndrome and Their Typically Developing Peers

Angela Faith Lukowski, Helen Masland Milojevich

University of California-Irvine, United States of America; alukowsk@uci.edu

Children with Down syndrome (DS) must be able to successfully encode and retain information in order to benefit from intervention programs. However, it is presently unknown whether children with DS encode and maintain information over the long term at levels that are comparable to those of typically developing (TD) children. In the present study, 10 children with DS and 10 TD children participated in a standardized developmental assessment and an encoding procedure using an elicited imitation paradigm; delayed recall was assessed after 1 month. Children with DS performed similarly to TD children on measures of encoding and 1-month delayed recall of target actions. However, TD children remembered temporal order information after the 1-month delay whereas children with DS did not. These findings provide important insight as to the cognitive functioning of children with DS and suggest that these children may experience difficulty with post-encoding processes relative to TD children.

ID: 331 / PS-I: 81

Poster

Topics: Attention, Language

Keywords: Word Learning

Salient Distractors in Novel Word Learning

Ron Pomper, Jenny Saffran

University of Wisconsin-Madison, United States of America; rpomper@wisc.edu

Toddlers determine the referent of novel names by rejecting familiar objects with known names (Markman & Wachtel, 1988). Decreasing the number of familiar competitors (Horst, Scott & Pollard, 2010) and drawing attention to the target novel object (Axelsson, Churchley & Horst, 2012) improve word learning. The current experiment examines whether the *salience* of familiar competitors also influences word learning.

Using the looking-while-listening procedure, 34 toddlers (38-42 months) were taught the names of novel objects paired with either **salient** familiar objects (e.g., kitten) or **boring** familiar objects (e.g., box). In an immediate test of retention, toddlers were above chance for novel objects labeled in the **boring** ($p < .05$) but not **salient** condition ($p = 0.5$). Retention in the **salient** condition was predicted by individual differences in fixations to the novel object *before* ($p < .05$) but not *after* labeling ($p = .81$) on teaching trials. Thus children's attention to salient familiar competitors influences novel word learning.

ID: 381 / PS-I: 82

Poster

Topics: Attention, Concepts/Categories, Word Learning

Selective attention in auditory lexical category learning: Dissociations from visual category learning

Keith S. Apfelbaum, Vladimir Sloutsky

Ohio State University, United States of America; apfelbaum.3@osu.edu

Selective attention shows a developmental trajectory from distributed attention across features early in life to selective attention to relevant features in adulthood. This development helps learners filter out unattended dimensions and generalize attention across categories. However, most research on selective attention uses visual categories. Meanwhile, auditory lexical categories' complex temporal structure and highly overlearned features may necessitate different deployment of selective attention.

We examined whether selective attention operates isomorphically in lexical and visual category learning, and compared developmental changes in the two domains. We taught participants novel words and gauged their attention to relevant and irrelevant features. Like in visual category learning, recognition improved for relevant features and declined for irrelevant features. However, the extent of generalization of attention was narrower than in visual categorization. These results suggest that selective attention operates in auditory word learning, but its extent is more context sensitive than in visual category learning.

ID: 702 / PS-I: 83

Poster

Topics: Culture, Executive Function, Social Learning

Selectivity in social and asocial learning: Investigating the prevalence, effect and development of young children's learning preferences

Emma Flynn¹, Cameron Turner¹, Luc-Alain Giraldeau²

¹Durham University, United Kingdom; ²L'Université du Québec à Montréal; e.g.flynn@durham.ac.uk

Cumulative culture requires both modification and faithful replication of behaviour, thus we need to understand individual's selection of asocial and social learning. 176 three- and five-year-olds, and 52 adults were presented individually with two puzzle boxes labelled 'easy' and 'hard'. Participants were asked if they wanted to attempt the task themselves or watch an experimenter attempt it first; and then had their preference met or violated. 74% of the sample chose to learn socially. For children, this request was efficient, as social learners were quicker and more successful than asocial learners. Five-year-olds who selected asocial learning were highly efficient at the task, showing an ability to select a learning strategy which is effective for them. Adults further evidenced this trend, also showing selectivity based on task difficulty. This is the first study to examine the rates, performance outcomes and developmental trajectory of preferences in asocial and social learning.

ID: 471 / PS-I: 84

Poster

Topics: Language, Reading

Shared Book Reading Practices: The effect of genre on parent/child interactions and perceptions of function

Kristin Nicole Henkaliné, Laura Wagner

The Ohio State University, United States of America; henkaliné.7@osu.edu

Parent/child interactions are an important part of the shared reading experience, but little is known about how interactions differ depending on the type of book involved. This study examines four book types (character study, classic narrative, life-skills, and alphabet) and examines how parent/child interactions differ depending on book type. Forty-eight parent/child dyads with preschool aged children were videotaped during a shared reading session (12 per book) and detailed coding was conducted on the extent and nature of the interactions during the session. Preliminary results suggest that the type of book does influence the interactions. For example, the narrative strength of the book was inversely correlated with the amount of extra-textual talk so that the alphabet book lead to the most extra-textual interactions and the classic narrative to the least. Optimal uses for promoting language and literacy skills of the different types of books will be discussed.

ID: 531 / PS-I: 85

Poster

Topics: Executive Function
Keywords: delay of gratification; siblings; relationships

Sibling Relationships and Delay of Gratification

Rachael D. Reavis¹, Stephanie E. Miller², Kubra Z. Kasicki¹, Arielle A. Webb¹, Olga V. Galperin¹, Sarah E. Kenny¹, Aubrie E. Hamp¹, Helena C. Flores¹

¹Earlham College, United States of America; ²University of Mississippi, United States of America; rdreavis@alum.conncoll.edu

We examined siblings as motivators in hypothetical delaying gratification scenarios in adults (using MTurk). We tested the effect of four different types of hypothetical scenarios (within-subjects): self-delay (e.g., \$30 now for the self; \$50 in a month), equal-consequences delay (e.g., \$30 now for the self and the sibling; \$50 in a month for both), sibling-incentive delay (e.g., \$30 now for both; \$50 in a month for the self and \$100 for the sibling), or no-self-incentive delay (e.g., \$30 now for both; \$30 in a month for the self and \$50 for the sibling). Participants were more likely to delay in sibling conditions compared to the self-delay condition and were most likely to delay in the sibling-incentive condition. Delaying for a sibling was significantly related to measures of current and recalled childhood sibling relationship quality, especially when in the sibling-incentive and no-self-incentive conditions.

ID: 415 / PS-I: 86

Poster

Topics: Infant Cognition, Language
Keywords: Motor learning, Developmental Cascades

Sit to talk: Sitting Skills Predict Subsequent Language Development

Klaus Libertus

University of Pittsburgh, United States of America; kll60@pitt.edu

The onset of walking has been shown to influence language development. However, whether earlier emerging motor milestones also affect language skills remains unknown. The current research fills this gap by examining the relation between reaching and sitting skills and subsequent language development respectively. Reaching and sitting were assessed longitudinally via 8 weekly videoconference assessments in 19 three-month-old infants. Subsequently, infants' language and motor skills were assessed via parent questionnaire (Communicative Development Inventories and Early Motor Questionnaire) at 10 months of age. Results revealed that sitting development at three months predicted receptive vocabulary at age 10 months above and beyond influences of concurrent motor development ($R^2_{Change} = .24, p = .02$). In contrast, reaching skills were not related to subsequent language development. These findings demonstrate a novel approach to assess motor skills via videoconference and provide insights into the dynamic interactions between motor and cognitive development in infancy.

ID: 686 / PS-I: 87

Poster

Topics: Decision Making and Reasoning, Social Cognition, Social Learning
Keywords: Food choice

Social tastes sweeter: Children use social messages to categorize ambiguous foods.

Jasmine M. DeJesus¹, Katherine Crain², Jennifer Galamba³, Kristin Shutts⁴, Katherine D. Kinzler⁵

¹University of Michigan; ²Duke University; ³University of Chicago; ⁴University of Wisconsin-Madison; ⁵Cornell University; jasmine.dejesus@gmail.com

How does social context influence children's food choices? Does food presented to children as socially desirable taste sweeter? In Experiment 1, 5- to 6-year-old children ate more of a food described as popular than a food described as unpopular, and evaluated the popular food's taste more positively than the taste of the unpopular food, even though both foods were identical. In Experiment 2, 5- to 6-year-old children were presented with applesauce with varying amounts of lemon juice added (1-4mL lemon juice). Foods were described as either popular or unpopular. After tasting each sample, children categorized foods as sweet or sour. For ambiguous trials (2mL and 3mL lemon), children's categorizations were sensitive to social information: Foods presented as socially desirable were more likely to be categorized as sweet. These findings suggest that children's perceptual experience of foods is impacted by social information.

ID: 731 / PS-I: 88

Poster

Topics: Language, Word Learning

Speech-Processing Efficiency Leverages Novel Word Learning in Infants and Toddlers

Jill Lany

University of Notre Dame, United States of America; jlany@nd.edu

Infants who encode familiar words quickly also add new words to their lexicons more rapidly across childhood. One explanation for this finding is that speech-processing efficiency (SPE) confers a direct benefit to word learning. However, an alternative explanation is that SPE is not causally related to vocabulary size, but rather that both benefit from the presence of better learning opportunities in the home. Thus, the current research tested whether children with faster SPE scores learn novel words more readily than children with slower SPE scores, even when given equivalent learning experience. At 16-17 months, SPE predicted novel word learning in a simple, ostensive-labeling task, but this relation was attenuated by 30 months. However at 24-30 months, SPE predicted learning when novel words were encountered in more complex sentences. These data suggest that SPE is causally related to word-learning ability across infancy and toddlerhood, thus driving differences in language-development trajectories.

ID: 801 / PS-I: 89

Poster

Topics: Computational Approaches, Language

Testing the Tolerance Principle for rule productivity in an artificial grammar

Kathryn D Schuler¹, John Davis¹, Charles Yang², Elissa L Newport¹

¹Georgetown University, United States of America; ²University of Pennsylvania, United States of America; kds71@georgetown.edu

Children must distinguish between *productive rules* in their language – those that apply broadly despite many exceptions (English ‘add –ed’) – and those that are lexically specific and should not be generalized. Yang proposed that these can be distinguished by the Tolerance Principle: a rule is productive if the number of exceptions is less than the number of words in the category N divided by the natural log of N . This principle accurately predicts rule productivity in 30 languages. Here we test whether it predicts children’s learning, using artificial languages with 9 nonsense nouns. As predicted, children exposed to 5 regular forms/4 exceptions generalized, applying the regular form to 100% of novel test words. Children exposed to 3 regulars/6 exceptions never extended the rule. Other manipulations of regulars/exceptions and noun frequency also followed predictions. The Tolerance Principle thus appears to capture a basic principle of generalization in rule formation.

ID: 523 / PS-I: 90

Poster

Topics: Number, STEM Learning

Keywords: Mathematics, Gender Stereotypes, Parent-Child Beliefs/Attitudes

The development and influence of math-gender stereotypes across the lifespan

Tasha Posid¹, Laura Hymes², Corinne Moss-Racusin³, Sara Cordes²

¹The Ohio State University; ²Boston College; ³Skidmore College; tasha.posid@bc.edu

Although the gender gap in mathematics achievement is narrowing, women are still underrepresented in STEM-fields. Many open questions remain: What is the prevalence of math-gender and math-difficulty stereotypes in children? Are parents’ attitudes about math concordant with that of their children? This study investigated implicit and explicit attitudes towards math in 6-12 year olds and their parents. We find both children and adults hold implicit math-difficulty (“math is hard”) beliefs, but this measure did not correlate within families. However, children’s implicit math-gender biases (“math is for boys”) did correlate with their same-gender parent’s biases (mother-daughter; father-son). Both men and boys were also more likely to explicitly self-identify with math than females. Together, results suggest that attitudes towards math being difficult and being for boys emerge early in development and may be influenced by parental attitudes.

ID: 497 / PS-I: 91

Poster

Topics: Concepts/Categories, Language

Keywords: semantics, pluralities

The Effect of Conceptual Factors on Children’s Interpretation of Ambiguous Sentences

Nikole D. Patson, Julie M. Hupp

Ohio State University, United States of America; hupp.34@osu.edu

Sentences such as “*The girls read a book*” can lead to multiple interpretations: the girls reading the same book (collective interpretation) or the girls each reading their own book (distributive interpretation). In ambiguous contexts, adults prefer the collective interpretation, and children show a slight bias for a distributive interpretation. The current research investigated whether conceptual factors (number of actors), influence adults’ and children’s (4- and 5-year-olds) interpretations of these sentences. While the number of actors does not influence adults’ preferences, children show a stronger collective bias when there are four actors compared to when there are two. This may be because young children are more likely to conceptualize groups of four compared to groups of two as sets rather than collections of individuals, or because children lag behind in their ability to combine components into a complex whole in comparison to their ability to parse objects into their component parts.

ID: 628 / PS-I: 92

Poster

Topics: Culture, Executive Function, Social Learning

The effect of social group affiliation on children’s social learning of self-regulation skills

Amy Chao, Rachel Bell, Jason Chin, Grace Min, Kathleen Corriveau

Boston University, United States of America; gmin@bu.edu

This study explored the effect of social group information on children’s acquisition of self-regulatory strategies. Twenty-nine Chinese American 4- to 5- year old children watched a model use novel strategies as she completed delay-of-gratification task. For half of the children, the model was the same race (Chinese), and for the other half, the model was Caucasian. Children were then invited to perform the same delay task, and their use of the novel strategies was recorded. Preliminary results reveal a trend for children who had observed an ingroup model (53% imitated) to be more likely to imitate the self-regulatory strategies than those who had observed an outgroup model (29% imitated). We discuss implications for these findings for social learning strategies.

ID: 585 / PS-I: 93

Poster

Topics: Executive Function, Social Cognition, Theory of Mind

Keywords: Pretense, Imagination, Play

The Effects of a RCT of Dramatic Pretend Play on Social Cognition and Self Control.

Thalia Goldstein

Pace University, United States of America; tgoldstein@pace.edu

Pretend play has long been empirically and theoretically connected to social cognitive abilities in preschool aged children. However, a recent meta-analysis and review (Lillard et al, 2013) called this connection into question. In an 8 week, randomly assigned, controlled and tester blind experimental study, low SES four year old children engaged in guided dramatic pretend play, or guided story time or block building control groups. Results showed no causal effect of pretend play engagement on social cognitive skills, but positive unique effects of dramatic pretend play on emotional self control. This self control may be a necessary precursor to social cognitive skills and may be specifically positively affected by engaging in the fictional portrayal of characters and emotions.

ID: 506 / PS-I: 94

Poster

Topics: Executive Function

Keywords: Executive Functions, Cognitive Control, Parenting

The Joint Contribution of Maternal Cognitive Control and Emotional Supportiveness on Child Cognitive Control

Selin Zeytinoglu, Margaret M. Swingler, Susan D. Calkins, Marion O'Brien, Esther M. Leerkes

The University of North Carolina at Greensboro, United States of America; s_zeytin@uncg.edu

The goals of this study were to examine the association between maternal cognitive control and child cognitive control, and to investigate whether maternal emotional supportiveness mediates this association. Participants were a diverse sample of 279 4-year-olds and their mothers who were recruited as part of a larger longitudinal study on academic readiness. Mothers' perceived cognitive control was assessed via a self-report measure. Maternal emotional support was observed during a semi-structured mother-child interaction task. Children's cognitive control was measured via computerized inhibitory control (Go-No-Go) and task-switching (Dimensional Change Card Sort) tasks in the laboratory, and a parent-report measure. Results indicated that better maternal cognitive control and greater maternal supportiveness were associated with better child cognitive control. Mediation analysis revealed an indirect effect of maternal cognitive control on child cognitive control through mother's supportiveness, suggesting that maternal emotional support may be one key mechanism contributing to possible intergenerational continuity of cognitive control.

ID: 468 / PS-I: 95

Poster

Topics: Executive Function, Language, Word Learning

The production of multiple labels for a single object: Category labels and registers

Toshiki Murase

Shimane University, Japan; t-murase@soc.shimane-u.ac.jp

The present study investigated the development of the meta-linguistic ability to multiply produce ADS and IDS labels as well as basic and superordinate category labels for a single object in Japanese children. Fifty-five Japanese preschoolers were asked to produce basic ADS, IDS and superordinate category labels. They also responded to the false-belief task and the DCCS task. Five- and 6-year-olds produced more multiple basic and superordinate category labels than did 4-year-olds, while we observed a marginal increase in the production of multiple ADS and IDS labels with age. Five- and 6-year-olds produced more multiple basic and superordinate category labels than multiple ADS and IDS labels. A positive relationship between number of multiple productions of basic and superordinate category labels and DCCS score was revealed. These findings demonstrate that Japanese preschoolers develop the ability to produce multiple labels for an object in conjunction with the development of their executive function.

ID: 590 / PS-I: 96

Poster

Topics: Language, Social Cognition, Theory of Mind

Keywords: source monitoring, language and thought

The Relation Between Evidentiality and Source Monitoring

Ercenur Unal, Anna Papafragou

University of Delaware, United States of America; eunal@psych.udel.edu

Classical developmental theories presume that cognitive development follows a universal timetable. Recent, relativist, proposals posit that language-specific encoding patterns might change the timetable of cognitive development. Here, we test these proposals in the domain of source-monitoring and evidentiality. We compare young learners of English and Turkish, a language that obligatorily encodes direct sources (perception) or indirect sources (hearsay/inference) through verb morphology. In Experiment 1, sixteen five-year-olds from each language group were asked to use direct perception vs. inference as information sources. Both language groups were equally successful in gaining knowledge from both Direct and Indirect evidence. In Experiment 2, sixteen

five-year-olds from each language group were asked to attribute knowledge to others. Turkish and English-speakers were equally accurate. Moreover, both groups were less accurate in this task compared to Exp.1. Our findings provide evidence against the relativist expectation that cross-linguistic differences in the encoding of evidentiality might affect cognitive development.

ID: 416 / PS-I: 97

Poster

Topics: Decision Making and Reasoning, Moral Cognition, Social Cognition
Keywords: Prosocial decision making

The relative influence of equality biases and valence attributions in young children's resource distribution

Rayna Edels, Ruxandra Filip, Kathleen Merwin, Valerie A. Kuhlmeier

Queen's University; vk4@queensu.ca

We examined the influence of two factors on young children's decisions when selectively distributing resources: (1) a potential recipient's valence (i.e., 'affective tagging') and (2) a preference for equal distributions (i.e., 'equality bias'). Forty-eight 3.5- to 4.5-year-olds observed that one individual was 'lucky' (e.g., found \$3) while another was 'unlucky' (e.g., lost the items). Children then distributed resources of the same type that were found/lost (Matching condition) or distributed a different type of resource (Unmatching). Children who could create equality (Matching) did so by favoring the unlucky individual (resource bias = 2.17/3, $t(23)=9.09$, $p=.00$), whereas children in the Unmatching condition created equality within their resource type by distributing equally ($t(23)=.33$, $p=.75$). Children in both conditions, however, labeled lucky individuals as 'nice' and unlucky individuals as 'mean' ($p's<.05$). Thus, although children broadly extended their evaluations of individuals, an equality bias overrode this evaluation in decisions regarding resource distribution.

ID: 595 / PS-I: 98

Poster

Topics: Communication, Media and Technology, Number

The Role of Temporal Synchrony in Learning from Hand Gesture

Todd J. Pruner¹, Voicu Popescu², Susan Wagner Cook¹

¹University of Iowa, United States of America; ²Purdue University, United States of America; pruner@ualberta.ca

Children's learning of mathematical equivalence is improved when teachers use hand gestures (Goldin-Meadow, Kim, & Singer, 1991), yet it is unclear how gesture supports learning. Gestures are typically semantically and temporally coordinated with speech. Research on gesture's effects on learning has most often focused on semantic content (e.g., Singer & Goldin-Meadow, 2005). Here we asked whether temporal coordination with speech also matters for learning. We used an animated pedagogical agent to vary speech-gesture timing while controlling other nonverbal behaviors. We found that eight-year-old children learn significantly more about mathematical equivalence when gestures precede speech by 500 ms, compared with synchronous or late gestures. Thus, learning from gesture is not simply due to gestures representing information in an analog format; the temporal synchrony of gesture with speech is critical for gesture's beneficial effects. Importantly, gestures that anticipate speech appear to be most beneficial for children learning about mathematical equivalence.

ID: 547 / PS-I: 99

Poster

Topics: Attention, Computational Approaches, Language

Using Diffusion Models for Understanding Speed-Accuracy Trade-offs in Bilinguals: A Hierarchical Bayesian Analysis of the Attention Network Test

Staci Ouch, Joseph Michael Burling, Crystal Duc Tran, Hanako Yoshida

University of Houston, United States of America; jmburling@uh.edu

Monolinguals and bilinguals have often been studied as a natural experimental manipulation for understanding the connection between language and executive functions. The Attention Network Test (ANT) is a popular task often employed for uncovering this connection. This approach has led to many studies suggesting that language is tightly coupled with general cognitive processes such as attention, yet overlooking the coupling between response time (RT) and accuracy. We propose a different approach toward analyzing ANT data by implementing Bayesian hierarchical diffusion models that model both RT and accuracy as competing, emergent processes that are directly impacted by cognitive control systems, while also accounting for the influence of language on these systems. Results indicate that language status largely impacts specific diffusion parameters such as information processing speed and speed-accuracy trade-off. Further implications of this method for analyzing RT and accuracy data between language groups for similar cognitive-based tasks will be discussed.

ID: 454 / PS-I: 100

Poster

Topics: Attention, STEM Learning
Keywords: Gesture, Eye tracking

Using eye tracking to explore how gesture facilitates learning

Elizabeth M. Wakefield¹, Eliza L. Congdon¹, Miriam Novack¹, Steve Franconeri², Susan Goldin-Meadow¹

¹University of Chicago; ²Northwestern University; ewakefield@uchicago.edu

Teaching children a new concept with the help of gestures – hand movements that accompany speech – facilitates learning above-and-beyond instruction through speech alone (Cook et al., 2008). However, the mechanisms underlying this phenomenon are poorly understood. Here, we use eye-tracking technology to determine whether gesture facilitates learning by organizing visual attention. Children ($N=82$, 8-11-year-olds) watched a video of a woman explaining the concept of mathematical equivalence (e.g., $3+4+5=$ __ $+5$) through either *Speech Alone* or *Speech-Gesture* instruction. Results show that whereas children in both conditions attended to the instruction for equal amounts of time, children in the *Speech-Gesture* condition showed a different pattern of looking. They had a higher number of fixations between elements of the problem, and in particular, anticipated the instructor's spoken instruction better than their peers in the *Speech Alone* group. Results suggest that gesture may support learning by qualitatively changing patterns of visual attention during math instruction.

ID: 374 / PS-I: 101

Poster

Topics: Culture, Decision Making and Reasoning, Social Cognition

Keywords: religion; teleological reasoning; cognitive biases

What Goes Around Comes Around: Children's Karmic Bargaining

Konika Banerjee, Paul Bloom

Yale University, United States of America; kbanerj@gmail.com

Why do so many people believe in karma—the notion that life events occur to punish or reward our past moral behavior? In three experiments, we examined 4-6-year-old children's ($N = 120$) belief in karma by investigating their willingness to engage in karmic bargaining—the practice of performing good acts in order to secure a future desired outcome. Most children agreed that performing a prosocial behavior, but not a morally neutral behavior, would increase the chances that their own desired outcomes would occur, and about half engaged in karmic bargaining behavior themselves. Children of both theist and atheist parents endorsed a belief in karmic bargaining, indicating that an intuitive belief in karma may be relatively immune to variation in children's exposure to religion, and may instead reflect a broad teleological bias to interpret life events in terms of agency, purpose, and design.

ID: 785 / PS-I: 102

Poster

Topics: Number, STEM Learning

Whole Number Bias Impedes Understanding of Fraction Equivalence

David William Braithwaite, Robert S Siegler

Carnegie Mellon University, United States of America; baixiwei@gmail.com

Learning fractions is a critical step on the pathway to more advanced mathematics. One obstacle to learning fractions is the whole number bias: a tendency to focus on the components of fractions rather than their overall magnitudes. While prior research has reported whole number bias in comparison of unequal fractions, the present study investigated whether whole number bias impedes understanding of fraction equivalence. 4th and 5th grade students' magnitude representations of equivalent fractions with either small or large components (e.g. $3/4$, $15/20$) were assessed using number line estimation and magnitude comparison tasks. Results indicated that fractions with larger components were represented as having larger magnitudes. Thus, children do not represent equivalent fractions as equal in magnitude, and whole number bias contributes to this misconception. The results imply that reducing whole number bias could improve understanding of fraction equivalence, and point to the importance of developing interventions towards this goal.

ID: 407 / PS-I: 103

Poster

Topics: Social Cognition, Theory of Mind

Keywords: preference attribution

Young children consider constraints when inferring people's preferences

Madison Leigh Pesowski, Ori Friedman, Stephanie Denison

University of Waterloo, Canada; mlpesows@uwaterloo.ca

Although people's choices are typically informative of their preferences, this changes when their choices are constrained. For instance, we cannot infer that a person who chooses an inexpensive object prefers it over an expensive one, if financial constraints made it impossible for them to choose the expensive one. In two experiments ($N=233$) we examined whether children consider constraints when inferring people's preferences. In Experiment 1, we investigated whether 3- to 6-year-olds consider physical constraints when inferring preferences. Children five years and older did this—they inferred that an agent preferred an attractive object that she could not reach, even though she chose a less attractive object. In Experiment 2, we examined whether 5- and 6-year-olds consider other constraints in addition to physical ones. Here we found that children considered epistemic and social constraints when inferring preferences. These findings reveal that children consider constraints on choice when inferring preferences.

ID: 663 / PS-I: 104

Poster

Topics: Infant Cognition, Language, Word Learning

Keywords: word learning, infancy, gestures, joint attention

Young Children use their Hands to Shape their Learning

Kelsey Lucca, Makeba Parramore Wilbourn

Duke University, United States of America; kelsey.lucca@duke.edu

Pointing is a powerful way for young children to actively contribute to their learning. Here, we tested how infants' pointing impacts one important developmental domain: word learning. Seventy-two 12 and 18-month-olds were tested in a paradigm that elicited communicative behavior. In response to infants' behavior towards an object (points, reaches, or looks), an experimenter labeled that object. Infants were more likely to map a label onto an object in trials in which they had first pointed towards that object, compared to trials in which they reached ($Z = -2.26, p = .02$) or looked at that object ($Z = -2.26, p = .005$).

When infants actively and clearly initiate a communicative interaction around an object, by pointing, they are in an optimal state to learn new information about that object. Developmental changes in the relationship between pointing and word learning, and the interactive role of infants' joint attention, will be discussed.

ID: 384 / PS-I: 105

Poster

Topics: Concepts/Categories, Decision Making and Reasoning

Young Children Value Variety (and They Think You'll Pay More for It, Too)

Margaret Echelbarger, Susan A. Gelman

University of Michigan, United States of America; echelbar@umich.edu

Variety-seeking is an important component of adults' consumer behavior (Kahn, 1995), yet little is known about when/how this preference emerges in children. In recent work, children were shown to prefer variety for themselves and others when allocating two novel items (Echelbarger & Gelman, 2015). In this follow-up study, we sought to explore the value children place on variety. Children ($N=79$) ages 6-9 years were asked to indicate how much people would pay for different sets of novel items (e.g., AA, BB, AB). Prior to the task, children completed a warm-up to ensure they were able to make monetary comparisons. Given children's pricing of AA and BB, they were shown to "overvalue" AB. There are at least two explanations: children place an absolute premium on variety and/or children assign less value to each additional unit of A or B. We discuss these alternatives and the implications for children's consumer behavior.

ID: 768 / PS-I: 106

Poster

Topics: Concepts/Categories, Social Cognition, Social Learning

Keywords: Children's understanding of teaching, understanding of learning, testimony

Young Children's Understanding of Learning Based on Teacher's Ability and Teaching Intention

Jeein Jeong, Douglas Frye

University of Pennsylvania, United States of America; jeongjee@gse.upenn.edu

How do children judge when to learn and anticipate the learning outcome? This study investigated young children's judgment of the intention and outcome of learning in relation to the teacher's ability and teaching intention.

Sixty-nine young Korean children (ages 3-5) were presented with three teaching stories in which skillful, neutral or unskillful teachers tried to teach something and three non-teaching stories that children happened to see skillful, neutral or unskillful teachers doing something. After each story, children's judgment of the agent's learning intention and outcome were assessed.

The results showed older children more expected the agent would try to learn, but their judgment was influenced by teacher's ability. Also, the older children were more likely to consider the teacher's ability in predicting the learning outcome. The results imply that with age, children are more sensitive to the situations that potentially lead to learning, and they understand teacher's degree of ability might affect the learning outcome.

ID: 642 / PS-I: 107

Poster

Topics: Concepts/Categories, Infant Cognition, Language

Keywords: preterm infant

-Maturation constrains the effect of exposure in linking language and core conceptual processes in healthy preterm infants

Danielle Renae Perszyk, Sandra R Waxman

Northwestern University, United States of America; danielleperszyk2017@u.northwestern.edu

Preterm infants are at risk for neurocognitive deficits that may persist throughout development. Because language capacities in preverbal infants are predictive of later capacities, researchers have sought to identify how preterm infants' language capacities unfold. By 3 months, full-term infants have already begun to link language to core cognitive capacities, including object categorization. Infants show evidence of categorization through looking patterns; at 3 months, a preference for familiar objects indicates categorization, whereas at 4 months, a preference for novel objects indicates categorization. Here we show that the shift from familiarity to novelty preferences is preserved in preterm infants: when age is corrected for gestation, preterm infants at 3 months show a familiarity preference, and older infants show a novelty preference. These results provide the first hints that the processes underlying the link between language and cognition are influenced strongly by maturational factors.

ID: 366 / PS-I: 108

Poster

Topics: Concepts/Categories, Language, Social Cognition

'One Color for Each Language': Evidence of Language Awareness in Coloring

Dolly P. Rojo (Diversity Fellow), Catharine H. Echols

University of Texas at Austin, United States of America; drojo@utexas.edu

In a non-traditional approach, Krumm (2001) and Martin (2012) asked school-age children to color the silhouette of a human figure, using colors that represented the various languages they spoke. In the current project, we adapted this task for children four to six years old. Seventy-three English-speaking children were asked to color a silhouette by selecting a color for "each language that you speak." Children had been categorized as having (1) minimal exposure to a non-English language (i.e., less than 4 hours per week), or (2) substantial exposure (i.e., 4 hours/week) but not fluent in a second language. Children with greater amounts of exposure, despite being proficient in only one language, were more successful at completing the task, $\chi^2(1, N = 73) = 5.14, p = .02$, suggesting that they have more metalinguistic knowledge. These results were further qualified by a questionnaire about the languages the children speak.

ID: 572 / PS-I: 109

Poster

Topics: Language, Number, Symbol Use

Children's Comprehension of Number Gestures

Dominic Gibson, Talia Berkowitz, Susan Levine

University of Chicago, United States of America; dominic.gibson@gmail.com

Children who are not cardinal-principle-knowers are more accurate when labeling numbers at the cusp of their knowledge with number-gestures than number words (Gunderson et al., under review). While this advantage is likely due to the one-to-one correspondence between fingers and items in a set, an important question is whether or not children come to recognize number-gestures in a way that does not require them to enumerate the number of fingers, i.e. as symbolic of the quantities they represent. Twenty-five children (Mean Age=4.7 years, SD=.75) participated in an estimation task, in which they were asked to use number words to label sets of shapes sets of fingers (number-gestures). We found that children's performance was more or less perfect when labeling sets of 1-3 shapes and then decreased significantly. In contrast, children's performance on number-gestures remained equally good on sets of 1-5 fingers (beyond the subitizable range) before decreasing.

ID: 772 / PS-I: 110

Poster

Topics: Number

Keywords: Mathematics

SES and ANS: How socio-economic status impacts the relation between the approximate number system and mathematics performance

Jennifer M Zosh¹, Brian N Verdine², Roberta Michnick Golinkoff², Kathy Hirsh-Pasek³, Justin Halberda⁴

¹Penn State University, Brandywine; ²University of Delaware; ³Temple University; ⁴The Johns Hopkins University; jzosh@psu.edu

Children's performance on quick, non-verbal numerical estimation tasks tap the approximate number system (ANS; Halberda & Feigenson, 2008). ANS performance is marked by increased acuity over development and large individual differences that, by many accounts, relate to later mathematics achievement (Libertus, 2015). Given that socio-economic status has been linked to mathematics performance (Jordan & Levine, 2009), it is important to examine if SES impacts ANS. Here, we present results from a longitudinal study with children ages 3-5 years that measures ANS performance, standardized mathematics test performance, along with executive function and vocabulary. We find that children from lower-SES backgrounds show worse accuracy and slower response times on the ANS task. Moreover, while the relation between ANS and mathematics performance holds when other variables are accounted for, the ANS-mathematics relation is stronger for higher-SES children. This has long-term implications for mathematics achievement and perhaps points to a locus for early intervention.

ID: 553 / PS-I: 111

Poster

Topics: Concepts/Categories

Children's categorization of conventional and privileged information

Helana Girgis, Douglas A. Behrend

University of Arkansas, United States of America; hgirgis@stlawu.edu

Large bodies of research have documented children's categorization in domains such as natural kinds, artifacts and human kinds, but not for different types of information. This research examined preschooler's ability to categorize conventional information, shareable to others with no restrictions, and privileged information, shareable to only a few. Four- and 5-year-olds and adults ($N = 70$) were presented with 10 pictures of either conventional (e.g., alphabet letters) or privileged (e.g., a birthday present) stimuli and sorted them into boxes labeled public or private. All participants correctly categorized both information types depicted equally well and at above chance levels, though 5-year-olds ($M = 77\%$) were more accurate than 4-year-olds ($M = 66\%$) and adults ($M = 99\%$) were more accurate than the child participants. Though this ability develops with age, by the age of 4 children are able to distinguish between and categorize conventional and privileged information.

ID: 520 / PS-I: 112

Poster

Topics: Culture, Decision Making and Reasoning
Keywords: grounded cognition, mental representation

Direction of the mental timeline develops before the ability to read

Kevin S. Autry², Helana Girgis¹, Kaitlyn J. Cummings¹

¹University of Arkansas, United States of America; ²Grand Valley State University, United States of America; hgirgis@stlawu.edu

Research has suggested that conceptual metaphors facilitate the representation of abstract concepts by using the perceptual characteristics of sensorimotor representations. Time, for example, is represented spatially along a mental timeline. The specific direction of this conceptual metaphor appears to be related to reading direction, with the past typically being represented on the left by English speakers and on the right by the Hebrew/Arabic speakers. The present study explored the causal role of reading direction by comparing the direction of the mental timeline in English-speaking preschoolers, kindergarteners, and adults. In an arrangement task, preschoolers and kindergarteners demonstrated a preference for a left (past) –right (future) conceptual metaphor similar to adults, although not as strong. The presence of a conceptual metaphor consistent with reading direction in preliterate children suggests that the mental timeline may be oriented by experience with a culturally preferred orientation rather than the specific visuo-motor processes involved with reading.

ID: 779 / PS-I: 113

Poster

Topics: Spatial Cognition

Socioeconomic status-related differences in giving and following directions for finding hidden objects

Maria del Rosario Maita¹, Seamus Donnelly², Olga Peralta¹

¹National Scientific and Technical Research Council of Argentina; ²CUNY Graduate Center; rosario.maita90@gmail.com

The present study explores whether socioeconomic status -SES- differences affect parental descriptions about location, and whether and how differences in parental spatial descriptions are related to children's ability to find an object. Sixteen dyads from middle-SES (MSES), and 15 from low-SES (LSES) participated so far. The task consists in the parent hiding a toy in one of five identical boxes and then guiding the child's search verbally. After controlling for the total parental language used, MSES parents use more language in general than LSES parents, but surprisingly, they use less spatial language. Middle and LSES parents widely vary in using frames of reference, with LSES parents scarcely labeling them. MSES parents showed a higher rate of self-centered frames of reference than LSES parents and their children perform better in the task. Our results suggest that providing effective spatial directions seems to be more a matter of quality than quantity.

ID: 412 / PS-I: 114

Poster

Topics: Memory, Social Learning
Keywords: Imitation

The influence of emotional affect on imitative behaviors in toddlers

Hannah Michelle Van Etten, Leslie Carver

University of California, San Diego, United States of America; hvanette@ucsd.edu

It is widely believed that imitation, in addition to serving an instrumental purpose, plays an important role in social interactions. What is unknown is how the social environment, in particular the emotional valence of that environment, influences whether children imitate others. Children aged 18 to 24 months were exposed to an experimenter displaying either a positive or neutral affect during an imitation paradigm. We expect that children exposed to a positive experimenter will engage in more imitative and social behaviors than those exposed to a neutral experimenter. Additionally, we expect that children's temperament will predict responses to displays of positive and neutral affect. Results will help gain new insight not only into the social role of imitation, but also into the influence that emotional affect has on children's behaviors.

ID: 548 / PS-I: 115

Poster

Topics: Spatial Cognition, STEM Learning

Does short exercise impact learning of polynomials before or after instruction?

Alejandro Monroy-Velez, Ruth Church, Linda Rueckert

northeastern illinois university, United States of America; amonroy@uchicago.edu

There has been a debate whether exercise is beneficial before or after exposure to instructional material. We use a pretest-intervention-posttest design where students received a short video lesson on polynomials, to address this question. Participants were randomly asked to exercise before or after instruction and some were not asked to exercise. Instruction interacted with exercise, although effects depended on the level of understanding a participant had. Participants who exhibited *no prior knowledge* and exercised after watching the video benefitted the most. In contrast, if they had *some knowledge*, learning was not affected by placement of exercise; exercising before or after video instruction were equally beneficial. It may be that exercise for the novice learner activates a general visual-spatial schema that enables consolidation of information. These results suggest that for

individuals who do not have a spatial representation for polynomials, instruction was beneficial but particularly when followed by some motor engagement.

ID: 546 / PS-I: 116

Poster

Topics: Attention, Perception, Reading

Keywords: Handwriting, Reading, Eye-tracking, Visual-motor coordination

Development of Handwriting: Basic Reading Skills and Visual-Motor Coordination in Young Children

Nicholas Fears¹, Emily A Lewis¹, Bjoern A Kahrs², Jeffrey J Lockman¹

¹Tulane University, United States of America; ²University of Missouri, Kansas City; nfears@tulane.edu

Handwriting is a fundamental skill that must be acquired early in education for academic success. Yet, the dynamic integration of perceptual, motor, and linguistic skills makes handwriting a complex skill that can be challenging for young children to master. To understand this integration process, head-mounted eye-tracking was used to study children between the ages of 4 and 8 years (N=42) to determine how efficiency in visual-motor coordination develops as they copy letters and words. Results indicate that in the early school years, children with more developed basic reading skills, such as letter-word knowledge and phonemic awareness, deployed eye movements more efficiently while copying letters and words than children with less developed basic reading skills. These data provide new information about the development of the processes involved in the complex skill of handwriting during the first years of formal education.

[Single Presentation of ID 251]

Time: Friday, 09/Oct/2015: 2:30pm - 4:00pm · *Location:* George Bellows DEF

Session Chair: Zi Lin Sim, University of California, Berkeley

Session Chair: Fei Xu, UC Berkeley

ID: 251

Symposium

Topics: Computational Approaches, Neuroscience Approaches

Keywords: Active Learning

Are Children Effective Active Learners?

Chair(s): **Zi Sim** (University of California, Berkeley), **Fei Xu** (University of California, Berkeley)

Discussant(s): **Todd Gureckis** (University of Michigan)

Virtually all developmental psychology textbooks start with a set of enduring themes on the study of children's development, and almost every one of them lists "the active child" as one of the questions that have motivated and puzzled developmental psychologists over the decades. What does it mean for a child to be "an active learner"? Despite the centrality of this question, we do not appear to have very clear answers. There are many dimensions along which we could construe active learning. The proposed symposium focuses on how effective and systematic children are when actively exploring their environment. We explore the development of this critical dimension of active learning across early childhood, shedding light on the underlying cognitive mechanisms that distinguish active learning from other forms of learning (e.g., being given informative evidence by someone else). Through the use of behavioral experiments, computational modeling and imaging techniques, we provide a multidisciplinary perspective supporting the early emergence of the capacity for active learning.

Specifically, the first paper shows that infants shape their own learning environments by modulating their pointing and cognitive engagement. The second paper provides the first evidence suggesting that 5- year-olds can successfully identify the most efficient questions. The final paper discusses computational approaches for understanding information selection. Our discussant, whose work centers on developing theories and formal models of learning that can account for the active way in which learners search, sample and explore the environment, will synthesize findings and stimulate discussion.

Presentations of the Symposium

Infants actively seek and learn the information they are interested in

Katarina Begus (International Fellow), Teodora Gliga, Victoria Southgate

Birkbeck College, University of London, United Kingdom

I will present a series of studies demonstrating even very young infants are active learners, with means of soliciting information and mechanisms of selective engagement and learning based on their interests and availability of information.

With our first set of studies we investigated the pointing gesture as a means of infants actively soliciting information. We show 16-month-olds modulate amount of pointing based on reliability of the source of information they interact with; and that they learn functions of objects better, when these are demonstrated on objects they had pointed to than on objects they had not expressed interest in. Together, these studies suggest that, not only do infants point in order to obtain information, but that responding to their expressions of interest leads to superior learning.

In our second set of studies we explored how interest affects learning even before infants can behaviourally express it. As a potential marker of interest we studied theta oscillations, shown to be modulated by motivation and to predict the rate of recall in adults (Gruber et al., 2013). We found that theta activity recorded during 11-month-olds' exploration predicted their subsequent recollection of explored objects. Furthermore, we show that 11-month-olds show a selective increase in theta activity in anticipation of receiving information in 3 different modalities. These studies demonstrate infants are active and selective learners, and set the ground for future investigation into drivers of active infant learning.

Children can Identify the Most Efficient Questions

Azzura Ruggeri, Zi Sim, Fei Xu

University of California, Berkeley

Asking questions is a powerful learning tool. We know that young children ask domain-appropriate questions (Callanan & Oaks, 1992; Greif, Kemler Nelson, Keil, Guterrez, 2006; Hickling & Wellman, 2001), have reasonable expectations about which responses count as answers to their questions (Frazier, Gelman, & Wellman, 2009), and can use the answers they receive to solve problems (Chouinard, 2007; Legare, Mills, Souza, Plummer, & Yasskin, 2013). But do children know what a good question is? We provide some first evidence suggesting that 5- year-olds, despite not being able to generate effective questions for problem-solving (see Legare et al., 2013), are already able to successfully identify the most efficient among given questions.

In our study, children are presented with a storybook describing the reasons why Toma (a monster) was late to school over several days. Across three experiments, we manipulate the number and likelihoods of the reasons presented. Children are then asked to identify which of two given questions will be more efficient in finding out why Toma was late to school again.

Overall, we find that children successfully identify the most efficient question, that is, the question with higher information gain. Our findings also demonstrate that children's judgments were not based on simple heuristics, such as selecting the question with the highest probability of getting a YES answer or selecting the question that targets the most likely reason.

Information Selection in Noisy Environments with Large Action Spaces

Pedro Tsvividis, Sam Gershman, Laura E. Schulz, Joshua B. Tenenbaum
Massachusetts Institute of Technology

A critical aspect of human cognition is the ability to effectively query the environment for information. The 'real' world is large and noisy, and therefore designing effective queries involves prioritizing both scope – the range of hypotheses addressed by the query – and reliability – the likelihood of obtaining a correct answer from the information source. Here we designed an information-search game in which participants had to select an informative query from a large set of potential queries, trading off scope and reliability.

We have tested 15 children (ages 7-10) and 26 adults. On the 26% of the child data that have been coded thus far, we find that children perform similarly to adults (data fully coded), and that the performance of both children and adults is best explained by a model that selects queries in proportion to their expected information gain.

Oral Papers I: Attention, memory, and symbols

Time: Friday, 09/Oct/2015: 2:30pm - 4:00pm · Location: Elijah Pierce A and B
Session Chair: Andrei Cimpian, University of Illinois

ID: 136 / Oral Papers I: 1
Individual Oral Paper

Topics: Infant Cognition, Language, Memory

Keywords: deferred imitation, gestural development, lexical development

Early memory predicts productive language – A longitudinal study on deferred imitation and communication at 9 and 16 months

Mikael Heimann, Emelie Nordqvist, Felix Koch, Anett Sundqvist

Linköping University, Sweden; mikael.heimann@liu.se

Deferred Imitation (DI) is an early declarative memory-like ability affecting the infant's ability to learn about novelties and regularities of the surrounding world. In a longitudinal design DI and communicative development were assessed in 42 infants followed from 9 to 16 months of age. The results indicate stability in DI performance and early communicative development between 9 and 16 months ($r = .37$), early achievers at 9 months are still ahead at 16 months. Moreover, both DI and gestural communication at 9 months predicted the infant's word use (productive language) at 16 months, whereas no concurrent relationship was detected. A regression analysis ($R^2 = 0.39$) revealed that DI and gestural ability at 9 months independently predicted the children's productive language at 16 months. These results indicate that measurement of DI when the child is predominantly pre-verbal might be an early domain general declarative memory ability underlying early lexical development.

ID: 266 / Oral Papers I: 2
Individual Oral Paper

Topics: Attention, Executive Function, Memory

To focus or to ignore? Activation and inhibition in young children's selective attention

Viridiana L. Benitez (Diversity Fellow)¹, Catarina Vales², Linda B. Smith²

¹University of Wisconsin-Madison, United States of America; ²Indiana University, United States of America; vbenitez@wisc.edu

Selective attention is composed of two processes: the activation of task-relevant information and the inhibition of task-irrelevant information. For young children, activation seems to be easier than inhibition, however, few studies have directly compared these two processes. Using a visual search task, we examined activation and inhibition in 4-year-olds by measuring how children coped with changes in targets or distractors. After searching for the same target among the same distractors, for half the children the target was changed (measuring item-specific target activation), while for the other half, the distractors were changed (measuring item-specific distractor inhibition). Across two experiments, children were immediately affected by a change in target, but were only affected by a change in distractors later in the task. These findings suggest that 1) children can build up item-specific distractor inhibition, and 2) there is a different time course for activation and inhibition processes in young children's selective attention.

ID: 147 / Oral Papers I: 3
Individual Oral Paper

Topics: Symbol Use

Learning after delay: Children gain insight into a symbolic task they typically fail when given a break

Kelly J. Sheehan, Stephanie Alfonseca, David H. Uttal

Northwestern University, United States of America; kellysheehan2011@u.northwestern.edu

Distributing learning across time promotes not only memory (Ebbinghaus, 1885), but categorization and generalization in infants (Vlach, 2014). Here we demonstrate that distributing *testing* across time (i.e., separating two testing sessions with a break) promotes insight in 3-year-old children on a symbolic task they typically fail when trials are massed. In three studies, children use a scale-model as a symbol for a larger room. Study 1 and 2 show that children perform significantly better on the model-room task when testing sessions are separated by 24 hours compared to when the trials are massed on one day, both with and without memory cues. Study 3 shows that these gains in performance can be elicited with a 5-minute break in between testing sessions, with no memory cues. These results show that children benefit from spaced-testing, suggesting that initial performance may not be the best measure of young children's understanding.

ID: 134 / Oral Papers I: 4
Individual Oral Paper

Topics: Language, Memory

Keywords: Autobiographical Memory, Childhood Amnesia

The Magic Shrinking Machine Revisited: The Presence of Props at Recall Facilitates Memory in 3-year-olds

Peter Krojgaard¹, Jonna J. Dahl², Osman S. Kingo¹

¹Center on Autobiographical Memory Research, Dept. of Psychology and the Behavioral Sciences, Aarhus University, Denmark;

²Pedagogical Psychological Counseling, Municipality of Hedensted; peter@psy.au.dk

In a seminal study Simcock and Hayne (2002) showed that 3-year-olds were unable to use newly acquired words to describe a "magic" event experienced six or twelve months earlier. In the reference study the children's verbal recall was tested *without* props being present. Inspired by recent evidence, we replicated the original design testing 33- and 39-month-olds ($n = 180$), but *with* props

present at recall while controlling for potential on-line reasoning. Vocabulary was assessed at encoding (T_1) as well as at test (T_2). The results revealed that the children did use newly acquired words to describe their previously experienced event. Thus, the present study shows that the presence of props at recall facilitates the ability to recall and talk about an event experienced at a time when the vocabulary in the children was less evolved. The findings are discussed in the context of childhood amnesia.

ID: 256 / Oral Papers I: 5

Individual Oral Paper

Topics: Moral Cognition, Social Cognition

Keywords: norms

How do we decide what is right and what is wrong? A cognitive bias in explanation shapes our normative evaluations

Christina Marie Tworek (Diversity Fellow), Andrei Cimpian

University of Illinois at Urbana-Champaign, United States of America; ctworek2@illinois.edu

Human behavior is structured by myriad norms — complex rules about right and wrong, and about what should be done under what circumstances. How do these norms arise? Here, we propose that normative evaluations often stem from a bias in how people make sense of the world. Five correlational and experimental studies ($N = 642$ four- to seven-year-olds and adults) suggest that a heuristic tendency to explain patterns in the world via inherent information (Cimpian & Salomon, 2014) often leads people to endorse such patterns as good, right, and the way things should be. For example, we may explain that girls wear pink because pink is delicate and flower-like (inherent features) and therefore judge that girls should wear pink (a normative evaluation). Our data thus suggest that — from a young age — we may promiscuously assign normative status to many aspects of our world simply by virtue of trying to understand it.

[Single Presentation of ID 281]

Time: Friday, 09/Oct/2015: 2:30pm - 4:00pm · Location: Emerson Burkhart A

Session Chair: Rachel Magid, MIT

Session Chair: Habiba N. Azab, University of Rochester

ID: 281

Symposium

Topics: Decision Making and Reasoning, Social Cognition, Social Learning

Developing representations of the self

Chair(s): **Rachel W. Magid** (MIT), **Habiba Azab** (University of Rochester)

Adults have rich representations of their knowledge, abilities, and traits. By elementary school, an individual's mindset (whether they believe characteristics like intelligence are fixed or changeable) affects one's responses to challenges (Dweck, 2000). Yet much is still unknown about how children come to represent their own knowledge and abilities such that beliefs about the self influence thought and behavior. This symposium brings together four lines of research showing that representations of the self, and self-knowledge, are present in childhood, are sensitive to information from external sources, and affect decision-making, performance, and motivation. Study 1 shows children's subjective assessments of their memories, and not objective performance, guide their decision-making. Study 2 considers young children's difficulty accessing their knowledge, pointing to a mechanism that might account for a gap between "implicit" and "explicit" representations. Study 3 presents some of the earliest evidence for social comparison, suggesting that preschoolers' persistence on letter-writing and counting tasks is affected by how well they believe they did relative to their peers. Study 4 uses a training method to investigate the effects of construing oneself differently, finding that middle-schoolers' persistence increases when they assume a harder-working persona. An intriguing result from these studies is the extent to which these representations reflect children's veridical knowledge as well as their potential for affecting real-world outcomes. Our goal is to foster discussion among scholars working in the areas of memory, statistical and evidence-based learning, and educational achievement, to make inroads towards understanding the role of the self in development.

Presentations of the Symposium

Children utilize coarse representations for generating predictions in probabilistic tasks

Habiba Azab, Holly Palmeri, Celeste Kidd

University of Rochester

Previous studies (e.g., Hudson Kam & Newport, 2005) have found children maximize in probabilistic learning tasks. We test whether children behave similarly in a probabilistic-choice task. We showed children (3 to 6 years, $n=48$) a transparent container filled with two different color balls (of varying distributions, e.g. 70/30) and asked them to predict which color will be pulled from the box if one is selected at random. Children reliably identify the more frequent color, yet the samples that they provide are nearly evenly distributed and do not reflect the probabilistic distribution of colors in the population—children choose the majority response on approximately 55% of trials in the 70/30 condition. This is puzzling in light of previous studies that demonstrate that infants as young as 8 months old have an intuitive understanding of sampling from probability distributions (e.g., Xu & Garcia, 2008). Why might children fail to access probabilistic representations here that they appear to use earlier in development in other contexts? One possibility is that, while children may have access to fine-grained probabilistic representations of populations when asked to identify samples from particular populations, they may utilize a far coarser representation—one that only represents available alternatives, but not their probabilities—when asked to generate samples themselves. The fact that children can identify an appropriate sample but not generate one suggests that children's access to their knowledge varies across contexts—it is not fixed. Work in progress explores children's metacognitive awareness of this asymmetry.

Social comparison affects preschoolers' persistence

Rachel W. Magid, Laura E. Schulz

MIT

One critical source of information that affects adults and older children's appraisals of their abilities is social comparison (Festinger, 1954). However, it is unclear to what degree social comparison affects young children's motivation. We found that even preschoolers are sensitive to social comparison, but it affects their motivation differently than older children. In Study 1, four- and five-year-olds ($n=78$, mean=56 months) spontaneously used evidence from social comparison to guide their behavior. Preschoolers who saw data suggesting they outperformed peers on a letter-tracing task subsequently traced fewer letters than children who saw neutral evidence, no evidence, or evidence suggesting they performed worse than their peers; moreover, relative to children who saw neutral or no evidence, those who saw they performed either better or worse were more likely to choose an easy versus difficult novel challenge. In Study 2 ($n=52$, mean 59 months) we used a counting task; unlike the letter task (which had a ceiling of 26) there was no visible endpoint. Preschoolers who saw data suggesting they performed worse than their peers persisted more on a novel counting task relative to children in a no data condition, and those who saw data suggesting they performed better persisted less than children in the no data condition. Rather than being motivated by relatively good performance and discouraged by relatively poor performance, preschoolers use social comparison to calibrate their effort: persisting less when they believe they have done well relative to peers, and persisting more when they believe their peers have done better.

Children's subjective judgments about their memories drive betting decisions beyond accuracy: Evidence from a metamemory illusion

Emily Hembacher, Simona Ghetti

University of California, Davis

There is plentiful evidence that children's ability to monitor their mental states is related to their accuracy regulation (for example, they choose not to report uncertain information). However, our interpretation of previous research is limited by the frequent correspondence between the object and meta levels of cognitive processes. When the two coincide (e.g., stronger memories are endorsed with higher confidence than weaker memories), it is difficult to exclude the possibility that the object level is driving behavior while the meta level is epiphenomenal. The goal of the present research was to test whether children's subjective assessments of their memories drive decision-making independent of objective accuracy. Children ages 6-7 and 9-10 (n=75) completed a forced-choice memory test for pictorial stimuli. Subjective recollection (i.e., the sense of vividly recalling the past, rather than simply recognizing something as "old") was dissociated from accuracy by manipulating retrieval: in the "match" condition the distracter was perceptually similar to the target and in the "nonmatch" condition the distracter was similar to another studied but untested item. Children across age groups were more accurate in the match condition, but reported subjective recollection more often in the nonmatch condition. Critically, when allowed to bet on their answers to win a prize, children across age groups bet more often on nonmatch trials, to the detriment of their score. These results indicate that elementary-aged children's subjective memory assessments are critical for their accuracy regulation. Future analyses will include 5-year-olds to determine whether subjective assessments drive decision-making similarly among younger children.

Identity interventions: Increasing persistence and performance

Lauren Eskreis-Winkler, Eli Tsukayama, Victoria Lee, Angela Lee Duckworth
University of Pennsylvania

Across five randomized-controlled, double-blind experiments, we examined whether prompting students to step into the identity of a hard-working individual increased persistence and objectively-measured performance. Middle school students prompted to "pretend to be someone slightly harder-working than yourself" were more likely to persist following failure (Study 1) and to sustain focus on a challenging academic task (Study 2) compared to control participants who pretended "to be someone whose name begins with the letter A." Two weeks following this manipulation, treatment participants reported higher levels of general academic persistence, and continued to sustain heightened focus on a challenging academic task (Study 3). In a final study that employed a different manipulation, students donned white coats and were told either that they were wearing lab coats and should act like "industrious doctors" (treatment) or that they were wearing smocks and should act like "creative painters" (control). Industrious doctors were more focused on a follow-up academic task than creative painters (Study 5). Collectively, these findings suggest the powerful effects of temporarily adopting the identity of someone slightly harder-working than oneself.

[Single Presentation of ID 198]

Time: Friday, 09/Oct/2015: 2:30pm - 4:00pm · *Location:* Emerson Burkhart B
Session Chair: Bethany Rittle-Johnson, Vanderbilt University

ID: 198

Symposium

Topics: Number, STEM Learning

Early Math Matters: Development of Number, Shape and Pattern Knowledge in Early Childhood

Chair(s): **Bethany Rittle-Johnson** (Vanderbilt University)

Proficiency in mathematics is critical to academic, economic, and life success (Adelman 2006; Altonji, Blom, and Meghir 2012). For example, mathematics knowledge at age 7 is a stronger predictor of socioeconomic status (SES) in adulthood than is childhood SES, over and above the effects of IQ, reading achievement, and intelligence (Ritchie and Bates 2013). Further, mathematics knowledge begins to develop at a young age, and this early knowledge matters. Mathematics knowledge in preschool and kindergarten are strong predictors of mathematics and reading achievement through elementary, middle, and high school (Duncan et al. 2007; Watts et al. 2014).

This symposium will bring together leading researchers who are studying a variety of early mathematics topics. These topics include numeracy as well as infrequently-studied topics of patterning and shape. The research involves children from middle- and low-income homes, focusing on children between the ages of 3 and 7. It involves a range of methodologies, including behavioral and eye-tracking methods, longitudinal designs and intervention research. By bringing together programs of research that address a variety of early math topics using a range of methodologies, this symposium will provide new insights into the early development of children's mathematical thinking.

Presentations of the Symposium

Development of Early Number Sense Shapes Educational Outcomes

Nancy Jordan

University of Delaware

Early number sense establishes children's learning paths in mathematics (Jordan et al., 2009). Number sense in pre-K and beyond involves symbolic representations of numbers in contrast to more fundamental non-symbolic number knowledge that appears to develop without much verbal input or instruction (Feigenson et al., 2004). Young children vary widely in their mathematical knowledge well before school entry (Levine et al., 2011). Income status and their associated home and preschool opportunities, in addition to their cognitive capacity, heavily influence their level of number knowledge (Ginsburg et al., 2008). Although foundational math content covers multiple topics, there is general agreement that number is of primary importance for school (NRC, 2009).

In this presentation, a research-based conceptual framework for understanding number sense and its primary importance for early education will be proposed. The framework is based on the following assumptions (1) Number sense in young children can be operationalized as knowledge of number, number relations, and number operations. (2) Number sense can be measured along a developmental progression. (3) Number sense predicts future math success. (4) Core deficiencies in number sense underlie mathematics difficulties. (5) Deficiencies in number sense can be reliably identified (6) Children from low-income homes show delays in math, but this is mediated by their number knowledge. (7) Number sense is malleable, and targeted help in number sense leads to improved mathematics achievement in school. The framework draws from my longitudinal and intervention studies with over 300 children from kindergarten to third grade, as well as research by others.

Improving Numeracy Skills in Early Childhood

Geetha B. Ramani, Sarah Eason, Erica Zippert, Emily Daubert (Diversity Fellow), Nicole Brooke

University of Maryland

Before entering school, children's early numeracy skills can vary widely, especially between children from different socioeconomic (SES) backgrounds with the numeracy skills of children from lower-SES backgrounds trailing behind that of peers from middle-SES backgrounds. Theorists drawing from sociocultural perspectives argue that one contributor to these early differences is children's varying experiences with number-related activities and input (Jordan & Levine, 2009; Saxe, 2004). These activities can provide children with opportunities to learn and develop numeracy skills.

By integrating sociocultural perspectives with an information-processing approach (Klahr & Wallace, 1976), which emphasizes the particular mechanisms that contribute to development, it can inform ways to design and test how numeracy activities can be used to promote early numeracy skills. Drawing from our analysis of number-related activities from this integrative perspective, we will discuss three studies providing support to this hypothesis that playing numeracy-related games can promote children's numeracy, specifically, their counting, numerical magnitude understanding, and numeral identification skills. First, we will discuss how number board games can be used as an intervention with small groups of children in Head Start classroom. Second, in a more recent study, we will suggest that playing card games also can yield improvements for Head Start children's numerical knowledge. Third, we will discuss how number board games can be translated to tablet computer games as an intervention for lower-income kindergarteners to use in their classrooms. Overall, these studies will demonstrate ways to help reduce the gap in numeracy skills between children from lower- and higher-SES backgrounds.

Preschool Shape Experiences, Geometric Knowledge, and Long-Term Outcomes

Brian N. Verdine¹, Ilyse Resnick¹, Ann Bunker², Roberta M. Golinkoff¹, Nora S. Newcombe³, Kathy Hirsh-Pasek³

¹University of Delaware, ²Indiana University, ³Temple University

Early experiences with geometric forms and the knowledge gleaned from those experiences are important for school-readiness under the Common Core and may form an important foundation for spatial and mathematical skills. Despite a sense that many preschool children “know their shapes,” past work suggests shape knowledge is fragmented and the defining properties of many shapes are not understood until well into elementary school (Satlow and Newcombe, 1998).

This talk focuses on three studies that speak to how young children learn and think about shapes. These studies include: 1) a corpus analysis of shape-focused toys, apps, and books that explores the opportunities toddlers and preschoolers are afforded to develop geometric and spatial skills; 2) a study on 25- and 30-month-olds’ understanding of shape names and the features that define them; and 3) an eye tracking study that investigates the accuracy and speed of shape identification at age 3 and relates individual differences in accuracy and speed to concurrent and later (age 5) spatial and mathematical skills.

This work demonstrates that early shape exposure is limited to a small number of categories and mostly to prototypical instances. These limitations appear to manifest themselves in children’s early shape knowledge. Importantly, preschool shape knowledge relates to spatial and mathematical skills around the time of school entry, a strong indication of the long-term implications of early shape learning. This comprehensive picture of early geometry learning provides information about the cognitive mechanisms underlying development of shape knowledge and suggests methods for improving instruction.

It’s a Pattern! The Importance of Early Pattern Knowledge for Mathematics

Bethany Rittle-Johnson¹, Emily R. Fyfe¹, Abbey M. Loehr¹, Michael R. Miller²

¹Vanderbilt University, ²Western University

Young children, parents and teachers emphasize patterns in the world (Ginsburg, Lin, Ness, & Seo, 2003; Clarke, Clarke, & Cheeseman, 2006), and some consider patterns a central idea in mathematics (Sarama & Clements, 2004; Steen, 1988). Patterns are predictable sequences, and basic patterns include stripes (e.g., a yellow-green striped shirt) and rhythms (e.g., da-de-dum).

However, patterning has received very little attention in the psychology literature. I will present evidence from two strands of research on the importance of early pattern knowledge.

First, I will describe 3 studies on changes in children’s pattern knowledge across the PreK year. Preschool children succeeded on more sophisticated pattern activities than they are frequently encouraged to do at home or at school, such as making the same kind of pattern using new materials. Parents reported doing some patterning activities at home, and children from low-income homes lagged behind their peers from more advantaged homes. Further, patterning uses children’s executive function skills. Children with better patterning knowledge had greater working memory capacity, inhibitory control and cognitive flexibility.

Second, I will present longitudinal evidence from over 500 children from low-income homes that pattern knowledge at the end of PreK predicted mathematics achievement in Grade 5 over and above other academic and cognitive skills. Overall, pattern activities can focus attention on identifying underlying structure, which is a core component of mathematics, and thus may be one reason why early patterning knowledge is important for learning mathematics.

[Single Presentation of ID 310]

Time: Friday, 09/Oct/2015: 4:15pm - 5:45pm · Location: George Bellows DEF
Session Chair: Sydney Levine, Rutgers University

ID: 310

Symposium

Topics: Moral Cognition, Social Cognition

The Development of Moral Judgment: From the descriptive to the normative

Chair(s): **Sydney Levine** (Rutgers University)

Discussant(s): **Paul Bloom** (Yale University)

Much of the work that has been done on the early development of moral judgment describes children's *expectations* about how others will behave in moral situations. Work with adults in this area, on the other hand, tends to explore how subjects think that others *ought* to behave. When do notions of normativity emerge in development? Do our current methods fall short of being able to answer this question? Wynn presents results that show that even when infants have no clear expectations about moral agents, they sometimes show preferences for moral agents that behave in certain ways. Wynn therefore suggests that preferences may be understood as an early proxy for normative judgment in the first year of life. Ting, He, and Baillargeon suggest that expectations about third-party punishment of transgressions might be considered a proto-normative judgment. However, they show that already by 2.5 years of age, expectations about third-party punishment are sensitive to group-membership, casting doubt on whether this could be a metric of 'ought'. Levine and Leslie present data that suggest that by 4 years of age, preschoolers are competent at answering the normative question, "Should she have done that?" and are sensitive to the means/side-effect distinction, a hallmark of complex moral judgment in adults. In discussion, Bloom addresses the question, How far are we from knowing whether young children understand the normativity of 'ought'?

Presentations of the Symposium

Evaluating Others: Evidence for Descriptive Expectations and Prescriptive Judgments in the First Year

Karen Wynn

Yale University

Recent studies find evidence for both descriptive and prescriptive understanding of others, even in the first year of life. This talk presents two example cases in which descriptive and prescriptive processes are clearly distinct. In the first example, we find that infants do not have baseline expectations of whether one individual will act prosocially or antisocially towards another (e.g. help another individual achieve a goal, versus hinder the other's efforts). However, they have a strong preference for prosocial actions over antisocial ones, suggesting that they approve the former and condemn the latter. In the second example, we find that babies hold distinct expectations of those who are similar to them and those who differ from them. Infants expect individuals who are "like me" to treat others positively, and appear to approve of them - they prefer others to treat them kindly and not poorly. We find a different pattern when it comes to how babies think about those judged as "different from me": infants have no expectations about how such individuals will act towards others, but - despite this lack of expectations - they appear to condemn such individuals, preferring others who treat them poorly over those who treat them kindly. These two examples provide evidence that babies' expectations and normative judgments are distinct aspects of cognition, both operative within the first year of life.

Toddlers' Expectations about Third-Party Punishment

Fransisca Ting, Zijing He, Renée Baillargeon

University of Illinois at Urbana-Champaign

Recent research suggests that toddlers and infants possess expectations about moral principles such as fairness and harm. But how should these expectations be characterized? Do they reflect how children understand what individuals will do, or what they should do? One approach to this issue has been to focus on third-party punishment: if toddlers expect an individual who produces a negative action to be punished by a third-party observer, this might suggest that they view the negative action as a moral transgression. The present research suggests that this approach is unlikely to be successful, however, because toddlers' expectations about punishment are highly context-sensitive. In experiments with 29-month-old toddlers, a thief stole a toy from a victim and subsequently needed help accessing an object. Toddlers viewed it as unexpected if an observer helped (as opposed to hindered) the thief when (a) the thief, victim, and observer all belonged to the same group or (b) the victim and observer belonged to the same group, and the thief belonged to a different group. In contrast, toddlers held no expectation about the observer's behavior if (c) the thief and victim belonged to the same group, but the observer belonged to a different group or (d) the thief and observer belonged to the same group, but the victim belonged to a different group. Together, these results suggest that third-party punishment is not expected for all transgressions: rather, it plays a functional role, as a deterrent against transgressions within the ingroup (a) or by the outgroup (b).

Preschoolers use the "means principle" to make deontic moral judgments

Sydney Levine, Alan Leslie

Rutgers University

When is it morally permissible to harm another person? As early as the thirteen century, Thomas Aquinas suggested that it may be permissible to harm another when the harm is committed as a foreseen side-effect and not a means. To this day, scholars of international law rely on the "means principle" as the moral basis for rules of international warfare. Previous work has shown that adults without philosophical or legal training also make the moral means/side-effect distinction and that this effect is robust cross-culturally (Mikhail 2011; Hauser, Young & Cushman 2007). In Study 1, we present evidence (from "should" questions and action ratings) that - like philosophers, legal scholars, and naïve adults - preschoolers (ages 4-5) judge harm-as-means as morally worse

than harm committed as a foreseen side-effect. In Study 2, we show that in a non-moral setting, neither adults nor preschoolers make a normative means/side-effect distinction. Together, these studies suggest that (1) preschoolers are representing complex causal and intention structures in order to make moral judgments and (2) preschoolers compute moral permissibility over their representations using rules that are specific to the moral domain.

Oral Papers II: Infant cognition and comparative cognition

Time: Friday, 09/Oct/2015: 4:15pm - 5:45pm · Location: Elijah Pierce A and B
Session Chair: Stephanie Mia Denison, University of Waterloo

ID: 229 / Oral Papers II: 1 Individual Oral Paper

Topics: Infant Cognition, Social Cognition, Theory of Mind

How infants represent others' beliefs about the disappearance and identity of one or more objects

Dora Kampis (International Fellow)¹, **Eugenio Parise**^{1,2}, **Gergely Csibra**^{1,3}, **Ágnes Melinda Kovács**¹

¹Central European University, Hungary; ²Lancaster University, UK; ³Birkbeck, University of London, UK; dorka.kampis@gmail.com

Infants' understanding of others' mental states has been documented in a wide array of tasks. It has recently become a question of interest, what kind of representations infants form when thinking about others' beliefs. In two studies we addressed cognitive mechanisms of infants' belief reasoning. First, in a manual search paradigm we found that infants' search times were modulated by a person's false belief regarding objects hidden in a box. Hence, contrary to suggested limitations of early mindreading systems, 14-month-old infants can ascribe beliefs regarding the identity of an object, or the number of objects. Second, using EEG measures we investigated how 8-month-old infants represent others' beliefs. We found similar activation during occlusion of objects from the infants' perspective, as during occlusion from only the other person's point of view. This suggests shared neurocognitive underpinnings of representing the world from infants' own perspective and for encoding others' beliefs.

ID: 177 / Oral Papers II: 2 Individual Oral Paper

Topics: Comparative Cognition, Infant Cognition, Social Cognition

Experience-independent sex differences in social interest in nursery-reared infant rhesus macaques

Elizabeth A. Simpson^{1,2}, **Ylenia Nicolini**², **Stephen J. Suomi**¹, **Pier F. Ferrari**², **Annika Paukner**¹

¹National Institute of Child Health and Human Development, National Institutes of Health, USA; ²University of Parma, Italy; elizabethhansimpson@gmail.com

Sex differences in infancy may have biological roots; however, in humans, male and female infants are treated differently, opening up the possibility that different experiences may drive some sex differences. Here, we tested whether sex difference may emerge in macaque infants ($n = 48$) reared in a controlled postnatal environment. At 2 to 3 weeks, infants viewed videos of positive and negative macaque facial expressions while we recorded their gaze with remote eye tracking. Females, compared to males, spent more time looking at faces ($d = .58$), and especially the eyes ($d = 1.31$). At 4 to 5 weeks, females, compared to males, engaged in more affiliative behaviors in a human-interaction task ($d = .64$). Together, these results suggest that macaque newborns, even in controlled postnatal environments, already exhibit significant sex differences in social interest and affiliative behaviors, with females appearing more socially interested than males.

ID: 195 / Oral Papers II: 3 Individual Oral Paper

Topics: Comparative Cognition, Infant Cognition, Perception

The Origins of Object Recognition: A Controlled-Rearing Approach

Justin Wood

University of Southern California, United States of America; justin.wood@usc.edu

Humans and other animals can recognize objects across novel viewing conditions. This ability—known as "invariant object recognition"—is central to perception and cognition, but its origins are poorly understood. To examine how invariant object recognition emerges in a newborn visual system, I raised newborn chicks within automated controlled-rearing chambers. These chambers tracked each chick's behavior continuously (24/7) while providing complete control over all visual object experiences. The results support two conclusions. First, newborn chicks can begin building invariant object representations at the onset of vision. Second, it is possible to 'break' this ability by raising chicks in environments that lack natural (slow and smooth) visual object input. Thus, newborn animals can build invariant object representations, but only when provided with a specific type of visual input. These results indicate that invariant object recognition is not a hardwired property of vision, but emerges rapidly when a newborn sees their first object.

ID: 173 / Oral Papers II: 4 Individual Oral Paper

Topics: Attention, Computational Approaches, Infant Cognition

Getting more from behavioral data: Computational approaches for exploring early visual experiences

Joseph Michael Burling¹, **Yukie Nagai**², **Hanako Yoshida**¹

¹University of Houston, United States of America; ²Osaka University, Japan; jburling@uh.edu

There has been a recent push toward implementing more technical solutions for behavioral data collection, such as the addition of head-mounted eye-trackers, motion sensors, and depth sensor cameras, which has called for unconventional computational techniques for data analysis and thus promoting cross-disciplinary research. The proposed talk provides a unique perspective on how the two fields of developmental science and computer vision may be combined for resolving complex questions regarding multiple, interacting factors at multiple timescales that influence the development of infant-guided attention and active exploration. We demonstrate the application of image processing techniques such as estimation of optical flow, perceptual saliency, and time

series analyses between eye gaze and behavioral events for uncovering the role of parental involvement in entraining infant attention between four to fifteen months. These highly approachable methods are particularly suitable for investigating dynamic parent-child interactions during frequent, small timescale, yet highly critical learning moments.

ID: 254 / Oral Papers II: 5
Individual Oral Paper

Topics: Comparative Cognition, Decision Making and Reasoning, Number

The evolutionary origins of intuitive statistics: probabilistic reasoning in capuchin monkeys

Emma Carolan Tecwyn¹, Stephanie Denison², Emily Messer³, Daphna Buchsbaum^{1,4}

¹University of Toronto, Canada; ²University of Waterloo, Canada; ³Heriot-Watt University, UK; ⁴University of St Andrews, UK;
emma.tecwyn@utoronto.ca

Recent research has shown that 12-month-old infants can make predictions about samples drawn from populations by reasoning about proportions. We adapted the infant paradigm for capuchin monkeys (*Sapajus apella*) to explore the evolutionary origins of probabilistic reasoning. Across four experiments, capuchins (n=19) were presented with two populations of food items that differed in their relative distribution of preferred and non-preferred items, such that one population was favourable relative to the other. In each trial, capuchins had to select between hidden single-item samples randomly drawn from each population. Results revealed that at least some capuchins were able to make inferences about samples drawn from populations, and successful individuals did this by reasoning about proportions as opposed to using simpler quantity heuristics. Given that humans and capuchins shared a common ancestor over 30 million years ago, this suggests that the capacity for probabilistic reasoning is evolutionarily ancient.

[Single Presentation of ID 214]

Time: Friday, 09/Oct/2015: 4:15pm - 5:45pm · Location: Emerson Burkhart A
Session Chair: Catarina Vales, Indiana University

ID: 214

Symposium

Topics: Concepts/Categories, Language

Language matters for more than talking: How language influences cognitive development in childhood

Chair(s): Catarina Vales (Indiana University)

Discussant(s): Dedre Gentner (Northwestern University)

Cognitive abilities change massively in the first years of life: Children become able to generalize their knowledge to novel instances, to think more abstractly, and to access information that cannot be directly perceived. Certainly, children's developing language reflects the advances in cognition; however, language and language learning may also play a role in creating these advanced cognitive skills. The idea that language learning is a driver of cognitive development is a venerable one with a long history. In this symposium, we will provide a new take by focusing on three foundational cognitive abilities that may be shaped by language: The ability to use configural information to recognize objects, the ability to represent and manipulate spatial information, and the ability to use abstract relational knowledge. The talks will feature different methodologies (a visual attention task, a training study, and a relational match-to-sample task), across different ages and populations (toddlers, preschoolers, and a population of deaf children) to provide both evidence and hypotheses about the mechanistic pathways through which language influences the development of cognitive abilities. The discussant, an expert in language and cognition, will relate these new findings with the broader issues on language and cognitive development, and will discuss its implications for understanding typical and atypical development, schooling and cross-language differences.

Presentations of the Symposium

Do you see the parts or the whole? Language influences object recognition in young children

Catarina Vales, Linda B. Smith

Indiana University

Human object recognition is fast and robust: Adults can easily recognize briefly presented objects, and can do so even under perceptually degraded conditions. Although a lot is known about object recognition in adults, less is known about the processes that support the development of object recognition. One marker of mature object recognition is the ability to attend to the configuration of the parts to identify an object. Since young children encounter objects (and learn everyday visual object categories) while they are also learning the names of things, one could hypothesize that learning names for objects might over time change what children pay attention to when recognizing objects. To test this hypothesis, two- to three-year-old children were cued with either the category-level name or the picture of an object, and then asked to find that object in clutter. To measure what aspects of the objects children attended to, we used two types of stimuli: One that encourages attention to the object configuration (relevant features in their spatially correct locations) and another that encourages attention to individual features (relevant features scrambled). Children were more likely to attend to the individual features when cued with visual information, but more likely to attend to the object configuration when cued with linguistic information – suggesting that language plays a role in shaping adult-like object recognition. Moreover, the number of words in the children's productive vocabulary interacted with these patterns, further supporting the importance of language experience in the development of visual object recognition.

Acquiring Spatial Language Promotes Children's Mental Rotation

Marianella Casasola, Wendy Wei, Daniel Suh

Cornell University

We test the hypothesis that acquiring spatial language may promote spatial skills more effectively than spatial play. Thus far, twenty-three children ($M = 56.68$ months, $SD = 4.26$ months) were randomly assigned to receive enriched spatial play experiences (play-only condition, $n = 12$) or spatial play plus spatial language experience (spatial language condition, $n = 11$) in a short-term, spatial language training study. An additional nine children are currently being tested. At baseline, all children were assessed on their mental rotation with two tasks (Honze & Quaiser-Pohl, 2003; Levine et al., 1999), spatial language and general vocabulary. Next, across six short training sessions (each 15 minutes) that spanned 3 weeks, children engaged in spatial activities with an experimenter (e.g., origami, Lego building, magnetic blocks). In the spatial language condition, the experimenter provided spatial language while playing with the child (e.g., "fold this square along the diagonal to make a triangle") whereas in the play-only condition, the experimenter avoided spatial language (e.g., "fold the paper this way to make it look like this"). Several days after the last training, children were tested on the same measures as baseline. The results yielded significant condition differences. Only children in the spatial language condition significantly improved in their spatial language and mental rotation. The results show a causal role of acquiring spatial language on mental rotation and indicate that spatial language better promotes this spatial skill than constructive play alone, at least over a three-week period.

Language Augments Relational Reasoning

Martin Zettersten¹, Jing Z. Paul², Gary Lupyan¹

¹University of Wisconsin-Madison, ²Agnes Scott College

Relational reasoning is a cornerstone of human cognition, playing a central role in everything from basic categorization to creative thinking. We present evidence from studies with children and adults for the view that relational thinking emerges in part through extensive experience with external symbol systems such as language. If language has a causal role in the development of relational reasoning, limited experience with language will lead to greater difficulty in relational reasoning. To test this prediction, we

investigated relational reasoning in a group of deaf Chinese children and adolescents ($n = 20$) who varied in their age of first exposure to a standardized language. We found that age of exposure to a standardized language predicted relational performance: Participants with later exposure to Chinese Sign Language were both less accurate and slower to respond than their peers with earlier exposure to Chinese Sign Language. Why might exposure to language influence relational reasoning? Relational labels such as “same” and “different” have the property of denoting abstract relations, allowing people to abstract away perceptual properties in a way that is difficult absent the labels. In a series of studies using English-speaking adults, we show that even subtle manipulations that emphasize such relational labels lead to a greater likelihood of representing relations in a more abstract way. Representing abstract relations appears to carry a cost of decreasing memory for perceptual details. Overall, our findings provide evidence for relational language playing an important role in the human capacity for relational reasoning.

[Single Presentation of ID 285]

Time: Friday, 09/Oct/2015: 4:15pm - 5:45pm · Location: Emerson Burkhart B
Session Chair: Megan Geerdt, UNCG

ID: 285

Symposium

Topics: Memory, Social Learning

Keywords: Informal Learning

Learning outside the lab: Factors that contribute to memory and learning in informal learning environments

Chair(s): **Megan Geerdt** (UNCG)

Discussant(s): **David Uttal** (Northwestern University)

Informal learning environments- such as zoos, science centers, and museums- are valuable settings for exploring children's learning and memory, providing new insight into the development of knowledge and cognitive processes through social interactions (Callanan, 2012; Haden, 2010). Importantly, research that explores the factors that affect memory and learning within these settings can (1) validate and extend previous research on cognitive development in laboratory settings and (2) provide insight into how we can support learning in natural contexts beyond the classroom. The goal of this symposium is to present recent research on previously unexplored areas in memory and learning within social interactions conducted across a range of informal learning settings. Paper 1 explores children's developing understanding of item authenticity in a museum setting, highlighting the important role that interaction with a knowledgeable adult plays in supporting children's learning and interest. Paper 2 explores whether children learn better from "experts", comparing memory for facts about aquarium animals presented by parents and docents. Paper 3 explores how the kind of language used by zoo docents to teach children about unfamiliar animals affects memory and learning. The discussant, David Uttal, who has research expertise in memory, learning, and social interactions in informal learning environments, will highlight connections across the current research as well as discuss their contribution to the broader literature on learning in informal contexts. Together, these papers provide new insight into how we can support children's memory and learning in informal learning contexts.

Presentations of the Symposium

The role of authenticity in informal science education

Brooke Miller, Jacqueline Woolley

University of Texas at Austin

Do children who views original items at museums have a better understanding than children who see pictures in textbooks? Children might attend more to authentic objects, thereby increasing interest and learning outcomes. Alternatively, authentic objects might be distracting, leading to decreased learning. A third possibility is that authenticity matters less than experience, and that any interaction with a knowledgeable adult in a museum setting may be beneficial, regardless of authenticity. The purpose of this study was to examine the effects of a museum-based learning experience using objects of varying authenticities on children's learning about and interest in those objects.

268 5- to 10- year-olds were tested in four conditions, each associated with an object of varying levels of authenticity: a fossil, a cast, a model, or a photograph of a Smilodon (Saber-tooth cat) tooth. A baseline group of children were interviewed to determine the general knowledge of museum visitors. Participants were first questioned about the authenticity of the object, and then taught a number of facts about Smilodon. Then children's knowledge about Smilodon, as well as their interest in learning more about it, was assessed. Results showed clear developmental differences in children's understanding of authenticity, extending findings from lab settings. Results also showed that, regardless of the object, direct interactions with experimenters increased knowledge as well as the desire to learn more, over and above baseline. This effect was particularly pronounced for girls. Results are discussed with regard to how to facilitate effective informal learning outside the classroom.

Children's selective trust and retention of information from educators and parents in a science center setting

Thanujeni Pathman, Janet Boseovski, Stuart Marcovitch, Megan Geerdt, Kimberly Marble (Diversity Fellow), Margaret Scales, Jessica Stark, Yixin Chen

University of North Carolina at Greensboro

Children often rely on other people to acquire new information about the world. Consequently, it is important to be selective when considering the credibility of different sources of information. Science centers provide an ideal opportunity to study selective social learning in a natural setting. We studied 4- to 8-year-old children's ability to learn and retain novel information about animals in a science center. In a within-subjects design, children heard facts about animals from a science center educator (SCE; expert condition) and from one parent (non-expert condition). Children's recognition of the facts and the sources of those facts were compared between conditions. We also assessed beliefs about the boundaries of expertise (e.g., who would know about rock specimens). Finally, we examined children's sensitivity to the valence of the facts (threatening vs. pleasant). Overall, younger children more accurately recognized facts given by a parent compared to a SCE ($p < .05$); there was no difference for older children ($p = .30$). Children were more likely to identify the source of the information accurately when it was presented by a parent ($p < .005$). However, this varied by age such that younger children chose the parent more often for both conditions, whereas older children identified the correct source across conditions. For beliefs about expertise, younger children did not distinguish experts and non-experts, whereas older children did in the expected direction (e.g., chose SCE for rocks). Valence effects will be discussed. Overall, this research provides novel insights into children's memory and social learning in a contextually-rich environment.

The effect of anthropomorphic language on learning about zoo animals

Megan Geerds, Stuart Marcovitch
University of North Carolina at Greensboro

Anthropomorphism (i.e., assigning human qualities to non-human animals) is frequently found in parent-child conversations at animal exhibits in informal learning environments (Geerds, Van de Walle, & LoBue, 2015a; Rigney & Callanan, 2011). Anthropomorphism can help people feel more connected to nature, thereby increasing conservation behaviors (Tam, Lee, & Chao, 2013). However, some research suggests that anthropomorphism interferes with factual learning and increases anthropomorphic attributes (Ganea, Canfield, Simons & Chou, 2014). The effect of anthropomorphism on learning about real animals within informal learning environments has never been examined. The purpose of this study was to explore how anthropomorphic descriptions of unfamiliar zoo animals in social interactions with docents affect children's factual memory and anthropomorphic attributions.

Children aged 4- to 7-years-old were recruited at an animal exhibit (fossa) at a zoo and randomly assigned to receive factual information about the fossa using either realistic or anthropomorphic language. After visiting the exhibit, children's memory for factual information and anthropomorphic attributions to other fossae were tested. In line with previous work (Ganea, Ma & DeLoache, 2011; Geerds, Van de Walle, & LoBue, 2015b), anthropomorphic language did not decrease factual memory: free recall, cued recall, and recognition scores were similar across conditions. In general, anthropomorphic language did not increase anthropomorphic attributions. However, children who had better factual memory were also more likely to attribute the specific anthropomorphic qualities we mentioned to other fossae. These results provide important information about how to best support learning about unfamiliar, live animals in informal learning environments.

PS-II: Poster Session II

Time: Friday, 09/Oct/2015: 5:45pm - 7:00pm · Location: George Bellows ABC

Cash bar and light snacks

ID: 543 / PS-II: 1

Poster

Topics: Culture, Social Cognition

"I've got freedom in my bones": Children's early conceptions of national identity

Larisa Janine Hussak, Andrei Cimpian

University of Illinois, United States of America; hussak2@illinois.edu

What does it mean to be an American? We explored whether children have an essentialist view of national identity, believing that it is a deep, inherent feature of who they are. In two studies ($N = 140$), we asked whether children believe national identity has a biological basis (e.g., can you tell if someone's an American by looking at their brain?), is stable over time (e.g., will an American always be an American, even if they don't want to be?), and is richly informative (e.g., does knowing what one American likes tell you what other Americans like?). We found that young (5-year-old) children reported essentialist beliefs about American identity, and this tendency declined significantly with age. We also found that children's reasoning about Canadians paralleled their reasoning about Americans: early essentialist reasoning, which declined with age. Together, these findings suggest a broad essentialist conception of nationality in early childhood.

ID: 485 / PS-II: 2

Poster

Topics: Culture, Language, Social Cognition

A Developmental Study on How Varieties of Spanish Influence U.S. Latino Children's Friendship Judgments

Maria Mercedes Arredondo (Diversity Fellow), Melanie Rosado, Susan A. Gelman

University of Michigan, United States of America; mmarre@umich.edu

"Latinos" comprise a variety of individuals living in the United States, whose ethnic background originates from multiple countries in Latin America and may be marked by their speaking varieties of the Spanish language (e.g., accents). The present study investigated whether Spanish varieties mark social categories for Spanish-English bilingual, Latino children. Seventy-five children (4.3 to 17.1) completed a task that pitted language variety (i.e., Mexican Spanish or Puerto Rican Spanish) against race (for half the trials) or gender (for half the trials). Results reveal judgments based on variety of Spanish increase with age, and they trump race more so than gender, earlier in development. The findings revealed that as U.S. Latino children get older, they do not consider "Latino" as an undifferentiated social group, but are aware of distinct Latino ethnicities as marked by Spanish. Thus, the link between language and social judgments is a complex result of multiple influences.

ID: 740 / PS-II: 3

Poster

Topics: Comparative Cognition, Number, Perception

A universal number bias in monkeys, children, and innumerate adults

Stephen Ferrigno¹, Julian Jara-Ettinger², Steven T. Piantadosi¹, Jessica F. Cantlon¹

¹Brain and Cognitive Sciences, University of Rochester; ²Brain and Cognitive Sciences, Massachusetts Institute of Technology; Sferrigno@rcbi.rochester.edu

A capacity for nonverbal numerical estimation is widespread among humans and animals. However, it is currently unclear whether numerical percepts are similarly strong in non-human primates as in humans, in young children as in adults, and in individuals from numerate societies as those in non-numerate societies. Despite large differences in age, species, and education, all subjects exhibited a spontaneous bias to categorize sets on the basis of number as opposed to alternative dimensions. The number bias was significantly enhanced in those with cultural exposure to formal counting and mathematics, and it correlated with degree of mathematics experience in both the US and Tsimané groups. We conclude that primates have a spontaneous bias to extract numerical information, and that human nonverbal numerical perception interacts with and is enhanced by symbolic counting and numeracy.

ID: 614 / PS-II: 4

Poster

Topics: Concepts/Categories, Social Cognition

Access to Variety as a Cue of Social Power

Margaret Echelbarger¹, Selin Gülgöz², Susan A. Gelman¹

¹University of Michigan, United States of America; ²Kalamazoo College, United States of America; echelbar@umich.edu

Children use control over more resources as a cue of social power (Gülgöz, unpublished dissertation). In this study, we explore whether children also use control over a variety of resources, irrespective of number, as a cue of social power. Children ($N=54$) ages 4-9 years were asked to indicate which of two characters was "in charge" based on their acquisition of variety versus non-variety sets of resources (e.g., 4 red balls versus 4 different colored balls). Consistent with previous results, children inferred that characters with control over more resources were "in charge"; however, children did not make consistent inferences about power based on variety. Further, while there were no age differences, there were gender differences. Girls inferred that the character with

a variety of resources was “in charge.” We are now moving beyond color to explore whether children are sensitive to the variety of kinds of resources when inferring social power.

ID: 780 / PS-II: 5

Poster

Topics: Language, Social Learning, Word Learning

Actively Overhearing to Learn New Words and Facts

Ruthe Jane Foushee, Fei Xu

University of California, Berkeley, United States of America; foushee@berkeley.edu

Learning language through eavesdropping can be seen as a type of active learning: information-gathering is self-directed, attention is strategically oriented, and given cross-cultural variation in child-directed speech practices, may also be evidence of children having ‘learned to learn.’ In this study, children learn four novel labels and six facts associated with a set of toys, either through overhearing an experimenter discuss them in a phone call, or through direct instruction. 4.5-6-year-olds learned labels and facts above chance in both conditions ($p < .001$). While accuracy on facts was significantly better in the Didactic condition ($p < .001$), learning of labels was identical between conditions. Data collection is ongoing, but of 23 children in the Overhearing condition, 20 children touched the objects matching the experimenter’s descriptions in greater proportion than they touched non-matching objects. A parental language environment survey will also probe links between the amount of ‘practice’ children get in overhearing, and their performance.

ID: 435 / PS-II: 6

Poster

Topics: Decision Making and Reasoning, Social Cognition, Social Learning

Are all behaviors created equal?: The influence of illusory correlation in the formation and maintenance of stereotypes in preschoolers

Ethan James Fleuchaus, Christopher Lawson

University of Wisconsin - Milwaukee, United States of America; fleucha2@uwm.edu

The tendency to form illusory correlations (ICs) – overestimate the relationship between two rare variables – plays a significant role in the formation and maintenance of stereotypes. This study examined the extent to which children relied on information about social actors to form new, or maintain existing, stereotypes. We presented preschoolers ($N=33$, $M_{age}=49$ months) evidence about the behaviors of children from a small minority classroom and a large majority classroom. Across both classrooms the prevalence of either negative behaviors (e.g., hitting) or positive behaviors (e.g., sharing) was rare (e.g. 30% of the individuals exhibited the behavior). Preliminary results reveal that children formed ICs when the negative behaviors were rare, but not when positive behaviors were rare. These results suggest that children rely on prior expectations to either maintain existing stereotypes (e.g., people are prosocial) or form new stereotypes (e.g., members of this group are antisocial).

ID: 558 / PS-II: 7

Poster

Topics: Language, Reading, Word Learning
Keywords: shared book-reading, school readiness

Banana begins with B: Parent-child book-reading can promote children’s school readiness skills

Elaine Reese, Elizabeth Schaughency, Jessica Johnston, Shika Das, Jane Carroll, Sarah-Jane Robertson

University of Otago, New Zealand; ereese@psy.otago.ac.nz

What can preschoolers learn from shared picturebook reading with their parents? The research on children’s naturally occurring interactions with parents suggests that picturebook reading is primarily a source of vocabulary and narrative skills, but not necessarily print and phonological awareness. We taught parents to interact with picturebooks with their preschoolers in one of two ways: Rich Reading and Reminiscing (RRR), with a focus on vocabulary and narrative ($n = 24$); Strengthening Sound Sensitivity (SSS), with a focus on understanding the sounds of words ($n = 23$); or an activity-based no-reading control condition ($n = 22$). Children in both book-reading conditions scored higher in print tasks after the 6-week intervention compared to the control, and children in the SSS condition scored higher in phonological awareness than the other two conditions. These findings suggest that parents can learn new ways of interacting with books to promote children’s school readiness skills.

ID: 489 / PS-II: 8

Poster

Topics: Perception, Social Cognition, Theory of Mind

Basic Social Perception Captures Variability in Social Cognition in Middle Childhood

Katherine Rice, Laura Anderson, Kayla Velnoskey, Elizabeth Redcay

University of Maryland, College Park, MD; krice@umd.edu

Two cornerstones of social development—social perception and theory of mind—undergo brain and behavioral changes in middle childhood, but the link between these developing domains is unknown. Given adult evidence that these superficially different domains may be related (Miller & Saygin, 2013), the present study examined the developmental relation between these social processes in fifty-two children (25 males) aged 7-12 years ($mean=10.07$, $SD=1.71$). Controlling for age and IQ, social perception (perception of biological motion in noise) was significantly correlated with measures of social cognition [face-based mental state

inference (Mind in the Eyes; $r=.44$, $p<.01$) and story-based mental state inference (Strange Stories; $r=.38$, $p<.01$), but not with physical inference (control stories; $r=-.097$, n.s.). These results elucidate the interrelated cognitive processes underlying social development. Further, face- and story-based mental state inference were not correlated with each other ($r=.18$, n.s.), suggesting a role for social perception in linking higher-order social cognitive processes.

ID: 703 / PS-II: 9

Poster

Topics: Culture, Social Learning

Keywords: Innovation, Problem-Solving

Behavioural Innovation: State or Trait?

Emma Flynn, Kayleigh Carr, Rachel Kendal

Durham University, United Kingdom; e.g.flynn@durham.ac.uk

We investigated whether individuals who innovate showed consistency in this behaviour over time and over tasks. Twenty-three children, distinguished earlier by their innovative behaviour on a novel puzzle-box task (Carr, Kendal, & Flynn, 2015) were compared to twenty-three children who conversely demonstrated high levels of imitation fidelity (matched across age, gender, school, condition in the original study). A battery of tasks administered to the two groups to assess related constructs (divergent thinking, social and asocial learning, inhibition, neophobia, etc) revealed some consistency in innovation on puzzle box tasks relative to 'imitators', across tasks and over time. No other group differences were found. In a second experiment, adults failed to exhibit a link between greater innovation, and the selected related constructs. Whilst the child findings are suggestive of a 'trait' interpretation, the selectivity of the effect suggests innovativeness, of the type explored in this study, may be domain-specific.

ID: 783 / PS-II: 10

Poster

Topics: Concepts/Categories, Culture

Bodily organs and the afterlife: Chinese children's developing understanding of death

Melanie Nyhof¹, Liqi Zhu², Tingyu Li², Hansong Zhang¹, Jiawei Yue¹, Jinyuan Zhang¹

¹Indiana University South Bend, United States of America; ²Institute of Psychology, Chinese Academy of Science, Beijing, China; melanie.nyhof@gmail.com

There is a demonstrated reluctance to donate organs in China, despite the official stance that there is no afterlife. Is there an intuitive belief that certain organs are needed after death despite explicit beliefs that functioning ceases at death? Chinese children, ages 4-12, and adults, were presented with three narratives in which a character who has died donates an organ (eyes, heart, brain). Participants were asked about the continued functioning of physical, perceptual, emotional, and mental processes after the character's death. Children responded that emotion would continue more than other functions. Adults responded that all functions would stop at death, regardless of question type. Participants responded more often that mental functions would stop in the brain transplant story and that emotion functions would stop more in the heart transplant scenario. Results point to a connection between afterlife beliefs and organ donation among children but not adults.

ID: 593 / PS-II: 11

Poster

Topics: Media and Technology, Social Cognition, Theory of Mind

Can a robot feel? Children's beliefs about robots and development of the Uncanny Valley.

Kimberly A Brink, Makenzie Flynn, Henry M Wellman

University of Michigan, United States of America; kabrink@umich.edu

Robots are increasingly a part of children's lives: teaching in classrooms, comforting children in hospitals, etc. We investigated children's ideas and feelings towards robots across development (4- to 12-years). After viewing videos of two robots differing in similarity to humans, younger vs. older children were more likely to attribute thoughts, $p < .001$; pain, $p < .001$; emotions, $p < .001$; and hunger, $p < .001$, regardless of the robot's appearance. For morality, however, older children often ascribed knowing the difference between good and bad to the human-like robot but not the machine-like robot, while younger children did the opposite, $p < .01$. Research on children's interactions with robots is increasing, but little investigates how children's beliefs about robots change across early childhood. Our research aids better understanding of children's interactions with this technology and eventually can provide advice on the creation of devices better suited for children.

ID: 351 / PS-II: 12

Poster

Topics: Communication, Language, Social Cognition

Children associate the use of child-directed prosody with greater communicative and social competence

Anisha Lizbeth Varghese, Elizabeth Nilsen

University of Waterloo, Canada; a5varghe@uwaterloo.ca

Difficulty adjusting prosody to listeners has been posited as a main contributor to social challenges. We examined children and adults' inferences when hearing a speaker use appropriate or inappropriate prosody for the characteristics of the listener. Participants watched videos of an adult speaker address another adult or child in either adult- or child-directed prosody (matched for content). They then rated speakers' and listeners' communicative and social competence. Children, unlike adults, were not

attuned to the match between speaker and listener: they generally gave higher competency ratings for child-directed prosody. Children indicated that they were more likely to speak like speakers who used child-directed prosody, and that speakers who used child prosody were more likely to communicate successfully, irrespective of their listener. Child prosody was also rated as more friendly and polite. Thus, children's preference for child-directed prosody was striking, whereas adults emphasized the match between speaker prosody and listener characteristics.

ID: 599 / PS-II: 13

Poster

Topics: Executive Function

Children Learn to Play Rock Band: Probing relations between executive function and learning

Alana Anderson, Sammy Perone, Philip Zelazo

University of Minnesota, United States of America; and03675@umn.edu

Executive function (EF) involves a set of neurocognitive processes involved in goal-directed behavior and is related children's school readiness and academics success. Thus, there is a need for early EF interventions. Gaming activities can improve EF in adults, but whether this link exists for children is unknown. If it does, gaming may provide an ideal platform to deliver widespread early interventions for children just before entering school. We investigated relations between EF and learning in 5-year-old children within the context of a 10-week in-home gaming activity. The gaming activity was to play a keyboard in the game Rock Band 3, which requires children exercise their EF abilities (e.g., attention switching). We will present results showing changes in children's EF abilities before and after the in-home gaming activity as well as relations between individual differences in EF and learning to play a keyboard over the course of the study.

ID: 324 / PS-II: 14

Poster

Topics: Decision Making and Reasoning, Social Cognition, Social Learning

Children Use Nonverbal Cues from Teachers to Evaluate Others

Elizabeth L. Brey, Kristin B. Shutts

University of Wisconsin-Madison, United States of America; elbrey@wisc.edu

What leads children to think their peers have different traits and abilities? The present research tested the role that teachers' actions play in guiding children's impressions of others' intelligence. Participants (5-6 years) saw videos in which a teacher directed one nonverbal behavior (e.g., smiling) toward one student and a neutral expression toward another student. When asked to identify which student was "smarter", participants were more likely to pick the student who was the target of a more positive cue. The findings suggest that children not only attend to the subtle actions of teachers, but also use them to form assessments of other students. Current research is testing whether children's inferences are specific to intelligence, or are more general.

ID: 648 / PS-II: 15

Poster

Topics: Culture, Social Cognition, Social Learning

Children's experiences being taught at school and in the home influence their attributions of knowledge to teachers and mothers: Cross-cultural evidence

Muanjing Wang¹, Samuel Ronfard¹, Alain Poutré¹, Leigh-Anne White¹, Rewa Atre², Jonathan D. Lane³, Paul L. Harris¹

¹Harvard University, United States of America; ²Emerson College, United States of America; ³Vanderbilt University, United States of America; sar798@mail.harvard.edu

We explore how children's experiences of being taught both in the home and in school influence their attributions of knowledge to teachers as compared to mothers. Younger ($M_{age} = 4.73$, $n = 32$) and older ($M_{age} = 6.67$, $n = 32$) children from the United States and China were introduced to two informants. One informant was designated as a mother and the other as a teacher. Children were asked who knew more about items falling into four different domains--health, food, mathematics, and literacy. Within each domain, children were asked who knew more about procedural knowledge ("How to...") and about propositional knowledge ("Why..."). In both the United States and China, children's attributions of knowledge to mothers (vs. teachers) varied depending upon the domain of knowledge, type of knowledge (i.e., How vs. Why), children's age, as well as the frequency with which they were taught at home.

ID: 349 / PS-II: 16

Poster

Topics: Decision Making and Reasoning, Media and Technology

Children's Understanding of Touchscreen Devices

Sierra Eisen, Angeline S. Lillard

University of Virginia, United States of America; sle3jt@virginia.edu

Although children's use of touchscreen devices has expanded exponentially in the last decade, little research has explored how children think about the functions of touchscreen devices. This study examined the functions young children attribute to touchscreen versus more traditional media devices (e.g., iPad versus computer), whether children understand the multi-functionality of touchscreen devices, and children's preferred device for a set of specific tasks. Forty-three preschoolers answered questions regarding six devices and seven functions; a comparison group of 16 adults was also tested. Adults attributed significantly more functions to touchscreen devices than children did. However, children attributed different functions to touchscreen devices than to

traditional devices, and claimed that touchscreen devices could be used for significantly more functions. Yet children did not prefer touchscreen devices; they chose devices selectively. The results show surprising differences from adults as well as some core understandings among young children regarding these new forms of media.

ID: 361 / PS-II: 17

Poster

Topics: Social Cognition

Keywords: statistical sampling, intergroup cognition

Children's use of sampling information to infer social preference

Arianne E. Eason, Cheryl R. Kaiser, Jessica A. Sommerville

University of Washington, United States of America; easona@uw.edu

How do children come to infer other's social preferences? Given that statistical sampling information has been shown to guide inferences about *object* preference, we were interested in whether it also serves as a source of information for children's inferences about *social* preference. In the current investigation, participants (7-10 years old) heard a story about a Target child who befriended two children, who were either part of the numerical minority (i.e., violated random sampling assumptions) or majority racial group in the classroom (i.e., did not violate random sampling assumptions). Results indicated that children only inferred social preferences when random sampling assumptions were violated; however, they made no such inferences when random sampling assumptions were not violated. This work provides important new information about a potential process by which children infer others' social preferences. Furthermore, these results provide more evidence of the domain general nature of children's use of statistical sampling information.

ID: 527 / PS-II: 18

Poster

Topics: Neuroscience Approaches, Social Cognition, Theory of Mind

Conceptual development in theory of mind is reflected in emerging neural distinctions

Hilary Richardson¹, Jorie Koster-Hale², Mika Asaba³, Natalia Velez-Alicea³, Caitlin Malloy⁴, Rebecca Saxe¹

¹MIT, United States of America; ²Harvard University, United States of America; ³Stanford University, United States of America;

⁴Boston College, United States of America; hlich@mit.edu

Throughout development, children build and revise intuitive theories about the world. Revising these theories requires reorganizing knowledge according to conceptual distinctions with newly acquired relevance. We tested whether this kind of developmental change in abstract conceptual knowledge, measured behaviorally, reflects increasingly explicit (i.e. linear) separation of distributed response patterns within specific neural populations. We focused on children's developing concepts of the source of other people's beliefs. Children (age 7-12 years) who were more sensitive to the difference between justified and unjustified beliefs (outside the scanner) had more distinct spontaneous neural response patterns to these conditions in their right temporal-parietal junction (RTPJ). Children's RTPJ also showed distinct patterns of response to others' beliefs based on visual versus auditory evidence. These results suggest that emerging conceptual distinctions are reflected in emerging distinctions in neural response patterns, and demonstrate that multi-voxel pattern analyses can be used to study conceptual change more broadly.

ID: 482 / PS-II: 19

Poster

Topics: Memory

Keywords: Auditory Working Memory, Memory Development, Precision

Development of Working Memory Capacity and Precision for Tones

Katherine Michelle Clark, Kyle Hardman, Todd R. Schachtman, J. Scott Saults, Bret A. Glass, Nelson Cowan

University of Missouri, United States of America; kmcw24@mail.missouri.edu

Very little is known about developmental changes in the capacity limits of nonverbal auditory working memory, and even less is known about developmental changes in its precision. This research examines reproduction, on each trial, of a tone from a short list to be retained in working memory, and it incorporates recent modeling techniques to dissociate capacity from precision. Subjects include children (6-13 years, N=84) and adults (26-50 years, N=31). Capacity (items in working memory) and precision (fidelity of each working memory representation) both improved with age but the developmental trajectories of these parameters differed. Moreover, based on auxiliary measures, capacity and precision were both related to general aptitude measures but only precision was also related to musical experience.

ID: 417 / PS-II: 20

Poster

Topics: Culture, Social Cognition

Keywords: Religious Cognition, Possibility Judgments, Anthropomorphism of God

Developmental Differences in Children's Views of God and the Effects of Prayer

Kirsten A. Lesage, Nicholas J. Shaman, Anondah R. Saide, Rebekah A. Richert

University of California Riverside, United States of America; kirsten.lesage@email.ucr.edu

The present study investigated how children who had more or less humanlike views of God differed in whether they thought impossible events become possible with prayer. Children from a variety of religious backgrounds ($N = 154$) were categorized as

younger (3.50 – 4.49), middle (4.50 – 5.49), and older (5.50 – 6.50). There was an interaction between age and humanlike views of God, $F(2, 148) = 4.314$, $p = .015$, $\eta_{\text{partial}}^2 = .055$. Younger and middle children who had humanlike views of God viewed the impossible events with prayer as more possible ($M = -.029$, $SD = .115$) than same-aged children who had non-humanlike views of God ($M = -.546$, $SD = .174$). Older children who had humanlike views of God ($M = -.50$, $SD = .23$) viewed the impossible events with prayer as less possible than older children who had non-humanlike views of God ($M = -.04$, $SD = .20$).

ID: 719 / PS-II: 21

Poster

Topics: Concepts/Categories, Infant Cognition, Language

Keywords: Categorization

Does language influence the perception of event components?

Haruka Konishi¹, Natalie Brezack¹, Roberta Michnick Golinkoff¹, Kathy Hirsh-Pasek²

¹University of Delaware, United States of America; ²Temple University, United States of America; harukak@udel.edu

Infants discriminate between a possibly universal set of event components, only later privileging components expressed in their native language. While language is hypothesized to guide infants' progression from language-general to language-specific event perception, no prior studies have examined how infants narrow their sensitivity to disregard non-native distinctions. At 14 months, English-reared infants, like their Japanese counterparts, distinguish between bounded (e.g., road) and unbounded grounds (e.g., field). By 20 months, English-reared children without this distinction in their native language dampen their ability to recognize these contrasts. This study examined whether language exposure weakens 14-month-old English-reared infants' sensitivity to Japanese ground-path categories. When presented with a novel word paired with both bounded and unbounded grounds, infants' ability to discriminate between Japanese ground-path categories diminishes, suggesting that language drives the narrowing occurs in the semantic domain. Understanding how children acquire the relational terms of their native language is a crucial question to investigate.

ID: 426 / PS-II: 22

Poster

Topics: Concepts/Categories, Culture

Does the body survive death? Cultural variation in beliefs about the life everlasting

Rachel E. Watson-Jones¹, Justin T. A. Busch¹, Cristine H. Legare¹, Paul L. Harris²

¹The University of Texas at Austin, United States of America; ²Harvard University, United States of America; watsonjones@austin.utexas.edu

The current research compares beliefs about the continuation of biological and psychological function after death in Tanna, Vanuatu (a Melanesian archipelago) and the U.S. Children, adolescents, and adults were read a story that either contained natural (biological) or supernatural (religious) cues and were asked whether or not various biological and psychological processes continue to function after death. We predicted that across cultures individuals would endorse the continuation of psychological processes over biological processes (dualism) and that the supernatural priming narrative would increase this response pattern. Results largely supported predictions; U.S. participants provided more continuation responses for psychological than biological processes in both the supernatural and natural conditions. In the supernatural condition, however, participants in Vanuatu provided more continuation responses for biological than psychological processes. The findings provide evidence for the context dependency of afterlife beliefs and demonstrate that individuals use both natural and supernatural explanations to interpret the same events.

ID: 539 / PS-II: 23

Poster

Topics: Number, Perception

Keywords: time perception; individual differences; psychophysics

Domain-specific development of number, time, and space perception in 2-12 year-old children

Darko Odic

University of British Columbia, Canada; darko.odic@psych.ubc.ca

Young children have an intuitive sense of number (who got more cookies), space (how big is this toy), and time (who held their breath the longest). Despite this universality, the precision of children's approximate sense of number (ANS), time, and space significantly improves across development. These improvements could be explained either by the development of domain-general factors (e.g., attention or executive function), or domain-specific factors (e.g., experience with each dimension). In this study, we tested a large sample of 2–12 year-old children who completed discrimination tasks for five dimensions: number, time, line-length, surface area, and density. We found unique developmental trajectories for each dimension: whereas line-length reached adult performance by age 7, time perception developed past age 12. Importantly, each dimension correlated with age even when controlling for all other tested dimensions. Thus, domain-general improvements cannot explain the development of children's intuitive sense of number, space, and time.

ID: 320 / PS-II: 24

Poster

Topics: Infant Cognition, Social Cognition

Entropy, Order, and Agency: Causal inference, not perceptual features, drives the link between order and agency

Adena Schachner, Deborah Kelemen

Boston University, United States of America; aschach@bu.edu

From infancy, people tend to believe that orderly structures (e.g. music, nature) were created by animate agents. Is this order-agency link driven by perceptual features of orderly stimuli, or causal reasoning? We compare infants (N=48) and adults (N=320), manipulating the context of orderly outcomes to change whether generating order requires an agent's intervention (a slanted xylophone: rolling downhill generates an orderly descending scale). The xylophone was occluded; an inanimate ball or animate agent moved behind the occluder; either orderly or disorderly sounds occurred. We found causal reasoning linked order with agency: Infants and adults were surprised by the ball producing order only when order required self-propelled movement. When order did not require self-propelled movement, participants were more surprised by disorder, and adults judged the ball more alive after disorder (not order). This provides a framework for predicting when orderly stimuli cue agency, and bears on early representations of music and order in nature.

ID: 607 / PS-II: 25

Poster

Topics: Attention, Executive Function, Neuroscience Approaches

Examining the electrophysiological correlates of response inhibition in young children

Zachary Bryon Salander¹, Jennie K. Grammer², Nolan O'Hara¹, Melisa Carrasco³, William J. Gehring¹, Frederick J. Morrison¹

¹University of Michigan, United States of America; ²University of California, Los Angeles, United States of America; ³University of Maryland, United States of America; zbryons@umich.edu

Recent research has focused on studying electrophysiological correlates of executive function (EF) in young children. Studies of adults show that event-related potentials (ERPs), such as the N200 and P300, are associated with executive functions like response inhibition. Although studies of school-age children have found similar effects, little data exists on these response inhibition-related ERP effects in children younger than age seven. The current study utilizes an in-school, child-friendly Go/No-Go task (the Zoo Game). Preliminary results show N200 and P300 effects in both kindergarten and first grade children, and in addition, a posterior P200 was larger on No-Go trials than on Go trials in both age groups. Further analysis will explore the extent to which the development of these EF-related ERP components may signal the development of the response inhibition and attention during childhood.

ID: 420 / PS-II: 26

Poster

Topics: Executive Function, Neuroscience Approaches, Word Learning

Exploring the neural basis of dimensional label learning

Aaron Thomas Buss

University of Tennessee, United States of America; abuss@utk.edu

Previously, Buss & Spencer (2014) proposed a neurocomputational model of flexible rule-use composed of frontal, temporal, and parietal neural networks. Flexible rule-use emerges as a function of dimensional label learning which is implemented as associations between frontal and temporal cortex. This model explains a complex pattern of results across 14 variations of the Dimensional Change Card Sort and has made both behavioral and hemodynamic predictions that have been successfully tested with 3- and 4-year-olds. In this poster, I discuss how this model can generalize to explain performance and learning in dimensional label learning tasks (e.g., Sandhofer & Smith, 2001). Further, I present a near-infrared spectroscopy (fNIRS) study that revealed a pattern of activation across measures of comprehension and production predicted by the model. Thus, by implementing a complex, general-purpose system, different aspects of cognition can be integrated and explained at multiple levels of analysis.

ID: 337 / PS-II: 27

Poster

Topics: Culture, Executive Function, Infant Cognition

Factor structure of performance-based executive function in New Zealand children: A cross-cultural comparison

Ryan Jim San Diego (International Fellow)¹, Judith Ansell², Jane Harding², Trecia Wouldes¹, Study Group CHYLD²

¹Department of Psychological Medicine, The University of Auckland, New Zealand; ²Liggins Institute, The University of Auckland, New Zealand; rjsysandiego@yahoo.com

Previous studies on the development of executive function (EF) showed an interdependent three-factor construct, namely, inhibition, working memory and cognitive flexibility. However, participants were mainly of European descent and included a broad range of ages that may represent differing levels of EF development. The objective of this study was to investigate EF in children from a bicultural nation at one age (24 +/- 1 month). Participants were New Zealand (NZ) Maori (N=143) and NZ European (N=188) toddlers enrolled in the Children with Neonatal Hypoglycaemia and their Later Development (CHYLD) Study. Four EF tasks were administered; Fruit Stroop, Snack Delay, Ducks and Buckets, and Multisearch Multilocation. Exploratory factor analysis revealed differences in the loadings of executive function tasks between Maori and European toddlers. Confirmatory factor analyses showed a model of EF function at toddlerhood for Maori was unitary, but was not as dissociable when compared to the European toddlers.

ID: 754 / PS-II: 28

Poster

Topics: Culture, Executive Function, Number

Family Income Moderates the Effect of Television Exposure on Math and Executive Function

Andrew Ribner¹, Caroline Fitzpatrick², Clancy Blair¹

¹New York University, United States of America; ²Concordia University, Canada; aribner@nyu.edu

Previous studies have found amount of television exposure early in life is negatively associated with school readiness outcomes. Additionally, family income has been found to be negatively associated with both hours of television exposure and school readiness. Using a diverse sample of 807 kindergarten students, we investigated whether the effect of television exposure on school readiness skills varied by family income. Analyses revealed television exposure did not predict literacy skills, but predicted both math and executive function skills in fall of the kindergarten year. We found a significant interaction between income and hours of television exposure, such that income buffered the association between television exposure and both math and executive function scores. Children from high-income families saw no association between television and skills, and children from low-income families saw a strong, significant negative association of television exposure with skills. This poster will discuss potential explanatory factors for these differential effects.

ID: 536 / PS-II: 29

Poster

Topics: Social Learning, STEM Learning

Keywords: Children Cognition

Family Science Talk in Museum Exhibits and Focused Tasks

Claudia Castaneda, Maureen A. Callanan

University of California Santa Cruz, United States of America; clcastan@ucsc.edu

Children's science "sense-making" develops within everyday conversation. Understanding children's diverse science thinking requires exploring variation across families and activities. We investigated parents' encouragement of children's critical thinking through questions asked in two settings (counter-balanced order): open-ended museum visit to a fossil exhibit, and focused activity exploring a "mystery-object" fossil. In regression analyses, we asked whether parents' characteristics, and order of activities, predicted proportion of critical thinking questions in the two settings. For families seeing the mystery object first, only parents' critical thinking questions in the mystery-object task predicted their critical thinking questions in the exhibit ($p=.02$). For families visiting the exhibit first, parents' science background ($p=.055$) and attitudes toward science ($p=.025$) predicted proportion of critical thinking questions in the exhibit, but parents' "experiential thinking style" predicted critical thinking questions about the mystery object ($p=.033$). These findings highlight family differences and potential intervention strategies related to children's developing science thinking.

ID: 632 / PS-II: 30

Poster

Topics: Executive Function, Theory of Mind

Keywords: pretend play, fantasy orientation

Fantasy Orientation and Cooperative Play

Brooke Meyer¹, Sydney Rowles², Ansley Gilpin¹

¹University of Alabama, United States of America; ²University of Texas at Dallas, United States of America; agilpin@ua.edu

Recent research has shown that fantasy-oriented (FO) children are more likely to engage in pretend play than their low FO peers, providing high FO children gains in executive functioning (EF). In addition, being highly engaged in pretend play that is fantastical provides children an even greater boost in EF development (Pierucci et al., 2014; Thibodeau et al., under review), but no research has explored whether high FO children engage in more cooperative play, which is positively related to socio-emotional development (Ashabi, 2007). In the present study, parents and teachers assessed the fantasy orientation and play type of 105 preschoolers. Using child, parent and teacher reports of FO and cooperative play, results indicate that high FO children are more likely to engage in cooperative peer play than others ($r = 0.44, p > .05$). Results are discussed in terms of how FO is positively related to both cognitive and social development.

ID: 778 / PS-II: 31

Poster

Topics: Memory

Frequent and positive: Children's repeated memory reports in a specific recall task

Elizabeth Van Horn, Lynne Baker-Ward

North Carolina State University, United States of America; evanhor@ncsu.edu

Depressed adults are more likely than other individuals to report overgeneral memories, including repeated memories, when recalling specific events. Peterson et al. (2015), however, reported that typical young adults easily retrieved repeated and specific memories, and rated both categories as comparably important. We examined the frequency with which children generate repeated memories when prompted to recall specific childhood memories. Further, reasoning that repeated memories should be negatively valenced if they played a role in adaptive functioning, we examined the emotions the children attached to the memories. Fifty-one typically-developing second graders recalled on average 2.75 memories and classified 37.9% of these memories as repeated. Further, they were 2.89 times more likely to label repeated memories, in comparison to specific memories, as positive. These

results are consistent with arguments that repeated memories are an integral component of autobiographical memory. Hence, care should be taken in generalizing a clinical phenomenon to non-clinical samples.

ID: 699 / PS-II: 32

Poster

Topics: Attention, Developmental Disabilities, Word Learning

Gesture Viewing Experiences by Children with Autism Spectrum Disorder

Robyn Douglas, Audrey Utti, Hanako Yoshida

University of Houston, United States of America; autti@uh.edu

Research in typical and atypical populations demonstrates that parental gesturing helps children direct attention and enhance communication, yet the effect differs across children. In a semi-naturalistic parent-child play, we studied gestures used by parents of typically developing (TD) and high-functioning autism (ASD) children 3 to 5 years old (n=10). Using a head-mounted camera to record each child's approximate view, we looked at the type and amount of gestures these children attended to. Results suggest that parents with ASD children make significantly more gestures overall and symbolic gestures, such as pantomimes that signify actions (e.g., drinking), than parents with TD children; however, TD children capture significantly more gestures than children with ASD. Gaze shift analyses suggest that parent's symbolic gesturing generated sustained attention among children with ASD, but not among TD children. The potential role of gestures in organizing visual experiences and a new perspective on language development are discussed.

ID: 662 / PS-II: 33

Poster

Topics: Social Learning, Theory of Mind, Word Learning

Keywords: joint attention, joint knowledge, referential cue

Getting child's attention to the act of naming as a referential cue and as a signal of joint knowledge

Elizaveta F. Vlasova¹, Tatyana N. Kotova¹, Alexey A. Kotov²

¹The Laboratory of Cognitive Research, Russian Academy for National Economy and Public Administration, Russian Federation;

²The Laboratory of Cognitive Research, National Research University "Higher School of Economics", Russian Federation;

tkotova@gmail.com

New word learning usually implies the new object demonstration, the new word pronunciation and the getting attention to the naming (GAN) simultaneously. To define the function of GAN, we dissociated the new object demonstration and the new word pronunciation. 3 year-olds participated in one of the four conditions: GAN accompanied demonstration of the object (experimenter noticed: "I will name this later!" and after 2-minutes-play she pronounced the label); GAN accompanied the label pronunciation (experimenter demonstrated the object without notification and after the same play said: "Now I name this! It is vepa!"); GAN accompanied the both; and Control condition (the label was pronounced after 2-minutes-play without notification). The selection of object by label was performed only in conditions when GAN accompanied label pronunciation. We suppose that it is required referential cue. But in the first condition children performed mutual exclusivity test, that is, GAN served as signal of joint knowledge.

ID: 455 / PS-II: 34

Poster

Topics: Moral Cognition, Social Cognition

Givers and Keepers: Children Expect Greater Giving From Resource-Rich Than Resource-Poor Individuals

Richard Evan Ahl¹, Elena Silla², Yarrow Dunham¹

¹Yale University; ²University of Notre Dame; ahl.richard@gmail.com

Preschool-age children show strong social preferences in favor of individuals with more resources as compared to individuals with fewer resources (Li, Spitzer, & Olson 2014). However, previous studies have not clarified the reasons for these preferences. We explored the viability of one explanation: Children expect those with more to be more likely to give to others. In three trials, we introduced participants to a child with 8 toys and a child with 3 toys and asked who they liked, as well as who would give one of their toys to someone with none. In addition to preferring the child with more, four-and-five-year-olds, $t(21) = 4.06$, $p < .01$, and seven-and-eight-year-olds, $t(23) = 6.03$, $p < .001$, were more likely to chose the child with 8 toys as the one who gave. The expectation that those with more are more likely to share may possibly underlie children's pro-wealth preferences.

ID: 759 / PS-II: 35

Poster

Topics: Number, STEM Learning

Group-based Numerosity Training and Number Line Training Promote Kindergartners' Numerical Abilities

Jike Qin, Xinlin Zhou

Beijing Normal University, China, People's Republic of; qin.jike@gmail.com

Early numerical abilities for kindergartners are crucial for later success in mathematics in schools. The current study tested whether group-based numerosity training and number line training were helpful for three to five-year-old kindergartners. In experiment 1, 155 three to four-year-old kindergartners were divided into three groups, one receiving numerosity training, one receiving number line training, and the other receiving regular instruction. There were 15 sessions during 2 months, 25-30 minutes per session. Similar methods were applied on 90 four to five-year-old kindergartners in experiment 2. The results showed that number line

training generated better numerical processing that was based on understanding of numerical magnitudes for the three to four-year-old kindergartners, and both numerosity training and number line training can promote their numeral abilities for the four to five-year-old children.

ID: 586 / PS-II: 36

Poster

Topics: Executive Function, Reading, Theory of Mind

Hot and Cool Executive Functions of Adults with Good and Poor Reading Comprehension

Kelly B Cartwright, Nicole R Guajardo, Sarah Rowland, Alexander Hoyes, Olivia Natale

Christopher Newport University, United States of America; kewright@cnu.edu

Although word-reading skills are significant contributors to reading comprehension, recent research suggests executive functions (EFs) contribute to reading comprehension problems in the absence of word-reading difficulties. However, no work has assessed both hot and cool EFs across good and poor comprehenders. In our ongoing project, we have assessed cool EFs (inhibition, cognitive flexibility, working memory, and planning) and hot EFs (theory of mind [ToM] and counterfactual reasoning), word-reading abilities, and vocabulary/semantic knowledge in 51 college students. Preliminary data indicate good ($n = 17$) and poor ($n = 20$) comprehenders differed on vocabulary/semantic knowledge, consistent with past work. Additionally, they differed significantly on ToM, counterfactual reasoning, cognitive flexibility, and marginally on working memory ($p = .057$), even when word identification, nonword decoding and reading fluency were controlled. These data point to additional malleable factors as targets for intervention for specific reading comprehension problems in the absence of word-reading difficulties.

ID: 563 / PS-II: 37

Poster

Topics: Decision Making and Reasoning, Social Learning

How Children Weigh Competence and Social Engagement When Seeking Help From Others

Sydney P. Rowles, Candice M. Mills

The University of Texas at Dallas, United States of America; sydney.rowles@utdallas.edu

In this experiment, 26 4- and 5-year-old children watched two adults demonstrate using a toy, with one adult being competent but socially unengaged and the other being incompetent but socially engaged. Children then had four trials to seek help from the adults while working with their own problem-solving toys. We found that children showed a slight preference for asking the engaged adult: 60% of children asked the engaged adult for over half of their requests. We also found that over 60% of children asked for help on three or more trials, with 70% of those children asking the engaged adult first on at least half the trials. Post-test, children were able to remember which adult demonstrated which characteristic, as well as to make inferences about which adult would likely engage in specific behaviors. Ongoing research is investigating how task characteristics may influence from whom children seek help.

ID: 557 / PS-II: 38

Poster

Topics: Concepts/Categories, Infant Cognition

Keywords: Causal reasoning

How did that happen? Investigating constraints on the development of children's causal exploration

Paul Muentener, Alex Pelliccione

Tufts University, United States of America; paul.muentener@tufts.edu

When presented with a novel, seemingly spontaneous event, children infer and search for a causal explanation by at least 2 years of age. The current study extends this research by 1) exploring constraints on children's early causal exploration and 2) investigating how causal exploration changes from infancy through early childhood. We presented children (12-36 months, $n = 256$) with an unexplained causal event and then provided a potential causal explanation. Between conditions we manipulated either the kind of potential cause (likely vs. unlikely) or the physical connection between the cause and the outcome (connected vs. at-a-distance). Current results suggest that both causal kind and physical connection impacted causal exploration, but that at the youngest ages tested children were significantly less likely to even engage in any causal exploration. The findings are discussed as they relate to the development of causal exploration in early childhood and children's understanding of causal mechanisms.

ID: 577 / PS-II: 39

Poster

Topics: Memory

How Do You Know That? Discerning the Status of Newly Self-Generated Knowledge Using Memory for Source

Jessica A. Dugan, Patricia J. Bauer

Emory University, United States of America; jessica.dugan@emory.edu

Semantic memory, our repository of knowledge, is unmarked by details of time or place (Tulving, 1972). It is reasonable to expect that the episodes during which knowledge is acquired are marked by such contextual details. The present research was an investigation of eight-year-olds' memory for the context of their newly self-generated knowledge. Children were read story passages presenting novel facts that could be integrated to self-generate new knowledge. Following a one-week delay, we asked them to identify where they learned each fact from a set of choices. Rather than choosing the option depicting "I figured it out myself,"

children selected the second story as the source of their new knowledge on 94% of correctly recalled trials. This suggests that children are, on some level, aware that they are integrating after learning the second fact in each story pair.

ID: 679 / PS-II: 40
Poster

Topics: Concepts/Categories, Social Cognition, Social Learning

How does psychological essentialism affect the development of social preferences?

Tara M Mandalaywala (Diversity Fellow), David M Amodio, Marjorie Rhodes
New York University, United States of America; tmandalaywala@nyu.edu

Psychological essentialism is a cognitive bias that leads people to view category members as sharing an underlying, inherent nature. This study examined whether the development of essentialist beliefs about social categories changes how people use that category to navigate the world. We tested whether essentialist beliefs about race explain variation in inter-group attitudes among White American children (M age = 5.7 ± 0.6 yrs; $n = 14$) and adults ($n = 154$). Racial essentialist beliefs increased across development; children viewed behavioral traits as environmentally determined (non-essentialist) ($t(14) = -4.71, p < 0.001$), whereas adults viewed these traits as biologically based (essentialist) ($t(154) = 3.74, p < 0.001$). Highly essentialist adults held more negative implicit attitudes towards racial out-groups ($r = 0.16, p = 0.045$), a relationship beginning to emerge in children ($r = .51, p < .08$). Thus, the acquisition of racial essentialism increases how racial categories are incorporated into social preferences.

ID: 733 / PS-II: 41
Poster

Topics: Infant Cognition, Language, Word Learning

How Much Do 12-Month-Olds Know About Common Words? Individual Differences in Lexical Recognition

Madeleine Oswald, Jill Lany

University of Notre Dame, United States of America; moswald2@nd.edu

Individual differences in the speed and accuracy of 18-month-olds' lexical recognition are related their word-learning ability. Infants recognize common words by 6 months, however, meaningful individual differences in such online processing have not been reported until 15-18 months. Are such differences absent in novice word-learners, or are they difficult to detect?

We tested 12-month-olds' lexical recognition using 4 words typically known at this age. Only infants with larger comprehension vocabularies according to parent report successfully identified the words. Furthermore, infants' accuracy on the lexical-recognition task was correlated with recognition speed several months later, even when controlling for vocabulary size at both times. Thus, individual differences in online processing are present by 12 months, suggesting continuity in lexical development. Future work testing how the emergence of online-processing skill relates to other measures of infant cognition may permit a more precise identification of the key mechanisms supporting early word learning.

ID: 461 / PS-II: 42
Poster

Topics: Attention, Infant Cognition

Keywords: Sensorimotor dynamics, Parent-child interaction, Dual Eye-tracking

How Speech Shapes Attention: Evidence from the Real-Time Dynamics of Parent-Infant Interactions

Steven L. Elmlinger, Sumarga H. Suanda, Linda B. Smith, Chen Yu

Indiana University, United States of America; selmling@indiana.edu

A wealth of evidence suggests that speech shapes and organizes infant attention (Vouloumanos & Waxman, 2014). Much of the work, however, is based on artificial laboratory experiments. Little is known about how speech influences attention within dynamic social interactions characteristic of infants' learning environments. Here, we studied sixteen 21-month-old infants' real-time attention during object play with their parents. Beforehand, we instructed parents to periodically direct infants' attention with either speech or non-speech bids. Through head-mounted eye tracking, we analyzed infants' moment-by-moment visual attention. Infants' switches in attention were quicker (speech = 1.4s, non-speech = 1.9s, $p < .05$) and more sustained (speech = 2.9s, non-speech = 1.3s, $p < .001$) to parents' bids containing speech, suggesting that speech effects on attention generalize to everyday interactions. Ongoing analyses focus on the sensorimotor dynamics that underlie these speech effects. Implications for theoretical accounts of how speech shapes attention will be discussed.

ID: 433 / PS-II: 43
Poster

Topics: Infant Cognition, Memory, Social Cognition

Human Action Supports Event Memory in Infancy

Lauren H. Howard¹, Amanda L. Woodward²

¹Franklin and Marshall College; ²University of Chicago; lauren.howard@fandm.edu

Both adults and children privilege agents when verbally recalling events (e.g. Trabasso, Stein, Rodkin, & Munger, 1992). However, little is known concerning the importance of agentive events on memory in infancy. In the current study, 9-month-old infants were familiarized to a video of a hand (*hand condition*) or claw (*claw condition*) building a block tower. An additional group of infants was given experience interacting with the claw (*training condition*) before watching the claw video. At test, infants viewed a side-by-side picture of the familiarized block tower and a novel block tower. Eye-tracking analyses demonstrate that infants in the hand and

training conditions looked significantly longer to the novel block tower than children in the claw condition ($p=.04$ and $p=.02$), though attention during encoding was the same ($p=.25$). This suggests that infants who construed the event as agentive remembered more than those who interpreted the event as an inanimate outcome.

ID: 680 / PS-II: 44

Poster

Topics: Infant Cognition, Number

Hysteresis-Induced Changes in Infants' Approximate Number Precision

Jinjing (Jenny) Wang¹, Melissa Libertus², Lisa Feigenson¹

¹Johns Hopkins University, United States of America; ²University of Pittsburgh, United States of America; jenny.wang@jhu.edu

Six-month-old infants discriminate numerosities that differ by at least a 1:2 ratio (e.g., 8 versus 16) but not a 2:3 ratio (e.g., 8 versus 12). However, little is known about the malleability of infants' approximate numerical abilities. Recent findings show that 5-year-old children's numerical discriminations are altered by the order in which trials are presented: children make finer discriminations when trials start with easier ratios and gradually progress to harder ones, compared to the reverse -- an effect termed *hysteresis*. An important open question is whether this hysteresis effect is driven by metacognitive factors, like self-confidence. Here we tested this by asking whether infants, too young for such metacognitive effects, also exhibit hysteresis. We found that 6-month-old infants successfully discriminated a 2:3 numerical ratio, but only when first familiarized to numerical discriminations that progressed from easy to hard ratios. Thus, hysteresis can affect approximate number representations, even in infancy.

ID: 405 / PS-II: 45

Poster

Topics: Language, Reading, Word Learning

Important differences between child-directed speech and the text of children's picture books

Jessica Lena Montag, Michael N Jones, Linda B Smith

Indiana University, United States of America; jmontag@gmail.com

Reading to young, pre-literate children is associated with better language and reading outcomes, but the underlying mechanisms are poorly understood. The goal of this work is to better understand the potential mechanisms. We hypothesized that there may be important differences between the words and sentences used in picture books versus child-directed speech. We built a corpus consisting of the text of 100 picture books that caregivers might read to pre-literate children. We compared the vocabulary and certain complex sentences of that corpus to child-directed speech from the CHILDES corpus. We found that picture books contained a higher number of unique word types for a given number of tokens, overall longer words, and a higher proportion of complex sentences. We propose that one mechanism by which shared book reading may contribute to improved language outcomes is by exposing children to words and sentence structures that they would not encounter otherwise.

ID: 510 / PS-II: 46

Poster

Topics: Infant Cognition, Social Cognition

Infants inferences about disgust

Zoe Liberman¹, Amanda L Woodward¹, Katherine D Kinzler²

¹University of Chicago, United States of America; ²Cornell University, United States of America; zoeliberman@uchicago.edu

What do infants learn from seeing someone dislike a food? They might learn about the person (she doesn't like the food), or the food (that it is bad). If they learn the food is bad, they might expect other people to avoid it. While infants typically restrict generalizing food preferences to people who affiliate (Liberman, Woodward, Sullivan, & Kinzler, in prep), here we asked whether infants generalize disgust even across people who socially disengage. Infants watched two actors socially disengage, and then saw one actor dislike a food. We asked whether infants expected the second actor to agree or disagree. Infants generalized the disgust across actors. This effect was specific to foods rather than a general negativity bias: infants who saw the actors dislike objects did not generalize. This suggests that infants can quickly learn about foods from watching other people eat: they expect everyone to avoid a disliked food.

ID: 669 / PS-II: 47

Poster

Topics: Decision Making and Reasoning, Infant Cognition

Infants inferring the location of a hidden toy from negative sentences.

Sharon Chan, Patricia Ganea

University of Toronto, Canada; shar.chan@mail.utoronto.ca

Although infants actively use negation in their own speech by 18-months (Thornton & Tesan, 2013), no previous research has examined infants' ability to rely on negation to make simple inferences. In the current study, 23 month-olds must rely on verbal information in the form of a negative sentence to correctly infer the location of a hidden toy. Previous research has shown that infants can more easily use visual information about an object's location change to find a hidden object compared to using verbal input about the location change (Ganea & Harris, 2013). In this study, we contrast seeing that a toy is not in a transparent container, with hearing that a toy is "not" in one of two possible containers. Pilot testing ($n=10$) suggests that 2-year-olds perform at ceiling when told "The puppy is not in the cup," and must infer that the puppy is in another location, a box.

ID: 476 / PS-II: 48

Poster

Topics: Infant Cognition, Social Cognition, Social Learning

Infants' Categorization of Social Actions

Lindsey J Powell¹, Elizabeth Spelke²

¹MIT, United States of America; ²Harvard University, Cambridge, MA; ljpowell@mit.edu

Infants use information about efficiency to identify agents' physical goals. But how do they recognize actions with social rather than physical functions? They may rely on an understanding that socially meaningful actions work not by efficiently enacting physical changes, but instead through shared use across group members. We found support for this hypothesis across several experiments that probed the conditions under which 8- and 9-month-old infants expect an action to be performed by additional members of the initial actor's social group. Infants generalized actions to new members of social groups if and only if the actions in question were non-instrumental and infants had observed two socially related individuals repeating the action, whether or not they were members of the group across which generalization was tested. Thus, infants use characteristics of social behavior – physical inefficiency and shared use by group members – to categorize actions as social.

ID: 639 / PS-II: 49

Poster

Topics: Attention, Infant Cognition, Word Learning

Investigating 12-Month-Old Infants' Visual Attention at Naming Moments during Naturalistic Parent-infant Toy Play

Yayun Zhang, Chen Yu

Indiana University-Bloomington, United States of America; yayunzhang23@gmail.com

A critical question in early word learning is how children visually attend to and select target object among many other objects in view when parents name it during naturalistic parent-child interactions. In the present study, we showed 12-month-old infants a set of images while tracking their eye-gaze during free viewing. Images were captured from children's first-person view using head-mounted cameras during toy play with their parents. We selected frames around toy-naming events and systematically varied both the size and location of target toys to examine how visual properties of target objects at naming moments influence the way infants allocate their attention and further influence their word learning. Preliminary data have shown that infants tend to pay more attention to visually dominate objects that are large and centered in view, suggesting that the visual properties of objects during naming moments may influence which candidate referents infants select to build word-object associations.

ID: 369 / PS-II: 50

Poster

Topics: Concepts/Categories

Keywords: visual recognition

Is a Hump-less Camel Real? The Role of Knowledge in Visual Recognition

Clint A. Jensen, Timothy T. Rogers, Vanessa R. Simmering

University of Wisconsin - Madison, United States of America; simmering@wisc.edu

The degree to which perceptual and recognition processes are independent of conceptual knowledge remains an open question. Studies of patients with semantic dementia, a neural degenerative disorder characterized by the progressive loss of conceptual knowledge, suggest that the prototypicality of target images influences recognition, even when the recognized object cannot be named. However, in patient populations both recognition and knowledge systems may have been impacted by the disease process. By adapting the "over-regular animal task" used in studies of semantic dementia for a developmental population, we assessed recognition and naming in 3- and 5-year-olds (n=42). By comparing children's performance, we can evaluate the effect of gaining knowledge in a population with unimpaired visual recognition processes. We found that young children's performance mirrored that of patients, with incorrect choices of visually prototypical chimeras as "real" over less prototypical counterparts. These results provide evidence for the interdependence of perception, recognition, and knowledge.

ID: 395 / PS-II: 51

Poster

Topics: Decision Making and Reasoning, Perception

Keywords: haptic exploratory abilities

It's just the right size! Young children's judgments of an object's size following haptic only exploration

Hilary Kalagher

Drew University, United States of America; hkalagher@drew.edu

When 4- to 5- year- old children haptically explore a tool, they make appropriate judgments about whether that tool could be used to complete a task. The present work asks if this ability is unique to tools. First, children were visually presented with 3 differently sized dolls, one at a time. While viewing each doll, children haptically explored 4 pieces of differently sized cloth. Children indicated whether each piece was "just the right size" to cover each doll. Second, children were visually presented with 3 differently sized transparent boxes, one at a time. While viewing each box, children haptically explored 4 differently sized balls. Children indicated whether each ball was "just the right size" to fit in each box. To date, 34 children have completed this study. Preliminary results

suggest a developmental trajectory that is in line with past work. Analyses will provide detailed examination of haptic exploration patterns.

ID: 472 / PS-II: 52

Poster

Topics: Executive Function, Language, Symbol Use

Language and Executive Functions as Predictors of Symbolic Understanding in Young Monolingual and Bilingual Children

Bruce Douglas Homer, Yolanta Kornak-Bozza, Teresa Ober, Seamus Donnelly

The Graduate Center, CUNY, United States of America; bhomer@gc.cuny.edu

Language and executive functions (EF) were examined as predictors of young monolingual and bilingual children's symbolic understanding. It was hypothesized that EF and language would predict symbolic understanding, and account for any bilingual/monolingual differences. Bilingual ($n = 30$; ages 2;5-3;6, mean = 3;0) and monolingual children ($n = 29$; ages 2;5-3;7, mean = 2;11) received the boxes task (Homer et al., 2013) to assess symbolic understanding, the PPVT-IV (Dunn & Dunn, 2007) to assess language, and the Shape Stroop (Kochanska et al., 2000) to assess EF. Results indicated no significant effect of bilingualism and no significant interactions, but significant main effects for language, $F(1, 53) = 4.56, p = .04$, and EF, $F(1, 53) = 4.04, p = .05$. Further analysis indicated that monolingual children had significantly higher language scores, while bilingual children had significantly better EF scores, suggesting that language and EF play unique roles in developing symbolic understanding.

ID: 602 / PS-II: 53

Poster

Topics: Language, Social Cognition, Theory of Mind

Keywords: false belief, language, parents

Language Mediates the Relation Between False Belief Understanding and Socioeconomic Status

Virginia Tompkins¹, Jessica A. R. Logan², Daniel F. Blosser¹, Duffy Kaylin¹

¹The Ohio State University at Lima, United States of America; ²The Ohio State University, United States of America; tompkins.73@osu.edu

Achieving false belief understanding (FBU) is an important cognitive milestone that allows children to understand that thoughts and reality can differ. Researchers have found that low-income children score significantly lower than middle-income children on FBU (e.g., Weimer & Guajardo, 2005), but have not examined why this difference exists. We hypothesized that language (i.e., children's verbal ability and parent language to children via disciplinary responses) mediates the socioeconomic status (SES)-FBU relation. Participants included 174 3- to 6-year-olds. FBU was significantly and positively correlated with SES, children's receptive vocabulary, parents' self-reported discussion of children's behavior, and discussion of how the child's actions make others feel. FBU was significantly and negatively correlated with parents' tendency to use power assertive parenting (e.g., yelling). SES had a significant indirect effect on FBU through children's vocabulary, parents' general discussion, and parents' power assertive responses. This study contributes to our knowledge of individual differences in FBU.

ID: 524 / PS-II: 54

Poster

Topics: Executive Function

Keywords: Learning engagement, academic achievement

Learning Engagement and Executive Functioning in Preschool as Predictors of Achievement in Kindergarten

Simone E. Halliday, Marion O'Brien, Margaret M. Swingler, Susan D. Calkins, Esther M. Leerkes

UNC at Greensboro, United States of America; sehallid@uncg.edu

The present study investigated the impact of executive functioning (EF) and learning engagement in preschool on kindergarten academic achievement. During preschool, 279 children were assessed for EF, measured by the Dimensional Change Card Sort (DCCS), and learning engagement, observed during two laboratory tasks. Two learning engagement factors, focused involvement and positive approach, were calculated. During kindergarten, mathematic achievement was measured by WJIII Applied Problems. Better EF performance and greater focused involvement in preschool both predicted higher mathematic achievement in kindergarten. Additionally, EF moderated the effect of positive approach on achievement: Higher positive approach predicted better mathematic achievement among children who failed the DCCS, but not among children who passed. This study endorses a multidimensional view of learning engagement and highlights the interactive relationship between EF and positive approach. The importance of preschool learning engagement and EF for future academic success is supported.

ID: 596 / PS-II: 55

Poster

Topics: Perception

Keywords: Affordances, Action Capabilities

Learning to Link Decisions and Actions: Developmental Change in Children's Road-Crossing Skills

Elizabeth O'Neal, Luke Franzen, Kathrynne Brown, Yuanyuan Jiang, Rahimian Pooya, Junghum Paul Yon, Joesph Kearney, Plumert Jodie

University of Iowa, United States of America; elizabeth-oneal@uiowa.edu

Road crossing is a common, everyday task that involves perceiving and acting on affordances involving moving objects. Importantly, given the dynamic nature of traffic, gap decisions and crossing movements must be tightly linked. We examined how children and adults link decisions and actions by asking 6-, 8-, 10-, and 12-year-old and adult pedestrians to cross a single lane of continuous traffic in a virtual environment. Twelve-year-olds chose significantly larger gaps than the other age groups, including adults. Children of all ages timed their entry into the gap less tightly than adults. Upon exiting the roadway, 6-, 8-, and 10-year-olds had less time to spare than 12-year-olds and adults, whereas the 12-year-olds and adults did not differ from each other. Overall, these age changes demonstrate that gap choices and crossing actions become more tightly intertwined with development, with poorer action capabilities more strongly constraining gap choices for older than younger children.

ID: 721 / PS-II: 56

Poster

Topics: Social Cognition, Social Learning

Learning who knows what: Children adjust their inquiry to gather information from others

Candice M. Mills¹, Asheley R. Landrum², Ian L. Campbell¹, Sydney P. Rowles¹

¹The University of Texas at Dallas, United States of America; ²Annenberg Public Policy Center, University of Pennsylvania, United States of America; candice.mills@utdallas.edu

This research focused on how children's inquiry may be affected by the way they learn about which sources provide accurate, helpful information. Four- and 5-year-olds ($N = 188$) were tasked with questioning two different puppet informants to determine which of four pictures was inside of a box. Before beginning the task, children learned about the knowledge status of the two informants in one of three learning conditions: a) behavioral observation of how the informants answered other questions, b) third-party report of what the informants knew, or c) a combination of the two previous conditions. Overall, children were highly resilient, adjusting their questioning strategies based on the information provided, leading to no overall differences in accuracy between the three learning conditions. How children adjusted their strategies and other differences between conditions will be discussed.

ID: 700 / PS-II: 57

Poster

Topics: Executive Function

Keywords: Planning, Lifespan

Lifespan Changes in Planning and Problem Solving

William Keith Berg¹, Vernon Haynes², Marite' Haynes³, Dana Byrd⁴

¹University of Florida, United States of America; ²Youngstown State University; ³Clarion University of Pennsylvania; ⁴Texas A&M University at Kingsville; wkberg@ufl.edu

Children (7-10 years), young adults (18-28 years) and older adults (58-83 years) (Total $N=193$) solved a wide range of difficulties of the Tower of London (TOL) task, which assesses the executive functions of planning for problem solving. To capture developmental differences in multiple aspects of planning and problem solving, a number of success, speed and efficiency measures were analyzed. Both younger and older adults had longer initial planning times on more difficult problems, whereas children showed no significant change in initial planning. This suggested that only adult groups chose to or were able to initially assess the difficulty of a problem and adjust their initial planfulness. In contrast, both children and older adults showed less efficient solutions than younger adults, as measured by number of superfluous moves. Across all measures it was evident that children and older adults are similarly challenged for some measures, but are differently so for others.

ID: 392 / PS-II: 58

Poster

Topics: Concepts/Categories, Social Cognition, Theory of Mind

Mapping people's conceptions of sentient beings: Judgments about the relative capacities of animals, humans, and technology

Kara Weisman, Carol S. Dweck, Ellen M. Markman

Stanford University, United States of America; kweisman@stanford.edu

Which is more likely to think, a robot or an insect? How does a human baby compare to a dog in her capacity for hunger, or emotions? Such comparisons have elucidated the "dimensions of mind perception" that adults employ in reasoning about mental and moral entities (Gray et al., 2007). Two studies extend this work, using multidimensional scaling and cluster analyses to demonstrate that when adults consider entities' *biological* capacities (e.g., hunger) they reason categorically about beings as either animate or inanimate. However, their judgments are more nuanced when considering *affective* or *cognitive* capacities (e.g., feelings, thought)—e.g., a robot might be more similar to a human in cognitive ability than an insect is. Preliminary work with 5-year-old children suggests similar patterns of judgments. These findings shed light on the conceptual organization of the many creatures in our world, from humans and animals to increasingly sophisticated "social" and "intelligent" technologies.

ID: 383 / PS-II: 59

Poster

Topics: Word Learning

Mutual Exclusivity Supports Children's Mapping, But Not Retention, Of Words

Catherine A. DeBrock, Haley A. Vlach

University of Wisconsin-Madison, United States of America; kt.debs@gmail.com

The mutual exclusivity bias describes children's tendency to assume that only one label should be applied to each novel object during early word learning. To date, most assessments of word learning have been conducted at an immediate test, resulting in a lack of understanding of how mutual exclusivity affects long-term language learning. Thus, we examined children's use of the mutual exclusivity bias in relation to their long-term memory for word mappings. Preschool-aged children ($N = 45$) were presented with an immediate word mapping task and a 5-minute retention task. Children used mutual exclusivity during learning, supporting immediate word mapping. However, at the 5-minute delayed test children did not have a higher memory for words that were mapped via mutual exclusivity. These results suggest that mutual exclusivity supports initial mappings of words to objects, but this linguistic constraint may not support long-term language learning.

ID: 400 / PS-II: 60

Poster

Topics: Computational Approaches, Memory

Neural Basis of Episodic Memory Development: Evidence from Single Nucleotide Polymorphisms (SNP) Genotyping

Hyungwook Yim¹, Simon J. Dennis², Christopher W. Bartlett³, Vladimir M. Sloutsky¹

¹Department of Psychology, The Ohio State University; ²Department of Psychology, The University of Newcastle; ³Department of Pediatrics, The Ohio State University; yim.31@osu.edu

Episodic memory involves a mechanism that binds information into a coherent representation structure, and more complex memory structures are required when there are more overlapping elements among different episodes. The adult literature shows that the prefrontal cortex (PFC) and hippocampus are the main neural structures of memory binding. However, it is possible that multiple brain mechanisms interact with different types of memory structure across development. The current study utilized a computational model (multinomial-processing-tree model), and genotyping approach (Single-Nucleotide-Polymorphisms) to elucidate the division of labor between different brain areas involved in forming different memory structures across development. The computational model estimates the ability to form memory structures of different complexity while genotyping provides individual difference in the functionality of different brain areas. Results with 155 adults and 31 5-year-olds show that the ability to remember complex binding structures is subserved by PFC, whereas context binding has additional contributions from the hippocampus.

ID: 762 / PS-II: 61

Poster

Topics: Attention, Number, Spatial Cognition

Non-symbolic operational momentum (OM) before and after acquiring counting principles (CP) in preschoolers

Maciej Haman

University of Warsaw, Poland; maciej.haman@psych.uw.edu.pl

May adding/subtracting one induce Operational Momentum in ANS-based calculation? Does motion-induced attention interact with OM effect? Does it depend on counting principles knowledge? Seventy-five 4- and 5-year-old preschoolers (42 non-CP-knowers (Give-a-Number ≤ 4) and 32 full-CP-knowers (Give-a-Number ≥ 7)) were watching 4 addition and 4 subtraction events (initial set of 6/7/8/10 balls falling to centrally located container ->single ball added/subtracted ->the container leaves the screen left/right ->three identical containers are displayed showing three result-sets: too_small/correct/too_large; random order; e.g. 12/6/9, 5/10/7). The child's task was to point to the correct result (touch-screen procedure). Non-CP-knowers did not prefer any result set-size, but were quicker when selecting the result for left-departing containers in subtraction, and right-departing in addition. The CP-knowers showed classical OM (preference for too large results for addition and too small for subtraction), but no effect of spatial directions. It will be discussed how acquisition of symbolic number system change spatial properties of number representation.

ID: 446 / PS-II: 62

Poster

Topics: Concepts/Categories, Decision Making and Reasoning, Moral Cognition

Keywords: Causal reasoning, Counterfactual reasoning

Norm violations affect children's causal judgments

Jonathan F. Kominsky, Jonathan Phillips, Joshua Knobe, Frank C. Keil

Yale University, United States of America; jonathan.kominsky@yale.edu

Previous work on causal reasoning in adults has consistently found that agents who violate moral or proscriptive norms are seen as more causal of the outcomes that result from their actions. In this experiment, we show that children's causal reasoning is similarly affected by norm violations no later than age 7. Children ages 5-10 and adults ($n = 40$ /age group) were presented with a scenario in which two children, Billy and Sam, watered a flower, which made the bottom of the flowerpot wet. We then varied whether Sam's action violated a norm (it was not his turn to water the flower). Children ages 7-8 and 9-10, as well as adults, gave significantly higher causal ratings for Sam when he violated a norm ($p_s \leq .03$), but 5-6-year-olds did not ($p = .17$). We discuss these findings in relation to recent work suggesting that counterfactual reasoning drives this effect in adults.

ID: 688 / PS-II: 63

Poster

Topics: Social Cognition, Theory of Mind

Only 4-year-olds Selectively Trust more Honest and Knowledgeable Sources

Karlana Diane Ochoa, Kimberly E. Vanderbilt

California State University San Marcos, United States of America; ochoa042@cougars.csusm.edu

Are children better able to reject information from sources who have poor knowledge or bad intentions? Little is known about how these abilities develop in relation to one another. In the present study, fifty-two 3- and 4-year-olds searched for a hidden sticker after hearing conflicting advice from two speakers about the sticker's location. In the *knowledge condition* children heard advice from a speaker described as "smart" and providing right answers, and a speaker described as "silly" and providing wrong answers. In the *intent condition*, children heard advice from a speaker described as "helpful" and providing right answers, and a speaker described as "tricky" and providing wrong answers. Only 4-year-olds were better than chance at trusting reliable over unreliable sources in the knowledge ($p = .045$), and intent conditions ($p = .001$). These results suggest that by age four, children trust selectively based both on speakers' relative knowledge and relative honesty.

ID: 556 / PS-II: 64

Poster

Topics: Developmental Disabilities, Memory

Participation in Social Skills Therapy and Recall Memory in Children with Down Syndrome

Angela Faith Lukowski, Helen Masland Milojevich

University of California-Irvine, United States of America; alukowsk@uci.edu

Children with Down syndrome (DS) experience deficits in recall memory relative to typically developing peers. The goal of the present study was to examine whether participation in social skills therapy (SST) was associated with enhanced recall memory in children with DS. Nineteen children with DS participated in an encoding procedure using an elicited imitation paradigm; delayed recall was assessed after 1 month. Parents completed a questionnaire inquiring about whether children had experienced SST. Children encoded target actions and temporal order information relative to baseline. However, children who participated in SST demonstrated better encoding on both dependent measures relative to those who had never participated. In addition, only those children who participated in SST recalled target actions after the 1-month delay. These findings indicate that SST is positively associated with recall memory in children with DS, thereby warranting further investigation into the potential benefits of this therapeutic approach on cognitive functioning.

ID: 552 / PS-II: 65

Poster

Topics: Attention, Infant Cognition, Memory

Keywords: Working memory, Heart rate, Pupilometry

Physiological correlates of infant working memory capacity: Evidence from pupilometry and heart rate

Bret Eschman, Shannon Ross-Sheehy

East Tennessee State University, United States of America; eschman@goldmail.etsu.edu

Visual working memory (VWM), a vital cognitive skill, is relatively understudied in infant populations. Though previous work demonstrates a marked increase in VWM performance between 4 and 10 months of age, it is currently unclear if these developmental differences are directly related to changes in VWM capacity, or changes in some other cognitive capability. This is due in part to the difficulty of assessing VWM using raw look durations (i.e., if infants are looking at a stimulus, they are assumed to be processing it). To begin to address this, we assessed VWM capacity using a combination of eyetracking, heart rate, and pupilometry while infants engaged in a passive change detection task. Together, these measures provide a highly sensitive marker of WM maintenance, allowing us to assess for the first time, WM capacity in 5 to 11-month-old infants.

ID: 730 / PS-II: 66

Poster

Topics: Decision Making and Reasoning, Social Cognition

Picture Yourself: Self-Representation and the Endowment Effect

Lauren Marsh¹, Sandra Welzien¹, Patricia Kanngiesser², Bruce Hood¹

¹University of Bristol, United Kingdom; ²Max-Planck-Institute for Evolutionary Anthropology, Germany; lauren.marsh@bristol.ac.uk

Adults consistently over-value things in their possession. This bias is particularly robust in societies with independent self-construals, but has not been observed in Western children below 5-6 years of age. One interpretation for this pattern is that it reflects a bias towards personal possessions as a function of developing and culturally variable *self-concepts*. In three studies, 120 children aged 3-4 years evaluated toys before and after a task where their attention was focused on themselves, others or a neutral stimulus. Attention focus was manipulated via picture construction of themselves, a friend or a farm scene. Over the three studies, children consistently evaluated their own possessions, relative to other identical toys, more positively following the self-priming manipulation. Together these studies support the notion that possessions can form part of an "extended self" from early on in development and that the endowment effect may be due to a (culturally variable) self-bias.

ID: 606 / PS-II: 67

Poster

Topics: Infant Cognition, Spatial Cognition

Planning during bottle transport: Effects of bottle orientation on hand-to-mouth coordination

Wendy P. Jung¹, Bjoern A. Kahrs², Brittany DeVries¹, Madeleine Schwartz³, Jeffrey J. Lockman¹

¹Tulane University, United States of America; ²University of Missouri - Kansas City; ³Ohio University; wjung@tulane.edu

When transporting objects to the mouth, one often must orient the object in such a way so that the functional end of the object contacts the mouth. Orienting objects to the mouth requires planning, possibly mental rotation, and understanding of object properties. Sixty infants between 6-12 months of age were presented a feeding task in which they reached for a baby bottle presented in different orientations (up, down, toward, away, left, and right). Regression analyses indicated that older infants were more likely to be successful when using a bottle regardless of the initial orientation of the bottle. Younger infants, however, had the most difficulty when the bottle was presented in unfamiliar orientations (down and away). The results offer insights into how infants become more efficient in orienting objects during feeding tasks as they get older.

ID: 375 / PS-II: 68

Poster

Topics: Number, STEM Learning

Playing Numerical Card Games Promotes Head Start Preschoolers' Early Math Skills

Nicole R. Brooke, Geetha B. Ramani, Emily N. Daubert (Diversity Fellow)

University of Maryland, College Park, United States of America; nbrooke@umd.edu

Low-income preschoolers lag behind their middle-income peers on a variety of early number skills, which form the foundation for later mathematics achievement. Informal math activities such as numerical card games may provide an opportunity for children to gain more experience with these skills. Forty-eight Head Start preschoolers (mean age = 57 months) were randomly assigned to play either a numerical magnitude comparison card game ("War") or a numerical matching card game ("Memory") across four 15-minute sessions with an experimenter. Preliminary analyses suggest playing both types of games helped children improve their rote counting skills, whereas playing the magnitude comparison card game led to significantly greater improvements in children's symbolic magnitude comparison skills. The results suggest that playing numerical magnitude comparison card games may be an effective means of reducing income-based number knowledge gaps among preschoolers, and may be a beneficial tool for parents and educators to support children's mathematics development.

ID: 652 / PS-II: 69

Poster

Topics: Social Cognition, Theory of Mind

Preschoolers as Teachers: Relations between Theory of Mind and Patterns of Spontaneous Instruction

Samuel Ronfard¹, Alain Poutre¹, Andrew P. Minigan¹, Rewa Atre², Muanjing Wang¹, Sidney Strauss³, Kathleen H. Corriveau⁴

¹Harvard University, United States of America; ²Emerson College, United States of America; ³Tel Aviv University, Israel; ⁴Boston University, United States of America; sar798@mail.harvard.edu

Across two studies ($n = 136$) 3- to 6-year-old children watched as two puppets that differed in their prior experience playing a game (puppet 1: naïve, puppet 2: experienced) individually struggled to decide how to play that game. Children's spontaneous instruction to the two puppets was recorded. In both studies, about half of the children spontaneously engaged in teaching behaviors. Of the children who taught, half differentiated their instruction - immediately teaching the naïve puppet while delaying their instruction to the knowledgeable puppet, and half did not. Children's decision to teach was not related to child age, temperament, conversational perspective taking, children's understanding of teaching, or false belief performance. However, children's differential teaching of the two puppets was related to their performance on false belief tasks and to their understanding of teaching, controlling for age and conversational perspective taking.

ID: 346 / PS-II: 70

Poster

Topics: Concepts/Categories, Memory, Social Learning

Keywords: Learning, Complexity

Preschoolers direct their own learning based on difficulty level in a memory task

Tiffany Doan, Nicole Biro, Stephanie Denison

University of Waterloo, Canada; tiffdoan19@gmail.com

This research examined 3- and 4-year-olds' ($N=48$) tendencies to ask questions during time-limited learning for items of varying difficulty (2 easy, 2 medium and 2 difficult animal-name pairings). Children could learn names through asking the experimenter questions by placing each animal's picture into a basket as many times as they liked to hear the name. They were required to recall the names at the end of the session. We examined whether children asked different numbers of questions about the easy, medium, or difficult names when learning. An ANOVA revealed that children asked the most questions about the difficult names, the least about easy names, and an intermediate number of questions about the medium names ($p = .02$). Despite these differences in number of questions asked, children recalled names at similar levels. These results suggest that preschoolers self-regulate their learning to correspond with the materials' difficulty.

ID: 538 / PS-II: 71

Poster

Topics: Social Cognition, Social Learning, Word Learning

Preschoolers restrict the conventional scope of novel labels to other speakers of their language.

Vanessa Schell, Mark Sabbagh

Queen's University, Canada; veschell@gmail.com

This study examined whether 4-year-olds restrict the scope of labels to speakers of their own dialect. A native-accented speaker first taught children labels for two novel objects. Children were then familiarized with a speaker with a non-native accent who spoke English but labeled some common objects with either shared or non-shared (nonce) labels. Results from both standard behavioral measures and eye-tracking showed that although children learned the novel labels taught by the unaccented speaker, they showed no evidence that they extended knowledge of these labels to the accented speaker irrespective of whether they saw her use shared or non-shared labels. We speculate that young children may have difficulty understanding that knowledge of a language can be partially, imperfectly shared and may instead rely on surface features such as accent to restrict conventional scope.

ID: 370 / PS-II: 72

Poster

Topics: Decision Making and Reasoning, Social Cognition, Social Learning

Preschoolers' sensitivity to generalizability information in problem-solving tasks

Alexandra M. Was, Felix Warneken

Harvard University, United States of America; was@fas.harvard.edu

Efficient social learning requires that children can assess whether an existing skill generalizes to new situations or they should seek assistance from a teacher. In four experiments 151 3- to 5-year-olds were taught the solution to a puzzle box and decided how to approach subsequent boxes that were identical to or different from the initial box. In hypothetical situations, children accurately predicted that they would need assistance with the different (but not the identical) boxes. However, in hands-on situations, children became increasingly less likely to seek assistance with age. Different theories of social learning are discussed to explain why children can recognize whether a recently acquired skill generalizes, but do not necessarily use this information to guide their behavior.

ID: 637 / PS-II: 73

Poster

Topics: Moral Cognition, Social Cognition, Social Learning

Keywords: moral development, moral conventional distinction, norms, social cognition

Preschoolers' Reactions to Novel Moral and Conventional Violations

Sara Al Mughairy¹, Audun Dahl², Mahesh Srinivasan¹

¹University of California, Berkeley, United States of America; ²University of California, Santa Cruz, United States of America; srinivasan@berkeley.edu

By some accounts, children form moral judgments when observing negative consequences for others' wellbeing, while conventional judgments are based on experiences like observing prohibitions. However, past studies have not explored how children's observation of novel moral and conventional violations inform their evaluations. Here, children observed a novel action causing pain to a puppet (moral) or a sound from a box (conventional). Both actions were initially prohibited by an adult. Preschoolers (N=44) gave distinct justifications for judgments of wrongness and saw the conventional rule as more alterable. Preschoolers protested/tattled more during the conventional than moral violation, suggesting they thought the moral violator already knew that causing pain was wrong. Children showed more positive facial expressions during the conventional violations and more negative expressions during moral violations, further demonstrating that children viewed the novel moral and conventional events differently. These findings suggest that preschoolers rapidly construct distinct evaluations about unfamiliar social events.

ID: 388 / PS-II: 74

Poster

Topics: Attention, Decision Making and Reasoning, Executive Function

Reach Tracking Reveals Dissociable Processes Underlying Cognitive Control in 5- to 10-year-olds

Christopher Erb¹, Jeff Moher², Joo-Hyun Song¹, David Sobel¹

¹Brown University, United States of America; ²Williams College, United States of America; christopher.d.erb@gmail.com

Current models of cognitive control feature two processes that involve distinct types of inhibition: a response threshold adjustment process involving the global inhibition of motor output and a conflict resolution process involving competitive inhibition between co-active response alternatives. We examined the development of these processes in 5-10-year-olds (N = 60) using a reach-tracking version of the flanker task in which participants made responses by reaching to touch response targets on a digital display. We found that two of the measures afforded by reach tracking, initiation time and reach curvature, revealed two different patterns of effects that appear to reflect global and competitive inhibition, respectively. Significant gains in performance were observed across development, particularly between 5- and 6-year-olds. Taken together, these results provide behavioral evidence for the dissociation between global and competitive inhibition. More generally, the findings illustrate the strengths of reach tracking for investigating interactions among perception, cognition, and action.

ID: 473 / PS-II: 75

Poster

Topics: Decision Making and Reasoning, Number, STEM Learning

Relational Reasoning with Fractions Primes Algebraic Modeling

Melissa DeWolf¹, Miriam Bassok², Keith Holyoak¹

¹University of California, Los Angeles, United States of America; ²University of Washington, United States of America; mdewolf@ucla.edu

Previous studies have shown correlational links between performance on relational fractions tasks and basic tests of algebra performance for Pre-Algebra and Algebra I students. The goal of the current study was to identify what aspects of fraction understanding directly affect algebra performance. Pre-Algebra students ($N = 101$) first completed a fractions task focused on either relations or else common procedures. Directly after this, students were given multiplicative comparison statements (e.g., "there are six times as many students as professors") and asked to create either a multiplication algebra equation (requiring only direct translation) or a division algebra equation (requiring modeling, and hence deeper relational understanding). For questions that required students to engage in modeling (division) rather than direct translation (multiplication), performance on the algebraic task was significantly higher for those students who first completed the fraction relations task. Implications for theories of rational number development and instruction will be discussed.

ID: 645 / PS-II: 76

Poster

Topics: Executive Function

Keywords: Executive function

Relations between Executive Functions in Childhood across Multiple Informants

Rachel B. Thibodeau¹, Melissa McInnis Brown², Ansley Tullos Gilpin¹, Caroline Boxmeyer¹, Jason DeCaro¹, John Lochman¹

¹University of Alabama; ²Texas Woman's University; mmcinnis2@twu.edu

Due to declines in academic performance, recent research has aimed to understand the development of cognitive control. Research indicates that in childhood, cognitive processes (i.e., domains of executive function (EF)) are highly integrated and not easily teased apart (Carlson, Moses, & Breton, 2002). The present research extends this research by examining relationships among EF measures across multiple informants. Participants ($N = 357$) ages 3-5 completed a battery of EF measures (i.e., working memory, inhibitory control, attention shift). Teachers also completed the BRIEF-P for each child and parents completed the Child Behavior Scale for their child. As expected, we found positive correlations among the child measures (p 's $< .02$) and positive correlations among the BRIEF-P subscales (p 's $< .03$), but there were no correlations between child, teacher, and parent measures of EF. Results will be discussed in terms of differences between informants and hot and cold measures of EF.

ID: 603 / PS-II: 77

Poster

Topics: Language

Keywords: event cognition, language cognition interface

Relationship between Linguistic and Conceptual Event Roles: A Cross-Linguistic Investigation

Ercenur Unal¹, Frances Wilson², John Trueswell³, Anna Papafragou¹

¹University of Delaware, United States of America; ²Cambridge University; ³University of Pennsylvania; eunal@psych.udel.edu

Prior work has shown that children are biased to express certain event components in speech and these biases persist in non-linguistic tasks. However, much of the empirical evidence on event role prominence comes from English. Here, we test whether the asymmetries in event role prominence generalize to other languages. Twenty-four English-speaking and 24 Turkish-speaking 3-to-4-year-olds saw pictures of caused-motion events in which a person/animal (Agent) used a tool (Instrument) to move an object (Patient) to a destination (Goal). We focused on the three inanimate components. In Experiment 1, children described the pictures. The relative proportion of mention of each component was Patients=Goals>Instruments. In Experiment 2, children saw two versions of a picture flickering, and responded as soon as they detected the changing object. The relative change-detection accuracy for each component was: Patients=Goals>Instruments. These findings offer cross-linguistic evidence for a homology between linguistic event roles and conceptual representations of event components.

ID: 796 / PS-II: 78

Poster

Topics: Infant Cognition, Language, Neuroscience Approaches

Keywords: neuroimaging; audition

Rich Auditory Representations in Cortex Even at 3 Months

Rhodri Cusack¹, Conor J. Wild¹, Annika C. Linke¹, Leire Zubiaurre-Elorza¹, Charlotte Herzmann¹, Hester Duffy¹, Victor K Han², David S.C. Lee²

¹Brain and Mind Institute, Western University, Canada; ²London Health Sciences Centre, London, Canada; rhodri@cusacklab.org

Despite tantalizing glimpses of early selectivity for surprisingly complex sounds, it is not known how auditory representations develop in the first year. Adults process sound through a hierarchy of cortical regions. In infants, we asked how development proceeds: are the basic foundations of simple auditory representations built first before more complex acoustic features are tackled; or do simple and complex representations develop together? To investigate this, we presented infants at 3 and 9 months with

sequences of rich engaging sounds (sung lullabies), while recording brain activity with functional magnetic resonance imaging (fMRI). The lullabies evoked activity across an area of cortex similar to that seen in adults, and critically, showed selectivity for complex as well as simple acoustic features even at 3 months. Furthermore, regions even in the frontal lobe were engaged by the lullabies at 3 months. These results suggest even young infants are developing selectivity for complex sounds.

ID: 647 / PS-II: 79

Poster

Topics: Infant Cognition, Perception

Same visual input, different cognitive outcome: Differences in 5-month-olds' emotion discrimination, but not visual scanning behavior

Kate C. Dixon, Nicholas A. Holt, Janet Woodruff-Broden, Cara H. Cashon

Department of Psychological and Brain Sciences, University of Louisville, United States of America; kate.dixon@louisville.edu

Differences in infants' cognitive processing are thought to be reflected in their visual scanning behaviors. In a study of emotion processing, using habituation only, Bornstein et al. (2011) found that 5-month-olds of clinically depressed mothers did not discriminate emotions, whereas 5-month-olds of non-depressed mothers did. Whether differences in visual exploration also exist is unknown. In the present study, emotion discrimination and scanning behaviors were measured in 5-month-olds using eye-tracking in concert with habituation. Based on mother self report, infants (from the general population) were divided into low and high maternal negative affect groups. We hypothesized that: (1) infants in the low, but not high, maternal negative affect group would show emotion discrimination, and (2) group differences in visual scanning would be found. We found the hypothesized difference in emotion discrimination, but, surprisingly, not scanning. These findings indicate that different cognitive outcomes can emerge from similar visual input.

ID: 465 / PS-II: 80

Poster

Topics: Concepts/Categories, Communication

Keywords: Gesture

Seeing meaning in movement: The development of gesture understanding

Miriam A. Novack, Elizabeth M. Wakefield, Julia Villarreal, Susan Goldin-Meadow

The University of Chicago, United States of America; mnovack1@uchicago.edu

Gestures, hand movements that accompany speech, affect children's learning, memory, and thinking (e.g., Goldin-Meadow, 2010). Yet, it is unknown how children identify movements as gestures, among the myriad of actions they encounter (e.g., object-directed actions, meaningless-movement in the air). In the current study, we asked 4-9-year-olds ($N=86$) to describe one of three scenes: (1) an actor moving objects, (2) an actor moving her hands in the presence of objects (but not touching them) or (3) an actor moving her hands in the absence of objects. Results show that children across all ages describe actions-on-objects in terms of external goals, but children's descriptions of empty-handed actions (i.e., gestures) change across development. With age, children become less likely to describe empty-handed movements as "meaningless movement" and more likely to describe them as "representational action". These findings broaden our understanding of how children process gesture, and movement in general.

ID: 444 / PS-II: 81

Poster

Topics: Attention

Keywords: Lifespan, Cross-Modal Processing

Selective Attention Within and Across Sensory Modalities: A Lifespan Approach

Lisa D. Marsh, Christopher W. Robinson

The Ohio State University, United States of America; robinson.777@osu.edu

The current study examined how auditory and visual distractors affect performance on a visual selective attention task, how these effects change with age, and if variability in resting heart rate predicts attentional control. Using two different flanker tasks, 4-6 year olds, young adults, and 65+ participants had to focus on animals inside a box and press one button if they saw a bird and a different button if they saw a dog. Participants were also instructed to ignore the pictures of animals outside the box (visual condition) or ignore the animal sounds (auditory condition). Results in young adults showed that auditory and visual distractors equally slowed down response times and variability in heart rate predicted the magnitude of this slowdown. Based on auditory dominance in children and increased sensory integration in older adults, it is expected that auditory distractors will be even more distracting early and late in development.

ID: 537 / PS-II: 82

Poster

Topics: Infant Cognition, Social Cognition

Six-month-old infants represent action efficiency on a continuous scale

Shari Liu, Elizabeth S. Spelke

Harvard University, United States of America; shariliu01@g.harvard.edu

In reasoning about agents and their actions, infants apply the principle of efficiency, recovering attention when rational agents take curvilinear paths towards goals when a straight path was available (Csibra et al., 1999). These findings leave open the format of the representation supporting these judgments. The present study explores the hypothesis that cost calculation, beyond discriminating curved from straight trajectories, subserves computations of action efficiency. Six-month-old infants ($n = 33$, planned $N = 40$) were randomly assigned to learn either about a rational agent who pursues goals by circumventing obstacles efficiently, or an irrational agent who performs identical but obstacle-irrelevant actions. Both groups then watched test trials in which the agent followed efficient and inefficient trajectories over a novel, low obstacle. We find that infants selectively recover attention when a rational agent incurs a novel amount of cost, suggesting that a continuous notion of cost supports early action representation.

ID: 806 / PS-II: 83

Poster

Topics: Language

Keywords: gesture, narrative skill

Teachers' Gesture Use Relates to ELLs' Gains in Narrative Language Skill

LaNette Mae Urbin, Perla B. Gámez

Loyola University Chicago, United States of America; lurbin@luc.edu

With the adoption of standards-based practices that call for exposure to and use of high-quality language use in the classroom, there is increased urgency to meet the linguistic needs of the increasingly linguistically-diverse U.S. student population, including English Language Learners (ELLs). The Emergentist Coalition Model specifies that children rely on a "coalition" of cues for language learning, with greater weight on linguistic (e.g., high-quality language) and social (e.g., gestures) cues with age. Thus, the leading hypothesis of this study is that the optimal language learning setting for ELLs is one in which these cues are readily accessed, for example, during shared book reading. Using video-taped observations, teacher's ($N=19$) linguistic and social cues were coded during shared book reading in Spanish. Students' ($N=91$) narrative production and comprehension (English, Spanish) was assessed in the fall and spring. Preliminary results reveal that teachers' gesture use ($M=22.05$; $SD=15.86$), indeed, predicted Spanish narrative comprehension ($p=0.04$).

ID: 763 / PS-II: 84

Poster

Topics: Communication, Culture, Language

The acquisition of flexible word order in 2- and 4-year-old Korean children

Jinhee Park¹, Min Nam², Sook Whan Cho³, Soon Jeong Lee², Jong W Jeong⁴, Letitia Naigles¹

¹University of Connecticut, United States of America; ²Seoul Metropolitan Eunpyeong Hospital, South Korea; ³Sogang University, South Korea; ⁴Korea Institute for Developmental Disabilities, South Korea; jinhee.g.park@gmail.com

English word order stably signals the relations between agents and patients whereas in Korean, multiple word orders are permissible; case markers provide the cues to thematic relations. Act-out paradigms suggest that Korean-learning 3-year-olds understand case-marked SOV sentences but not OSV (Cho, 1981; Chung, 1994). We used Intermodal-Preferential-Looking to compare comprehension of SOV and OSV in monolingual Korean-learning 2-year-olds ($n=11$) and 4-year-olds ($n=13$). Children viewed side-by-side videos showing familiar actions (e.g., A pushes B vs. B pushes A); test sentences followed SOV (A-**Nom** B-**Acc** verb) or OSV (B-**Acc** A-**Nom** verb) order. Baseline trials had no directing audio. Eyegaze to the match was compared for test vs. baseline trials. 4-year-olds demonstrated successful comprehension of SOV; they also differentiated OSV from SOV trials, suggesting attention to case markers. Contrastingly, 2-year-olds looked significantly longer to scenes in which the 1st NP was the agent for both SOV and OSV sentences, suggesting a Subject-first strategy.

ID: 387 / PS-II: 85

Poster

Topics: Language, Word Learning

Keywords: narrative development, temporality, longitudinal study

The construction of temporality in mother-child conversations about past and future events. A longitudinal study.

Alejandra Stein (International Fellow)^{1,2}, Florencia Alam (International Fellow)¹, Celia Rosemberg^{1,2}

¹National Council of Scientific Research (CONICET), Argentine Republic; ²University of Buenos Aires (UBA); alejandrastein@yahoo.com.ar

The study analyzes the construction of temporality in 48 conversations about past and future events that were audioregistered in the homes of 12 middle-income children from Argentina at 2:6 and 3:6 years old. The analysis focused on: the use of temporal terms (TT) used by the children and their mothers, changes in the temporal frame of reference of the events narrated, the establishment of the temporal sequence, the use of evaluative devices that suspend temporal sequence. At 2:6 all the participants used several evaluative devices. Participation in exchanges about past events facilitated the use of TT by the children, while adults used more TT in future accounts. At 3:6 children used a greater quantity and diversity of TT, while their mothers only increased the diversity of temporal vocabulary. Changes in the temporal frame of reference were more frequent in future accounts in the two moments considered.

ID: 550 / PS-II: 86

Poster

Topics: Social Cognition
Keywords: Gender stereotype; Motivation; Intelligence

The development of gender stereotypes about intelligence

Lin Bian¹, Andrei Cimpian¹, Sarah-Jane Leslie²

¹University of Illinois, United States of America; ²Princeton University, United States of America; linbian2@illinois.edu

Current cultural stereotypes portray women as being less intellectually gifted than men (e.g., Stephens-Davidowitz, 2014). Across four studies, we investigated (1) the development of these stereotypes, and (2) their effect on children's activity choices. In Experiments 1 and 2 ($N = 240$), we found that children begin to assimilate the "brilliance = males" stereotypes as early as 6 years of age. Experiments 3 and 4 ($N = 160$) indicated that, as children's endorsement of these stereotypes grows, messages suggesting that certain activities require "smarts" begin to undermine girls' motivation toward these activities. Thus, the negative stereotypes about women's intelligence seem to be assimilated in the early elementary-school years and immediately begin to guide girls' activity choices, leading them to avoid the ones said to require high levels of intelligence. Since many STEM fields are portrayed precisely in these terms, this research provides new clues concerning women's underrepresentation in these fields.

ID: 481 / PS-II: 87

Poster

Topics: Comparative Cognition, Culture, Social Cognition

The development of ownership understanding in small-scale societies

Patricia Kanngiesser¹, Federico Rossano¹, Henriette Zeidler¹, Daniel Haun², Michael Tomasello¹

¹Max Planck Institute for Evolutionary Anthropology, Germany; ²Universität Leipzig, Germany; kanngiesser@eva.mpg.de

Norms of ownership play an important role in social interactions and reasoning. In a series of studies we investigated the development of ownership reasoning and behavior in children from non-industrialized populations with few personal possessions. We studied five- to nine-year-old Kikuyu children's ($N=112$) ownership reasoning when observing third party interactions. Kikuyu children used first possession as an ownership cue much later than their Western peers. Next, we focused on respect for first possession in dyadic peer interactions in 109 five- to seven-year-old children from three small-scale cultures (Akhoe Hai|om, Kikuyu, Wichi). Children respected the peer-partners' ownership of marbles in a game - irrespective of whether the partner was present or absent. Taken together, children growing up in diverse socio-cultural environments show respect for possession in their social interactions with peers but apply this reasoning to third parties later than Western children.

ID: 654 / PS-II: 88

Poster

Topics: Language, Word Learning

The development of young children's abilities to understand the nature of foreign language words

Hyuna Lee, Eun Young Kim, Hyun-joo Song

Yonsei University, Korea, Republic of (South Korea); lovehyuna@gmail.com

The current research explored the developmental trajectory of monolingual children's knowledge about the nature of foreign language words. We tested 2- to 4-year-old Korean children unfamiliar with English. First, a Korean speaker taught them a novel label, 'toru' referring to an object. Then the children were presented with two objects, the *toru* and a novel object. When the Korean speaker asked children to find a referent of another novel label, 'somppi', they chose the novel object, which suggests that they used mutual exclusivity. When an English speaker asked children to find the object for a novel English label, 'fep', 2-year-old children selected the novel object. In contrast, 3- to 4-year-old did not show systematic responses, suggesting their understanding that the English-speaker may not know Korean words. The results suggest that the metalinguistic knowledge that labels are not conventionally shared across different languages develops between ages 2 and 3 years.

ID: 764 / PS-II: 89

Poster

Topics: Culture, Moral Cognition

The Effect of Collaboration on Children's Aversion to Inequity

John Corbit¹, Peter Blake², Tara Callaghan³, Katherine McAuliffe^{4,5}, Felix Warneken⁶

¹Simon Fraser University, Department of Psychology; ²Boston University, Department of Psychological & Brain Sciences; ³St. Francis Xavier, Department of Psychology; ⁴Yale University, Department of Psychology; ⁵Boston College, Department of Psychology; ⁶Harvard University, Department of Psychology; johncorbit@gmail.com

Children across societies reject resource allocations that disadvantage them relative to a peer (disadvantageous inequity aversion; DI). In certain societies, older children also reject advantageous allocations (advantageous inequity aversion; AI). Alongside work on inequity aversion, research demonstrates that collaboration increases equal sharing in children. To date, no work has united these two lines of inquiry and it is thus unknown whether collaboration influences inequity aversion. Here we investigated this question in 7- to 12-year-old children from rural India, a population that has shown aversion to DI but not AI. Pairs of children worked either collaboratively or in parallel obtaining candy that was then distributed in an inequity game. Children showed DI regardless of how resources were obtained. However, older children demonstrated an aversion to AI after collaboration but not after parallel work. These results show that collaboration can induce a willingness to sacrifice an advantage in order to achieve equality.

ID: 511 / PS-II: 90

Poster

Topics: Decision Making and Reasoning, Media and Technology

Keywords: Fantasy-Reality Judgments

The Effect of Medium on Children's Ability to Learn About and Judge the Reality Status of a Novel Animal

Michelle R. Jackson^{1,2}, Jacqueline D. Woolley²

¹University of Louisville, United States of America; ²University of Texas at Austin, United States of America;
michelle.jackson@louisville.edu

Previous research has examined children's fantasy-reality judgments (e.g. Woolley, 1997), children's ability to learn from books (e.g. Woolley & Cox, 2007), and from TV (Wright et. al. 1994). However, few studies have addressed both children's learning and fantasy-reality judgments or compared the effects of different media on children's learning.

In the present study, 64 children ages four to seven were read a book or watched a TV show created from the same script about a novel animal. The children were asked to recall facts about the animal and to make a fantasy-reality judgment about the animal. Results demonstrated that children who were read the book recalled more facts than children who watched the TV show and that children were more likely to say the animal was real when they heard about it on TV. Implications for education, advertising, and law will be discussed.

ID: 503 / PS-II: 91

Poster

Topics: Concepts/Categories, Social Cognition

The Effect of Target Trait Information on Children's Self-Evaluations following Social Comparison

Candace Lapan (Diversity Fellow), Janet J. Boseovski, Carmin Ball

University of North Carolina at Greensboro, United States of America; calapan@uncg.edu

Preschoolers often make trait judgments about others (Heyman & Gelman, 1999). Less is known about self-evaluative judgments, which differ because they have affective consequences (Dweck, 2002). We assessed 5- to 6-year-olds' and 9- to 10-year-olds' reasoning about others' traits in a self-evaluative context. Sixty-two children completed an intelligence task, received predetermined feedback that they were outperformed by a target child, and rated their feelings about their own performance. Targets were labeled with traits varying in relevance to task performance (e.g., athletic vs. smart) and valence (i.e., positive vs. negative). When outperformed by "athletic" or "not athletic" targets, all age groups felt similarly positive about their performance, p 's > .10. However, older children felt worse than younger children when they were outperformed by "smart" targets and even worse when outperformed by "not smart" targets, p 's < .05. These results indicate that, by late childhood, children consider others' traits in self-evaluative contexts.

ID: 403 / PS-II: 92

Poster

Topics: Reading

Keywords: Learning, Narratives

The Effects of Character-Similarity on Identification and Learning from a Narrative

Rebecca Ansley Dore^{1,2}

¹University of Virginia, United States of America; ²University of Delaware; rebeccadore@virginia.edu

When identifying with a character, one experiences the narrative from the character's perspective. Researchers have suggested that a character's similarity to the audience member should be related to identification. Additionally, higher identification may lead to more learning from a narrative. These two proposed links, between character similarity and identification, and between identification and learning, suggest that children may learn more from narratives with characters who are similar to them than from narratives with dissimilar characters. This study used racial similarity to examine this possibility. Results showed that White children were more likely to identify with own-race characters than with other-race characters and freely recalled more information from stories with own-race characters. However, White children did not learn more from stories with own-race characters when knowledge was probed via specific questions. These findings inform our understanding of the nature and effects of children's identification with own- and other-race characters.

ID: 419 / PS-II: 93

Poster

Topics: Communication, Infant Cognition, Language

The effects of pointing experience on infants' language development: A potential neural correlate

Virginia Charlotte Salo¹, Meredith Rowe², Nathan Fox¹

¹University of Maryland, College Park, United States of America; ²Harvard University, Graduate School of Education;
vcshalo@umd.edu

We are examining the neural correlates of pointing and links to experience and language development. EEG activity in the mu rhythm band is measured while 10- to 12-month-old infants watch an experimenter execute pointing gestures. Ability to point and receptive vocabulary are also measured. Pilot data show that mu rhythm activity changes during observation of pointing gestures. Infants and their parents are then randomized to either an intervention group, in which parents receive training intended to increase their use of pointing gestures over the next month, or to a control group. Infant assessment is repeated following the intervention

period, and vocabulary is again measured one month after the training period ends. Analyses compare the two groups to determine whether training influences infant pointing and/or mu rhythm activity. We also examine the extent to which parent training, infants' pointing, and mu rhythm activity predict growth in vocabulary.

ID: 480 / PS-II: 94

Poster

Topics: Language, Spatial Cognition

The Effects of Spatial Location Coding on Word Learning

Megan G. Lorenz^{1,3}, **John P. Spencer**^{2,3}, **Larissa K. Samuelson**^{2,3}

¹Department of Psychological & Brain Sciences, University of Iowa, United States of America; ²School of Psychology, University of East Anglia, United Kingdom; ³DeLTA Center, University of Iowa, United States of America; megan-lorenz@uiowa.edu

How spatial information is encoded changes in the second and third years, when children are also learning words rapidly. To examine the role of spatial coding in word learning, thirty 18- to 35-month-old children saw novel objects always presented in distinct spatial locations on a table. They then switched sides of the table before an experimenter pointed to where one of the objects had been and repeated a label. Children were later asked to find the referent of the provided word. To index children's encoding of spatial information they searched for hidden objects in a sandbox both with and without allocentric cues available. Children who resolved referential ambiguity via allocentric cues made larger errors without those cues in the sandbox task, whereas those who relied on egocentric cues made equally-sized errors in all conditions. This suggests development of spatial memory and use of spatial cues in word learning are tightly linked.

ID: 605 / PS-II: 95

Poster

Topics: Infant Cognition, Spatial Cognition

The ratio and orientation effect in infants' and adults' speed discrimination

Ruizhe Liu¹, **Wenke Möhring**², **Melissa Libertus**¹

¹University of Pittsburgh, United States of America; ²University of Fribourg, Switzerland; 1987.rachel@gmail.com

Previous research has shown that adults' speed discrimination of moving patterns does not differ between orientations. Here, we examined whether adults' speed discrimination of a single object differed between vertical and oblique orientations and whether there are developmental changes between infancy and adulthood. A habituation paradigm was used to measure 6-month-olds' ability ($N = 90$) to discriminate speeds that differed by either a 1:2- or 2:3-ratio. Forty-six adults were tested on a speed discrimination task in which speeds differed between 1:3 to 15:16. Both infants and adults showed better differentiation for easier than harder ratios. Orientation did not affect infants' speed discrimination. However, adults showed better discrimination of harder ratios in the oblique than in the vertical orientation. Our findings suggest that orientation affects adults' speed discrimination of a single object and patterns differently. Furthermore, the orientation effect seems to emerge with age.

ID: 802 / PS-II: 96

Poster

Topics: Attention, Executive Function, Memory

The relation between lab-based and classroom-based measures of executive function in kindergarten students

Sammy F. Ahmed¹, **Nicholas E. Waters**¹, **Sarah M. Stilwell**¹, **Zachary B. Salander**¹, **Benjamin Katz**¹, **Jennie K Grammer**², **Frederick J. Morrison**¹

¹University of Michigan, United States of America; ²University of California, Los Angeles; sammyfa@umich.edu

Researchers from different disciplines have relied on multiple techniques when studying executive function (EF). However, it remains unclear whether these distinct assessments tap into the same underlying construct in children. We assessed 81 kindergarteners ($m_{age}=5.9$ years) using 3 group classroom-based and 3 single-participant lab-based measurements of EF, intended to capture working memory, attentional control and response inhibition. Results indicate that lab-based measures of working memory (digit span backward, $r=.32$, $p=.022$) attentional control (pair cancellation, $r=.39$, $p=.004$) and response inhibition (Head Toes Knees Shoulders, $r=.28$, $p=.046$) were related to classroom assessments of similar constructs. Additionally, results showed associations among the lab-based measures but no relations among classroom-based measures, suggesting that the lab-based measures constitute a more global construct. In contrast, the classroom-based measures show distinct differentiation across components of EF. These results suggest that classroom-based assessments might prove to be a more sensitive measure of EF at this age.

ID: 653 / PS-II: 97

Poster

Topics: Number

The relationship between diminished marginal utility and numeric processing in childhood

Karina Hamamouche, **Sara Cordes**

Boston College; hamamouc@bc.edu

Recent research has shown that adults' rate of Diminished Marginal Utility (DMU), their tendency to value each additional resource less than the last (i.e., each additional dollar provides less value than the preceding dollar), is predicted by their ability to

symbolically map numbers on a number line (Schley & Peters, 2014). Yet, the relationship between children's valuation and numerical abilities remains an open question. Given that children's numerical abilities undergo dramatic changes during childhood, particularly on symbolic mapping tasks, it is expected that children may demonstrate significantly more DMU than adult counterparts. This study aims to investigate how children's valuation of additional resources (favorable stickers) relates to their numerical abilities. Findings reveal that 6-7 year old children exhibit DMU similar to their adult counterparts, and that their rate of DMU is also related to performance on numerical tasks suggesting that, like adults, children's symbolic numerical abilities predict their valuations of a resource.

ID: 323 / PS-II: 98

Poster

Topics: Executive Function, Social Cognition

The Role of Executive Function (EF) in the Development of Social Competence

Jessica S. Caporaso, Stuart Marcovitch, Janet J. Boseovski

University of North Carolina- Greensboro, United States of America; jlstark@uncg.edu

Responding to difficult social situations, such as peer provocation and rejection, is important to the development of social competence in preschoolers. The current study explored how components of EF related to social competence. Thirty-two children ($M = 58.4$ months; $s = 6.3$) completed the Challenging Situations Task (CST; Denham & Buril, 1994) which presents peer provocation/rejection scenarios. Aggressive responding was related to working memory ($r = -0.4$, $p = .02$), as measured by the Visual Counting Span task (Case, Kurland & Goldberg, 1982), and response inhibition ($r = 0.36$, $p = .04$), as measured by the Happy/Sad Stroop task (Lagattuta, Sayfan, & Monsour, 2011). Competent responding was also related to working memory ($r = 0.55$, $p = .001$). Cognitive flexibility, as measured by the DCCS-Borders (Zelazo, 2006), was not related to any social competence measure. These results highlight which specific executive function abilities may be contributing to developing social competence.

ID: 584 / PS-II: 99

Poster

Topics: Social Cognition, Social Learning, Theory of Mind

Keywords: Theory of Mind, social cognition, youth

The Social Context of Advanced Theory of Mind in Adolescence: The Role of Friendship Style, Age, and Gender

Sandra Leanne Bosacki¹, Marta Bialecka-Pikul², Anna Kołodziejczyk³

¹Brock University, Canada; ²Jagiellonian University, Poland; ³Jagiellonian University, Poland; sandra.bosacki@brocku.ca

Emerging adolescence is a key transition period for self-identity, intellect, physical maturation, and social behaviors (Siegel, 2013). Theory of Mind (ToM) is the ability to infer others' mental states within social action. We explored the role peer friendship-style plays in the development of cognitive and affective ToM. Three hundred and twenty-five 13-year-old ($M=13$ year 1 months, 73 girls, $N=151$) and 16-year-old Polish adolescents ($M=16$ year 2 months; 132 girls, $N=174$) completed cognitive and affective ToM and language tasks, and self-reports of friendship style. Results found significant gender and age differences in ToM scores and perceived friendship style. Older females scored higher than younger and older males on affective ToM and perceptions of friendship. Results suggest that the affiliative and communicative dimensions of friendship played a significant role in young people's ToM development. Implications for theory, research, and education on the promotion of social skills within adolescence are discussed.

ID: 591 / PS-II: 100

Poster

Topics: Executive Function, Memory, Spatial Cognition

Keywords: working memory, children

The Structure of Working Memory in Young Children with Typical Development

Shelley I Gray¹, Samuel B Green¹, Mary Alt², Tiffany P Hogan³, Shara Brinkley¹, Nelson Cowan⁴

¹Arizona State University, United States of America; ²University of Arizona, United States of America; ³Massachusetts General Hospital Institute of Health Professions; ⁴University of Missouri - Columbia; Shelley.Gray@asu.edu

Prominent theories of working memory differ on whether working memory can be divided into domain-specific components with unique processing and storage capabilities, or whether working memory is part of a less modular system based on attention. Theories of development and its disorders depend on which model accounts for individual differences. We inform this theoretical debate with a sample of 168 typically-developing 2nd grade children taking an extensive battery of 18 computer-based tests covering phonological and spatial storage, processing, and cross-modal binding. We fit the data to four structural equation models differing in the number of separate working memory factors. The best-fitting model was a bifactor model with a central executive factor accounting for covariance among all items in the model and two additional subfactors that reflected phonological and non-phonological (visual and semantic) storage. These results suggest conceptual revisions that may help to bring the modular and non-modular approaches closer together.

ID: 329 / PS-II: 101

Poster

Topics: Decision Making and Reasoning, Media and Technology, STEM Learning
Keywords: causal reasoning, scientific reasoning

Thinking about play: spontaneous experiments and verbal scientific reasoning

Audrey Ksenia Kittredge¹, David Klahr¹, Kevin Willows²

¹Carnegie Mellon University; ²Synaptek Research; audreyk@andrew.cmu.edu

Preschoolers spontaneously experiment during free play (Cook, Goodman, & Schulz, 2011), and, when queried, demonstrate learning from these experiments (Bonawitz, van Schijndel, Friel, & Schulz, 2012). However, whether children would choose to articulate hypotheses for such experiments, or what they learned from them, remains unknown. In Experiment 1 (n=52), 4-6-year-olds played with blocks that activated a “machine” (cf. Cook *et al.*, 2011) on a touchscreen-tablet. Many children (69%) generated controlled experiments, disambiguating cause-effect relationships, and 50% of these children described their discoveries given open-ended questions after play (e.g. “what did you find out...?”). In Experiment 2 (ongoing), we asked 4-6-year-olds what they wanted to find out (n=13) or do (n=13) *during* their play. Although only 8% mentioned desires to perform causally informative actions, 31% wanted to understand cause-effect relationships. This suggests that young children can appreciate and articulate the significance of causal hypotheses and discoveries during their play.

ID: 776 / PS-II: 102

Poster

Topics: Social Cognition

Keywords: dominance, selective play, selective helping

Toddlers' selective social behavior towards high-status individuals

Amanda Mae Woodward, Emma G. Larson, Jenna S. Sheldon, Brandon F. Terrizzi, Jonathan S. Beier

University of Maryland, College Park, United States of America; amwoodwa@umd.edu

Social dominance relations strongly influence interactions between individuals. Recently, developmental research has demonstrated that human infants identify those with social power and expect dominant individuals to prevail in ongoing and future interactions with subordinates (Thomsen *et al.*, 2011; Mascaro & Csibra, 2012). Preschoolers can also label who is “in charge” after viewing a social interaction (Brey & Shutts, 2014; Over & Carpenter, 2014). The present study investigates whether these early representations of social dominance inform children's own social behaviors. Twenty-three 2-year-old children watched one live actor repeatedly demonstrate social power over another. When both actors reached for the same object, children's selective helping did not favor the dominant individual (15 of 23, $p = .21$). However, a significant majority of children later chose to play with the dominant individual (17 of 21, $p = .007$). Ongoing research further explores selectivity in children's behavior toward actors of varying social power.

ID: 315 / PS-II: 103

Poster

Topics: Concepts/Categories, Language, Social Learning

Keywords: prospection

Training children's prospective abilities through future-oriented conversation

Nadia Chernyak^{1,3}, Kathryn A. Leech^{2,3}, Meredith Rowe³

¹Cognitive, Linguistic, & Psychological Sciences, Brown University; ²Department of Human Development and Quantitative Methodology, University of Maryland; ³Harvard Graduate School of Education; chernyak@bu.edu

The ability to think about and behave on behalf of one's future self is critical to planning, self-control, and goal attainment. Prior work has found that prospective abilities develop rapidly during early childhood, but the mechanisms that develop these abilities are not well understood. Here we explored how future-oriented talk shapes children's prospective abilities. Preschoolers ($N=56$) engaged in a brief training session in which they were asked to think and talk about either the immediate future, immediate past, distant future, or present. Immediately following, children were assessed on a series of cognitive (mental time travel, mental time line) and behavioral (delay of gratification, prospective memory) prospection tasks. Training children to think about their immediate futures improved performance on the mental time travel and prospective memory tasks. Our results suggest a role of social context in the development of children's prospective abilities.

ID: 581 / PS-II: 104

Poster

Topics: Memory

Transforming experience into knowledge: Comparing the status of self-generated versus explicitly learned knowledge

Nicole Leigh Varga, Amanda Broyles, Rebekah Ann Stewart, Patricia J Bauer

Emory University, United States of America; nvarga@emory.edu

A striking feature of our store of knowledge about the world—so-called *semantic memory*—is that it is productive. That is, new content can be entered into semantic memory not only through direct experience, but also through self-generation resulting from integration of information acquired across separate learning episodes. The present research was an investigation of whether the long-term status of knowledge differs as a function of the source through which it was acquired. Five-year-old children were read episodically rich passages featuring novel facts that were either explicitly stated or that could be self-generated through cross-episode integration. Children retained the factual knowledge equally well over 1 week regardless of how it was acquired. However, when memory for the initial learning episodes was assessed, conceptual knowledge remained significantly more associated with

the episodes in the self-generation condition. The findings have implications for our understanding of how experience is transformed into enduring knowledge.

ID: 752 / PS-II: 105

Poster

Topics: Concepts/Categories, Computational Approaches, Decision Making and Reasoning

Keywords: active inquiry, question asking

Understanding developmental bottlenecks in active inquiry

George Kachergis, Marjorie Rhodes, Todd Gureckis

New York University, United States of America; george.kachergis@nyu.edu

This project explores how the ability to ask informative questions changes during development. We hypothesized an intrinsic link between the ability to update beliefs given evidence and the ability to ask informative questions. To study the developmental trajectory of this behavior, five to ten-year-old children played an iPad game asking them to identify a hidden bug. Learners could either ask about individual bugs, or make a series of feature queries (e.g., "Does the hidden bug have antenna?") that more efficiently narrow the hypothesis space. The iPad display either assisted children with updating their beliefs or required them to update themselves. We analyze the relationship between belief updating and information seeking behavior as a function of age, along with how their strategies for acquiring information change. The broader context of the work is to better understand how to structure informal science exhibits in ways that are developmentally appropriate.

ID: 498 / PS-II: 106

Poster

Topics: Social Cognition, Social Learning

Ways of Knowing: Investigating the epistemic aspect of selective trust

Asheley R. Landrum¹, Adam Bamforth², Patrick Shafto³

¹University of Pennsylvania, United States of America; ²University of Louisville, United States of America; ³Rutgers University--Newark, United States of America; LandrumAR@gmail.com

Knowing *whom* to trust involves knowing *why* we should trust. We investigate children's trust in informants who vary by how their knowledge was acquired: first-hand perceptual experience (i.e., "perception"), testimony from others (i.e., "testimony") and inference based on prior knowledge (i.e., "reason"). In three within-subjects conditions, children and adults choose which of a pair of informants (Perception vs. Testimony, Perception vs. Reason, and Reason vs. Testimony) was likely providing accurate information and which one was likely to have more knowledge. Whereas adults prioritized perception over reason over testimony, only about 20% of children demonstrated this pattern. Moreover, only 52% of 6.5-year-olds* and 28% of 4.5-year-olds prioritized perception and 44% of 6.5-year-olds* and 40% of 4.5-year-olds* ranked testimony as the least desirable (* indicates significance). Thus, although children's *selective* trust is relatively mature by the onset of schooling, *epistemic* trust continues to develop through the early school years.

ID: 386 / PS-II: 107

Poster

Topics: Memory

When Delays Improve Memory: Stabilizing Memory in Children May Require Time

Kevin Patrick Darby

The Ohio State University, United States of America; darby.60@osu.edu

Memory is crucial to cognitive development, but in some situations learning new information can interfere with memory for previous learning, a phenomenon known as retroactive interference. Recent work suggests that children are vulnerable to catastrophic levels of retroactive interference when memory is tested immediately after learning overlapping sets of information in a paired associate learning task (Darby & Sloutsky, 2015). In the current task, children learned a set of contingencies in Phase 1, learned a new set with an overlapping stimulus structure in Phase 2, and re-learned the first set of contingencies in Phase 3. When Phase 3 was presented immediately following Phase 2, children demonstrated catastrophic interference, but introducing a 48h delay between Phases 2 and 3 eliminated interference and improved children's memory. This suggests a powerful role of consolidation processes in stabilizing children's memory structures across time and protecting information from interference.

ID: 518 / PS-II: 108

Poster

Topics: Concepts/Categories

Why is she sick? Prompting preschoolers to provide explanations during storybook reading increases causal learning about illness.

Katy-Ann Blacker, Elizabeth Bonawitz, Vanessa LoBue

Rutgers University, United States of America; blacker.katvann@gmail.com

Self-explanation may improve conceptual understanding (Lombrozo, in press): generating explanations is correlated with causal learning in early childhood (Lombrozo, Legare, & Gopnik, 2014) and prompting preschoolers to provide explanations influences categorical inferences (Walker, Lombrozo, Legare & Gopnik, 2014). Does explanation promote learning in domains where children have richer prior knowledge? The current study examines whether asking preschoolers to explain events improves their causal

reasoning about illness and contagion. Children were read a storybook about a character who plays with a sick child and subsequently wakes up sick the next day. They were prompted to provide explanations (N=10) or descriptions (N=10) of the events in the story, but were provided no feedback. We then assessed children's inferences on a novel task about illness transmission. Preliminary results reveal that children in the storybook-explanation condition outperform the control group, suggesting that explanation helps children learn more about illness generally.

ID: 578 / PS-II: 109

Poster

Topics: Decision Making and Reasoning, Number

Keywords: probability, proportion, sampling

Young children's use of proportions in making statistical inferences

Wen-Chi Chiang, Kai-Nan Chen, He-Rui Chen

National Chung Cheng University, Taiwan, Republic of China; psywcc@ccu.edu.tw

Earlier studies have found that children possess a limited understanding of proportions, and some suggested that this understanding undergoes a qualitative change and reaches maturity late. For instance, one study showed that preschoolers solved proportion-judgment problems by comparing the (target vs. nontarget) part-part relations, not by comparing proportions. However, several recent studies have demonstrated that even young infants can infer which of two populations is the more probable source of a known sample based on the proportion relations, indicating that statistical inferences may constitute a reasoning context more sensitive to children's use of proportions. The current study used scenarios involving lottery machines and found that: Young children use proportions per se to infer from a sample to the causally related population, but their performance is negatively influenced if scenarios solvable by comparing the target-type quantities are given first, suggesting that processing of numerical quantities sometimes interfere their processing of proportions.

ID: 342 / PS-II: 110

Poster

Topics: Infant Cognition, Social Cognition

"He seems a little bit jealous." "Yeah and doesn't look like he's happy." School-Age Friends' Fictional Narratives about Interpersonal Rivalry

Jessica Kay Fritzier, Nick Lewan, Naomi Aldrich

Grand Valley State University, United States of America; fritzej@mail.gvsu.edu

Relationship-dependent differences in children's emotion language may reflect distinctive social processes within socio-cognitive development. Unlike parental-socialization models, early adolescents' criticisms of same-sex friends' emotions do not deter their peers' subsequent emotional discourse about conflict. Extending this research, we examined 6-to-8-year-olds' responses to a peer's emotional discourse within mixed-sex and same-sex dyads. 144 children were tested for emotion knowledge and co-narrated a story about an aggressive, jealous frog which was coded for responses (supportive, dismissive, neutral) to their peer's use of emotion terms. While dyads did not differ in emotion terms or knowledge, girl-girl and girl-boy dyads included more supportive responses than boy-boy dyads. Our findings emphasize the need for further investigations of peer influences on discourse about rivalry at ages when children increasingly rely on friendships as opportunities for emotional disclosure.

ID: 765 / PS-II: 111

Poster

Topics: Culture, Moral Cognition, Social Learning

Keywords: Mother-child interaction, parental socialization goals, personal storytelling

"I want her to learn about life": Mexican- and European-heritage parents' beliefs about children's learning from personal stories

Graciela Solis, Maureen Callanan

University of Santa Cruz, California, United States of America; gsolis2@ucsc.edu

Cultural variations in parents' elaborativeness with children has been attributed to socialization goals and parental beliefs (Wang & Fivush, 2004). This study's goal was to uncover parental beliefs about personal storytelling within US Mexican-heritage and European-heritage families. We found that Mexican-heritage parents were more likely to share parents' experiences whereas European-heritage parents were more likely to share jointly-shared experiences. Additionally, European-heritage parents reported that they were more likely to avoid telling stories about topics such as death, while Mexican-heritage were more likely to report that no topics are inappropriate. With regard to their goals for sharing stories, European-heritage parents were more likely to report academic learning, distraction, or fun, while Mexican-heritage parents were more likely to report the goal of telling stories as being about children's morality or teaching life lessons. These findings are discussed in relation to understanding different socialization goals when examining elaborativeness in diverse cultural communities.

ID: 566 / PS-II: 112

Poster

Topics: Communication, Language, Word Learning

Keywords: conventionality, young children

"Let's make up a name!" Do young children expect all labels to be conventional?

Begum Ozdemir, Patricia A. Ganea

University of Toronto, Canada; begum.ozdemir@mail.utoronto.ca

Young children expect speakers of their language to refer to an object using a conventional label. We examined whether children's expectation depends on the label type: conventional label vs made-up label. Seventy-three children aged 2 to 4.5 years were shown two novel objects one of which was labelled. Then, a second speaker asked the child to point to the referent of a novel label. We used a 2 x 2 design with Label type (Conventional vs Made-up) and Presence of the second speaker (Absent vs Present) as variables. The total number of correct responses across 2 trials was scored. A 2 (Label type) x 2 (Presence) ANOVA showed a significant main effect of label type ($p=.02$). There was no effect of speaker presence ($p=.07$) and no interaction. These findings indicate that children do not extend made-up labels to other speakers as they do with conventional ones.

ID: 464 / PS-II: 113

Poster

Topics: Concepts/Categories

Children's simultaneous cross-classification of toys

Helana Girgis¹, Rebecca Bauer², Simone P. Nguyen²

¹University of Arkansas, United States of America; ²University of North Carolina Wilmington, United States of America; hgirgis@stlawu.edu

Children commonly encounter a variety of items that can be cross-classified into more than one category, yet there is little research on children's simultaneous cross-classification, which is the ability to cross-classify an item into two categories at the same time. Two studies investigated simultaneous cross-classification in 4-year-olds, 5-year-olds, and adults ($N = 102$) by asking participants to apply single or dual category labels and properties to different types of toys (e.g., anthropomorphic, control). The results of both studies indicated that 4- and 5-year-olds and adults favor joint category labels as well as dual properties for toys that represent two categories (e.g., toaster with eyes). In contrast, 4- and 5-year-olds and adults favored single category labels as well as single properties for toys that represent only one category (e.g., ball). These results have implications for conceptual development, including conceptual flexibility and identity understanding.

ID: 714 / PS-II: 114

Poster

Topics: Language, Word Learning

You say apple, I say manzana: Overlap in English- and Spanish-learning children's early vocabularies

Emily Ellen Russell¹, Christina Schonberg (Diversity Fellow)²

¹CSUN, United States of America; ²UCLA, United States of America; emily.russell@csun.edu

We classified the nouns on the Spanish MCDI to explore the content of Spanish-learning children's early vocabularies. 28 Spanish-fluent undergraduates rated the nouns on the Spanish MCDI according to their referents' similarity in shape, material, and color; 21 English-fluent undergraduates did the same for the English MCDI. Preliminary results indicate that the Spanish MCDI contains more nouns referring to entities similar in shape than texture or color; the Spanish MCDI also contains more nouns referring to entities similar in shape than the English MCDI. There are also between-subject differences in ratings of translation equivalents on the Spanish and English MCDIs, which will be explored in a within-subjects follow-up study. Differences between our findings and those of similar previous research (Hahn & Cantrell, 2012; Samuelson & Smith, 1999) will be discussed in the poster, as will their implications for the use of adult ratings to classify the nouns children know.

ID: 715 / PS-II: 115

Poster

Topics: Communication, Language, Word Learning

Children's linguistic background and their ability to learn labels for objects from complex categories

Emily Ellen Russell¹, Christina Schonberg (Diversity Fellow)²

¹CSUN, United States of America; ²UCLA, United States of America; emily.russell@csun.edu

English-monolingual children frequently generalize novel objects' labels by shape (Landau, Smith, Jones, 1988) whereas Spanish-monolingual children generalize novel objects' labels by various perceptual features (Hahn & Cantrell, 2012). The current study tests if the combination of knowing a less shape-biased language (Spanish) and the flexibility of bilingualism (Bialystok & Martin, 2004) helps English-Spanish bilingual children override the shape-biased nature of their other language (English) to attend to multiple features in label-learning contexts. We are comparing English-monolingual, Spanish-monolingual, and English-Spanish bilingual children's ability to learn objects for complex categories organized by multiple perceptual features (e.g., shape and color, color and material). Trends in pilot data suggest that children's label-learning ability differs according to their linguistic background and the perceptual organization of the category. Results and their implications for mechanisms of vocabulary acquisition for non-English monolingual children and the cognitive benefits of bilingualism will be discussed in the poster.

ID: 707 / PS-II: 116

Poster

Topics: Infant Cognition, Language, Word Learning

The Effects of Parents' Conversational Styles on Early Disambiguation

Denitza Petio Dramkin, Crystal D. Tran, Hanako Yoshida

University of Houston, Cognitive Development Lab, United States of America; ddramkin@gmail.com

Parental-input provides a strong foundation for attention and learning that is critical for language acquisition, yet how parental-input shapes a child's linguistic and cognitive experience is not fully understood. The present study specifically explores how parents' talking about objects influences children's interpretation of novel object-novel label relation—known as disambiguation—by testing twenty 15- to 25-month-olds in two tasks: a disambiguation task, in which infants' eye-gazes (frequency and duration) were measured for novel target object selection when presented with a novel label; and a joint picture-viewing task in which parents were instructed to talk about 20 consecutive pictures, with parents' speech analyzed for the words (e.g., type, token) and phrases (descriptive v. questioning) used. Results demonstrate that question-based parental-input significantly predicts children's disambiguation, regardless of age. As such, these findings are among the first to demonstrate how parents' conversational styles impact the attentional biases relevant to language learning.

ID: 756 / PS-II: 117

Poster

Topics: Infant Cognition, Media and Technology, Social Cognition

Keywords: music

For five-month-old infants, melodies are social

Samuel A Mehr^{1,2}, Lee Ann Song², Elizabeth S Spelke²

¹Graduate School of Education, Harvard University; ²Department of Psychology, Harvard University; sam@wjh.harvard.edu

Five-month-old infants listened to one of two novel songs with identical lyrics, but different melodies, by one of three methods: sung by a parent, emanating from a stuffed animal, or sung by an experimenter via interactive video. Following 1-2 weeks' exposure, we tested infants' selective attention to a novel individual after she sang the familiar song, relative to another individual who sang the other song, which was unfamiliar to the infant. Infants exposed to their parent's singing displayed an attentional preference for the singer of the familiar song, and the size of that preference was predictable from infants' degree of exposure to the song. Neither effect was observed after song exposure from a toy or interactive video, despite infants' memory for the song in those conditions after an average delay of 8.6 months. These results suggest that live song carries social meaning for infants, informing theories of music's psychological functions.

ID: 519 / PS-II: 118

Poster

Topics: Language, Reading

Children's spontaneous representation of space and goal information when listening to narratives

Angela Nyhout, Daniela O'Neill

University of Waterloo, Canada; aknyhout@uwaterloo.ca

Six- through 8-year-olds ($N = 89$) listened to a series of 18 short stories presented through computer speakers – clicking after each sentence to advance through each story. In the latter half of the stories, a sentence was consistent or inconsistent with earlier stated information pertaining to either the spatial layout or goal fabric of the narrative. We hypothesized that children's processing times (PTs; the time from the end of the sentence to the child's click) would be slower on critical sentences that were inconsistent rather than consistent with the earlier stated information, despite being identical otherwise. This was the case: children' PTs for inconsistent critical sentences were significantly slower than for consistent ones, $F(1, 86) = 8.80, p = .004$. There was no difference between space and goal narratives. These results strongly support the spontaneous, online representation of spatial and goal information by children during narrative processing.

[Single Presentation of ID 810]

Time: Saturday, 10/Oct/2015: 9:00am - 10:15am · *Location:* George Bellows DEF
Session Chair: Lisa Michelle Oakes, University of California, Davis

ID: 810 / [Single Presentation of ID 810]: 1
Plenary Address

Plenary Address by Janet Werker: Critical Periods in Speech Perception Development

Janet F Werker

University of British Columbia, Canada; jwerker@psych.ubc.ca

The process of language acquisition begins in perceptual development long before infants produce or even understand, their first words. In this talk, I will review the rapid changes in auditory, visual, and multimodal speech perception that occur in the first months of life as infants establish a foundation for language acquisition. I will then present evidence that, while under typical circumstances the timing of perceptual attunement seems to be constrained by maturation, there are identifiable variations in experiences that can accelerate, slow down, or modify this developmental trajectory. Finally, I will introduce new questions about whether or studies to date on the timing of plasticity have considered all the relevant input systems. The implications of these findings for better understanding language development in both typically developing and atypical populations will be considered.

[Single Presentation of ID 812]

Time: Saturday, 10/Oct/2015: 10:30am - 12:00pm · Location: George Bellows DEF
Session Chair: David Uttal, Northwestern University

ID: 812

PlenarySymposium

Plenary Symposium: Living in Pasteur's Quadrant: Four examples of advancing cognitive development by researching real educational problems

Chair(s): **David Uttal** (Northwestern University)

Pasteur's Quadrant refers to the synthesis that can arise from focusing basic research on addressing important, real-world problems. The four talks in this symposium will address how cognitive development research can inform the search for better ways to help children understand and enjoy learning about T Science, Technology, Engineering, and Mathematics (STEM).

Presentations of the Symposium

Hands-on Activities, Conversations, and Early STEM Learning Opportunities for Children in Informal Educational Contexts

Catherine Haden¹, David Uttal²

¹Loyola University Chicago, ²Northwestern University

The research that will be presented is focused on understanding and improving young children's science, technology, engineering and mathematics (STEM) education and learning. The research takes place at the Chicago Children's Museum, and is yielding much needed empirical work on how parent-child conversational interactions and hands-on activities help children remember what they have learned and apply it to new situations. At the same time, the work is helping informal science learning practitioners develop and identify practices that are effective in advancing STEM learning opportunities for children.

Learning and transfer of mathematical knowledge: Lessons from wine tasting in the dark

Vladimir Sloutsky

Ohio State University

Mathematical knowledge is difficult to acquire and even more difficult to apply to new situations. Therefore, it is reasonable to ask: how should mathematics be taught to maximize both learning and transfer? There are several arguments that because mathematical knowledge is so difficult, it should be taught through concrete examples and grounded in personally meaningful experience. However, there are reasons for skepticism as well. In this talk, review some general principles of early learning that shed light on how concrete instantiations affect what is learned in the course of learning. These principles suggest that concreteness should not facilitate transfer in principle. I will then discuss multiple findings indicating that concreteness may not work in practice, when the goal is to learn mathematical and other relational concepts. I will conclude with discussing the role of cognitive and developmental science in bridging the gap between the lab and classroom studies of learning and transfer.

Acquiring the Place Value System: Statistical Learning, Concrete Models, and the Power of Symbols

Kelly Mix¹, Linda Smith²

¹Michigan State University, ²Indiana University

Place value is a major obstacle in elementary mathematics. Children's struggles to master multi-digit number meanings have been well-documented for some time (Fuson, 1990; Kamii, 1986; Kouba et al., 1988; Miura, 1987) and longitudinal studies show that those who fail to master place value face chronic low achievement in mathematics (Ho & Cheng, 1997; Moeller et al., 2011). These difficulties may be best understood in light of several cognitive developmental mechanisms that are implicated in symbol system acquisition more broadly—mechanisms such as Statistical Learning, Structure Mapping, and Symbol Grounding (e.g., Aslin & Newport, 2012; Huttenlocher et al., 2002; Lakoff & Nunes, 2000; Namy & Gentner, 2004; Sandhofer & Smith, 1999). In this paper, we present a series of experiments that examined how children naturally gain traction with place value and how they respond to common educational approaches, such as instruction with concrete models. Our research reveals several surprisingly early competencies that appear to be based on patterns inherent to the symbols themselves, rather than mapping to a physical referent. Another key finding is that concrete models may be helpful, but only in specific ways and after considerable exposure. These new insights provide a more detailed, nuanced, and mechanistic explanation for children's difficulties with place value than previous accounts, and could form the basis of innovative instructional approaches.

Using Developmental Science to Support Young Children's Math Learning

Susan Levine

University of Chicago

Two intervention studies examined whether providing parents with ways to interact with their children about math promotes children's math learning. The first (Gibson, Gunderson & Levine) is a number book study, in which parents of preschoolers were randomly assigned to read number or control books to their children. The number books were written to incorporate many lessons from developmental science to enhance children's cardinal number knowledge. Results showed significant gains in the number book group compared to the control group. The second (Berkowitz, Schaeffer, Peterson, Gregor, Levine, & Beilock) is an intervention designed to promote positive interactions between parents and their 1st grade children around math, which was delivered via an iPad app. The dependent variable was growth in children's math knowledge over the school year compared to a control group that received a reading comprehension app. Results show that children in the math-app group showed significantly more math learning compared to the control group and that this was particularly the case for those with math anxious parents.

PS-III: Poster Session III

Time: Saturday, 10/Oct/2015: 1:15pm - 2:30pm · Location: George Bellows ABC

ID: 692 / PS-III: 1

Poster

Topics: Infant Cognition, Moral Cognition, Social Cognition

21-Month-Old Infants Expect Equitable Third-Party Punishment

Melody Buyukozer Dawkins (Diversity Fellow), Stephanie Sloane, Renée Baillargeon

University of Illinois at Urbana-Champaign, United States of America; buyukoz2@illinois.edu

Prior research indicates that infants expect fair outcomes in resource-distribution situations. Does this expectation reflect a concept of equality (individuals should be treated similarly) or a richer notion of equity (individuals should receive the treatment they deserve)? One way to address this question is to show infants situations where treating individuals similarly is the unfair outcome. To date, one study has done so: In a reward-allocation situation, 21-month-olds detected a violation when a worker and a slacker were rewarded equally, supporting a notion of equity. Our experiments asked whether 21-month-olds would also expect an equitable outcome in a punishment situation. In our events, two individuals disobeyed an experimenter (both-disobey event) or only one of the individuals disobeyed (one-disobeys event). In both events, the experimenter punished both individuals. Infants detected a violation in the one-disobeys event. This and control results indicated that infants expected only the disobedient individual to be punished.

ID: 436 / PS-III: 2

Poster

Topics: Decision Making and Reasoning, Executive Function, Infant Cognition

A Bat is Not a Bird: Infants' Use of Distinct Labels to Guide Inductive Reasoning

Jessica Switzer, Susan Graham

University of Calgary, Canada; jess.switzer@ucalgary.ca

This study examined individual factors that contribute to infants' use of distinct labels. Sixty-five 14- to 16-month-olds were presented with target objects that possessed a non-obvious sound property, followed by test objects that varied in shape similarity (inductive inference task). Infants were also administered a working memory and an inhibition task, and parents completed a vocabulary questionnaire. Results revealed that when objects were not labeled, infants generalized the non-obvious property to the high-similarity objects only. When the target and test objects were labeled with distinct nouns, infants 15-months and older inhibited their generalization of the non-obvious property to the high- and low-similarity objects. Performance on the inductive inference task was related to age, but not to working memory, inhibition or language measures. Our findings suggest that infants 15-months and older use distinct labels to highlight differences and carve out distinct categories, even in the presence of highly perceptually similar objects.

ID: 670 / PS-III: 3

Poster

Topics: Social Learning, STEM Learning

Keywords: Epistemological Development

A Case Study of Family Epistemology Practices in Science Learning Activities

Megan Luce, Luke Conlin

Stanford University, United States of America; mluce@stanford.edu

Research on epistemological development (e.g., what counts as knowing) has focused on taxonomies of epistemological sophistication across domains, and whether there is a stage-like progression. Recent studies focus on the socio-cultural contexts in which children develop epistemological practices and beliefs. We understand relatively little about the variety of epistemological practices children engage in across settings and with various people, and the processes by which children learn to participate in epistemological practices. We present in-depth video analysis of one family doing science-related activities together outside at a beach. Analysis is ongoing and shows how parents and children (ages 7 and 9) co-construct different epistemological practices, which include spontaneous lessons centered on "known-answer" questions as well as evaluating mechanistic explanations of "known" and "unknown" phenomena. Who gets to "know" varies across situation, and epistemological roles within family interaction shift over time. We discuss implications for theories of epistemological development and study design.

ID: 554 / PS-III: 4

Poster

Topics: Infant Cognition, Media and Technology, Symbol Use

A touching moment: Infants' manual exploration of touch screen images

Jane Hirtle, Sarah Wiesen, Claire Weaver, Georgene Troseth, Amy Needham

Vanderbilt University, United States of America; jane.a.hirtle@vanderbilt.edu

Children decrease manual exploration of images from infancy to toddlerhood (DeLoache et al., 1998; Pierroutsakos & Troseth, 2003). This transition has been interpreted as reflecting affordance learning for 2D versus 3D objects: Experience teaches infants that 2D images are good for looking, not for touching. This study asks how this may change with the advent of touch screens. Nine-and-a-half-month-olds ($N = 6$) played with touch-responsive or non-responsive pictures of toys on an iPad for 6 minutes. Pre and post assessments with responsive and non-responsive pictures bookended this experience. A within-subjects ANOVA of infants in

the responsive condition ($N = 6$) revealed a significant main effect of responsivity, $F(1,5) = 11.50$, $p = .019$, $\eta^2 = .697$. Infants decreased exploration over time (likely due to habituation), but explored responsive pictures significantly more than non-responsive pictures. Infants do learn image affordances via exploration, but more importantly they respond to the differential affordances of 2D media.

ID: 314 / PS-III: 5
Poster

Topics: Social Cognition

An intervention to reduce children's gender-based social exclusion

Maggie Powers Renno, Chelsea Mitamura, Patricia Devine, Kristin Shutts

University of Wisconsin-Madison, United States of America; renno@wisc.edu

Young children self-segregate by gender and prefer same-gender individuals. The present work assessed whether encouraging children to reflect on the emotional experiences of excluded peers would reduce gender-based exclusion. At pre-test, all participants (4-6 years, $N=98$) viewed pictures of unfamiliar girls and boys and were asked to select social partners to include in, or exclude from, an activity. Participants in the *intervention condition* rated how each of the target children likely felt as a result of the participant's own decision to include or exclude him/her. In a *control condition*, participants rated target children's feelings as a result of the actions of a different person. At post-test, participants in the *intervention condition* included more other-gender target children than did participants in the *control condition*. The findings suggest that prompting children to reflect on the consequences of their actions can serve as a powerful strategy for reducing gender-based exclusion.

ID: 448 / PS-III: 6
Poster

Topics: Executive Function, Language
Keywords: bilingualism, cognitive control, math

Arithmetic Problem-Solving in Bilingual Children

Natsuki Ataqi (Diversity Fellow), Catherine M. Sandhofer

University of California, Los Angeles, United States of America; nataqi@q.ucla.edu

Bilingual children show advantages in cognitive control as compared to monolingual children, and cognitive control is known to predict math performance. The present study thus examines whether bilinguals' cognitive control advantage extends to mathematical. To measure children's use of cognitive control, worksheets containing 60 arithmetic problems of different operations were administered to first- through fifth-grade monolingual and bilingual children; children were given 60 seconds to complete as many grade-appropriate problems as possible. Performance on the math worksheet was analyzed as the number of problems completed and solved correctly. Results will indicate whether bilingualism affects arithmetic problem solving in elementary school-age children and if bilingual cognitive control extends to mathematical problem solving.

ID: 408 / PS-III: 7
Poster

Topics: Language, Social Cognition, Theory of Mind
Keywords: Mind-Mindedness

Assessment of Maternal-Mind-Mindedness within a Child-Maltreatment Prevention Program

Amarachi Diatra Nnebedum (Diversity Fellow), Jing Chen, Naomi Aldrich

Grand Valley State University, United States of America; nnebedua@mail.gvsu.edu

Mind-Mindedness (MM) is defined as a caregiver's ability to understand their children by seeing them as individuals with their own thoughts and feelings (e.g., Mein et al., 1998). Research indicates that "mind-minded" mothers are less likely to direct hostile behaviors towards their child and experience less stress/difficulties within parent-child interactions. Instead, they demonstrate higher sensitivity and are more likely to form secure attachment with their children. The current study assessed the MM in a community sample enrolled in Family Future's Connections Program (a non-profit, child maltreatment prevention program). We analyzed responses from 239 individuals and our results suggest that the degree of MM increases as a function of child age. Findings are discussed in relation to the efficacy of MM assessment in mothers of children across the first five years of children's lives.

ID: 490 / PS-III: 8
Poster

Topics: Memory

Associations Between Internal States Language and Extended, Categorical, and Specific Autobiographical Memory Recall

Beth Bray², Dean Muzina¹, Elizabeth Jackson¹, Nicola Rodwell Herting², John Paul Legerski², Sarah Loveland Bunnell¹

¹Ohio Wesleyan University, United States of America; ²University of North Dakota, United States of America; slbunnel@owu.edu

Past work finds that overgeneral autobiographical memory recall is associated with psychopathological symptoms. One proposed mechanism for this relationship focuses on internal states language, as higher rates of internal states during remembering may reflect past and/or ongoing meaning-making about life events. However, less work has separately examined categorical (i.e., a category of events) and extended (i.e., one event lasting multiple days) overgeneral memories (OGMs), although they likely stem

from distinct memory search truncation processes. To address this limitation, we explored associations between internal states language and memory specificity in a sample of 177 late adolescents. While internal states language was not predictive of rates of categoric OGMs, extended OGMs were negatively predicted by causal terms and word count and positively predicted by cognitive term usage. These findings have implications for the assessment of memory specificity across the lifespan and interventions that target meaning-making as a mechanism for psychological growth.

ID: 389 / PS-III: 9

Poster

Topics: Attention, Concepts/Categories, Memory

Attention and the development of inductive inference: Evidence from cognition memory

Tracey M. Miser, Vladimir M. Sloutsky

Ohio State University, United States of America; miser.4@osu.edu

Induction is the ability to generalize knowledge from known to novel instances, and is essential in human learning and reasoning. This study assesses how attention allocation during category-learning affects both induction and memory for items presented during induction. Adults and five-year-olds participated in one of two conditions: Attention attracted to all features (Baseline) or to deterministic features (Attention to Deterministic). Participants learned novel categories having one deterministic and multiple probabilistic dimensions. It was predicted attention to defining features during category-learning and induction would result in low memory for non-attended features, and that the effect should transpire if participants attend selectively (i.e., adults) rather than when attending diffusely (i.e., children). Preliminary results indicate that memory was better in Baseline than in Attention to Deterministic condition, but only for adults. Conversely, children seem to have good memory in either condition. Results indicate that children and adults allocate attention differently when performing induction.

ID: 690 / PS-III: 10

Poster

Topics: Culture, Social Cognition, Social Learning

Keywords: transgressions, intention, toddlers

Bad babies? Interpreting the transgressions of young children

Talia Lin Waltzer^{1,2}, Audun Dahl¹, Caitlin Fausey³

¹University of California, Santa Cruz, United States of America; ²Rutgers University, New Brunswick, United States of America;

³University of Oregon, Eugene, United States of America; talia.waltzer@gmail.com

Parent-child interactions are crucial to child development. These interactions are greatly influenced by the adult's interpretations of the child's behavior. In this study, we investigated how adults would interpret, and react to, the transgressions of infants and toddlers. Adult participants watched videos in which toddlers performed transgressive actions such as hitting, biting, and spilling. While participants largely viewed the children's actions as *wrong* (70%), they nonetheless believed that the children did not *mean to cause harm* (82%). Instead, adults interpreted the children's intentions as reflecting curiosity, excitement, or attempts to attain an instrumental goal. To see how consistent and generalizable these patterns of responses may be, a cross-cultural follow-up is currently in progress. With these findings, we are taking important steps toward understanding how adults' interpretations and cultural norms may influence children's acquisition of social knowledge.

ID: 592 / PS-III: 11

Poster

Topics: Social Cognition, Social Learning

Best of luck: Experience affects how children evaluate potential informants

Ashleigh Victoria Rutherford, Carolyn Maxwell Palmquist

Amherst College, United States of America; cpalmquist@amherst.edu

Previously, preschoolers played a hiding game with two partners (helpful/unhelpful). The game was rigged so that despite partner helpfulness, children always found the hidden objects. Later, children did not prefer the helpful partner (Palmquist & Jaswal, 2013). One reason why 4- and 5-year-olds may have ignored this help is because children do not understand "luck" until 8 years of age (Fry, 2000). Thus, children believed that they had the ability to solve the task without seeking help. The current study explored whether making luck more salient would lead children to prefer a helpful partner. In this paradigm, children were successful due to an obvious flaw in the game rather than a choice of their own. Children now prefer the helpful partner, despite having been successful in the past, $t(7) = -2.38$, $p < 0.05$. Therefore, under some circumstances, preschoolers monitor informant quality even when they have previously been successful.

ID: 328 / PS-III: 12

Poster

Topics: Number, Spatial Cognition, STEM Learning

Keywords: numerical estimation, representation, mental number line, logarithmic-to-linear shift

Bounded vs. Unbounded Number-Line Estimation: A Unified Framework For Mental Number Line

Dan Kim, John Opfer

The Ohio State University, United States of America; kim.3839@osu.edu

Representations of numerical value have been assessed using bounded (e.g., 0-1000) and unbounded (e.g., 0-?) number-line tasks, with considerable debate regarding whether one or both tasks require unique measurement strategies (e.g., addition or subtraction) and unique cognitive models. To test this, we examined 86 5- to 8-year-olds' addition, subtraction, and estimation skill (bounded and unbounded). Against the measurement-skills hypothesis, estimates were even more logarithmic on unbounded than bounded number-lines ($p < .001$; $\eta^2 = .26$) and were better described by conventional log-linear models (best fit to 67% of children) than by the six alternative cognitive models. Moreover, logarithmic index values reliably predicted arithmetic scores ($p < .001$ for both tests), whereas model parameters of alternative models failed to do so. Results suggest that both bounded and unbounded number-line estimation can be understood best within the logarithmic-to-linear shift theory.

ID: 804 / PS-III: 13

Poster

Topics: Attention, Perception, Word Learning

Category Effects on Visual Perception in 3-year-old Children

Elizabeth M Clerkin, Catarina Vales, Linda B Smith

Indiana University; emclerki@indiana.edu

Learning categories enables us to see different things as the same. Does category learning also help children see the different things as more different? To investigate this question, we used a visual search task. In Experiment 1, children searched for cakes among cakes or hats (or hats among hats or cakes) and, given these highly similar visual stimuli, did not show faster search for between than within category (contrary to well documented results with adults). In Experiment 2, children were given category training with these same stimuli, with half the children trained to categorize one instance as a hat and the other half to categorize one instance as a cake. After multi-session training with the stimuli, children did show a category effect in visual search with those exact stimuli only. The results suggest that for young children top-down influences on perception may be weak and stimulus- not category- level effects.

ID: 507 / PS-III: 14

Poster

Topics: Concepts/Categories, Infant Cognition, Perception

Keywords: Motor Development, Motor Learning, Embodiment

Causal Perception in 4-month-olds: Contributions of Self-produced Action and Parental Interaction

Nicholas A. Holt, Cara H. Cashion

University of Louisville, United States of America; naholt03@louisville.edu

Sticky mittens (SM) training (Needham, Barrett, & Peterman, 2002) has been shown to facilitate cognitive development in infants, including in their perception of causality (Rakison & Krogh, 2012). SM training is thought to be effective because it provides infants with self-produced action experience. In the current study, we compare the effects of self-produced versus parent-controlled action during SM training on infants' causal perception. The role of parent interaction is also examined. In this ongoing study, 4-month-old infants are randomly assigned to one of three types of SM training: (1) Active with Parental Interaction (traditional), (2) Passive with Parental Interaction (parent controls infants' arm movements), (3) Active without Parental Interaction. Following 10 minutes of training, infants are tested in a causal perception habituation task. Preliminary results ($N = 8$) suggest that 4-month-olds' understanding of causality benefits from SM training that does not necessarily involve both self-produced action and parental interaction.

ID: 712 / PS-III: 15

Poster

Topics: Spatial Cognition

Characterizing the relation between spatial and mathematical competence in preschool-aged children

Jillian E. Lauer (Diversity Fellow), Stella F. Lourenco

Emory University, United States of America; jillian.lauer@emory.edu

Superior spatial abilities are known to predict greater math achievement (Mix & Cheng, 2012). Yet less is known about the extent of within-domain variability in spatial and mathematical aptitude or the consistency of this association across tasks, particularly in young children. The present ongoing study attempts to address this gap by examining four-year-olds' (current $n = 110$) performance across ten spatial and quantitative tasks and six domain-general control measures. Initial analyses revealed robust correlations between tasks within each domain as well as across spatial and quantitative measures. These correlations were also task-specific: whereas some spatial skills (e.g., spatial visualization) were associated with multiple quantitative measures, others (e.g., spatial reorientation) were not related to any other spatial or quantitative ability assessed. In addition, a preliminary factor analysis produced multiple overlapping space-math factors, suggesting an association between spatial and quantitative abilities but also heterogeneity within these domains at preschool age.

ID: 376 / PS-III: 16

Poster

Topics: Decision Making and Reasoning

Keywords: Cognitive dynamics, entropy, induction

Children are more complex than adults: Cognitive dynamics and entropy in inductive reasoning

Steve Croker¹, Corinne Zimmerman¹, Bradley J. Morris²

¹Illinois State University, United States of America; ²Kent State University; s.croker@ilstu.edu

We examined cognitive dynamics and response complexity on a multivariate computerized inductive reasoning task, with either a plausible or implausible rule. Ten-year-olds and adults made predictions about which of two cars would go faster over 300 trials. One perceptually salient feature (e.g., color) and one less salient feature (e.g., tailfin) were causally responsible for the outcome. For each trial, mouse trajectory data were used to compute sample entropy, a measure of complexity. Children's response trajectories were more complex than adults, indicating that both response choices acted as strong attractors. Adults experienced reduced degrees of freedom in their movements, suggesting greater inhibition of irrelevant features. The complexity of children's responses also varied as a function of feature salience and rule plausibility, with greatest complexity for small perceptual differences between the two response choices for implausible rules. Our data suggest that both global (rule) and local (stimulus features) constraints affect task behavior.

ID: 354 / PS-III: 17

Poster

Topics: Communication, Social Cognition, Theory of Mind

Children selectively transmit general information to ignorant listeners

Carolyn Baer, Ori Friedman

University of Waterloo, Canada; cebaer@psych.ubc.ca

In successful communication, speakers convey different information depending on what their audience knows. For example, they convey more general information to ignorant audiences, and more specific information to knowledgeable audiences. We investigated whether 3-6-year-olds use knowledge information to alter this content in their communication. In Experiment 1, we compared the presence of general and specific knowledge conveyed by children when they described items to listeners who were either ignorant or knowledgeable about the items. In Experiment 2, we added a baseline condition in which children were not told about the listener's knowledge state. In Experiment 3, we told children to either "teach" or "tell" the listener about the objects, instead of manipulating knowledge state. Overall, our findings suggest that the ability to tailor the presence of general information in utterances in response to listeners' knowledge states emerges between four and five years of age.

ID: 355 / PS-III: 18

Poster

Topics: Moral Cognition, Social Cognition, Social Learning

Children's Beliefs about Fairness are Influenced by Direct Testimony but not Storybooks

Joshua Rottman¹, Liane Young², Peter Blake³, Deborah Kelemen³

¹Franklin & Marshall College; ²Boston College; ³Boston University; rottman@bu.edu

How can social learning influence children's inclinations toward equality-based or merit-based fairness? Six- and seven-year-olds were presented with a pre-test distribution task in which they divided eight stickers between two hypothetical children, one of whom was a harder worker. Participants next heard either an allegorical storybook or brief, direct testimony. This intervention advocated either equality- or merit-based fairness (whichever was not chosen at pre-test), and appealed either to emotions or moral principles. A novel experimenter then presented participants with a second distribution task. Results indicated that few children who heard storybooks changed their distribution patterns from pre-test to post-test, while a substantially greater number of children changed their distributions after being provided with direct testimony. There were no other main effects or interactions. This research indicates that children's beliefs about just resource distribution are influenced by social communication, but only when information is provided in a direct, clearly transferable format.

ID: 378 / PS-III: 19

Poster

Topics: Concepts/Categories, Language

Children's and Adults' inferences about human impacts on the environment: Reasoning about Distal Consequences

Marlotte De Jong, Claire Weaver, Sofia Jimenez, Kara Kedrick, Megan Michelle Saylor

Vanderbilt University, United States of America; m.saylor@vanderbilt.edu

Reasoning about the impact of humans on the environment requires thinking about distal, rather than proximal, consequences. Preschoolers (N = 24) and adults (N = 12) were asked to categorize helpful (recycling) and harmful (polluting) human actions on the environment as good or bad and were asked to justify their choice. Justifications could be proximal (about people) or distal (about ecological systems).

Both children (81% correct) and adults (93%) correctly categorized human actions on the environment. Children were more likely to justify harmful versus helpful actions as bad for distal/ecological reasons ($F(1,22) = 5.18, p < .05$). Adults were more likely than children to offer distal/ecological reasons for their categorizations ($F(1,35) = 36.27, p < .001$). When asked to elaborate on their justifications adults were also more likely to mention additional distant consequences, $F(2,35) = 9.62, p < .001$. These results showcase the emergence of reasoning about distal consequences in the context of human actions on the environment.

ID: 570 / PS-III: 20

Poster

Topics: Culture, Moral Cognition, Social Cognition

Children's perceptions of inter-caste sharing in India

Haleh Yazdi¹, Mahesh Srinivasan², Yarrow Dunham³, Mike C. Frank⁴, David Barner¹

¹University of California, San Diego, United States of America; ²University of California, Berkeley; ³Yale University; ⁴Stanford University; haleh.yazdi@gmail.com

We investigated perceptions of sharing within the Indian caste system in 6th, 8th and 9th graders (N= 112) in Gujarat, India. Children heard narratives about either inter-caste or inter-wealth sharing of food or objects that occurred between givers and receivers of high to low, low to high, or same status. We found that children in both conditions (caste vs. wealth) rated the giver's willingness to share similarly, except when sharing occurred between low caste givers and high caste recipients. Children in the inter-caste sharing condition rated this scenario significantly higher, particularly for food items. Next, children rated different reasons for giving. Across all ages and conditions children rated the need of the recipient and similarity between the giver and recipient as the most influential reasons for giving. Though Indian children are sensitive to the hierarchical structure of castes, their sharing reasoning is based on more universal principles.

ID: 792 / PS-III: 21

Poster

Topics: Social Cognition, Social Learning

Keywords: Ownership

Children's Sensitivity to Past Investment in Reasoning About Ownership As a Continuous Attribute

Telli Davoodi, Laura Nelson, Peter Blake

Boston University, United States of America; telli@bu.edu

For adults, the effort invested in an entity is an important factor when evaluating ownership. In this study, we tested whether children display an understanding of ownership as a continuous attribute when past investment is manipulated. Children participated in two trials, one in which past investment was in the form of making objects, and another where past investment was in the form of finding objects. Children were then given the chance to donate the objects. Additionally, children made judgments about how others would allocate the two types of objects, and given the chance to take another child's objects. Results suggest that when reasoning about third party ownership, 4-5-year-old children begin to distinguish between different strengths of ownership claims based on past investment, but not so in their first person ownership claims. 6-7-year old children, however, showed sensitivity to this distinction both in their first person and third-person reasoning about ownership.

ID: 664 / PS-III: 22

Poster

Topics: Social Cognition

Keywords: artifact function

Children's understanding of artifact function as a cultural convention

Drew Weatherhead¹, Shaylene Nancekivell², Ori Friedman³

¹University of Waterloo, Canada; ²University of Waterloo, Canada; ³University of Waterloo, Canada; deweathe@uwaterloo.ca

Children not only recognize the function of an artifact, but they actively protest when others use it in an inconsistent way. In two experiments, we asked whether children view artifact function as universal or as culturally dependent. In both experiments children watched videos of two actors who used common artifacts incorrectly (e.g. a woman using a fork to comb her hair). In Experiment 1 children were simply told that the actors were either from Canada or a far away place called Brungaria. 4-5-year-olds protested the incorrect usage regardless of where the actor was from, while 6-7-year-olds selectively protested in the Canada condition. This same pattern was observed in Experiment 2 when the familiar or unfamiliar culture was explicitly highlighted. These findings demonstrate that while younger children view artifact function as universal, children over the age of 6 recognize that the accepted use of an artifact may vary by culture.

ID: 681 / PS-III: 23

Poster

Topics: Concepts/Categories, Culture, STEM Learning

Keywords: Cognitive construal, U.S/ Chinese 8th graders, intuitive biology, essentialism, teleology, anthropocentrism

Cognitive Construals in U.S and Chinese 8th Graders' Intuitive Biology Thinking

Yian Xu, John Coley

Northeastern University, United States of America; xu.yia@husky.neu.edu

Although previous research has documented the development of intuitive biological thinking in young children, there has been little research on later development, and little comparative research. To address these gaps, we compared three core components of intuitive biological thinking among 8th graders in U.S and China. We administered a survey that included multiple measures of *essentialist thinking*, *anthropocentric thinking*, and *teleological thinking*. Comparisons of composite scores suggest that while the two groups did not differ in essentialist and teleological responses, Chinese 8th graders showed significantly less anthropocentric thinking than their U.S peers ($t_{151}=5.83, p<.001$). This cross-cultural comparison carries important implications in understanding the nature of intuitive biological thought and advancing pedagogical methods in the biology classroom.

ID: 751 / PS-III: 24

Poster

Topics: Comparative Cognition, Concepts/Categories

Common Signatures of Conceptual Processing in Monkeys and Humans

Sarah E. Koopman¹, Bradford Z. Mahon^{1,2,3}, Jessica F. Cantlon¹

¹Department of Brain & Cognitive Sciences, University of Rochester, United States of America; ²Department of Neurosurgery, University of Rochester, United States of America; ³Center for Visual Science, University of Rochester, United States of America; skoopman@mail.bcs.rochester.edu

Although humans have greater access to conceptual information due to language and culture, both human and non-human primates might share capabilities for conceptual inference due to common evolutionary constraints on their categorization systems. Here we show that monkeys' discrimination sensitivity when categorizing images of animals is predicted by measures of semantic similarity derived from human conceptual judgments. The relation between monkey performance and human-derived measures of conceptual similarity held when accounting for the visual similarity among the stimuli, using a number of different approaches for capturing visual similarity. Moreover, discrimination sensitivity across pairs of animal stimuli was highly correlated between monkeys and humans. These data demonstrate that the underlying structure of category representations in humans is shared with non-human primates, at an abstract level that extends beyond visual similarity. The results provide new evidence that the structure of abstract concepts in humans has an evolutionarily primitive foundation.

ID: 522 / PS-III: 25

Poster

Topics: Concepts/Categories, Number, STEM Learning

Conceptual change in children's number categories: The integration of fraction and whole number knowledge

Pooja Gupta Sidney, Martha W Alibali

UW-Madison, United States of America; pgupta6@wisc.edu

Children sometimes behave as if fractions belong to a different category of number than whole numbers, for example, when ordering numerals (Harnett & Gelman, 1998) or reasoning about numerical density (Vamvakoussi & Vosniadou, 2010). However, fractions and whole numbers share many concepts, and understanding relationships between fractions and whole numbers may improve fraction learning. We explored whether students' category structures for arithmetic change across development. Participants were students in grades 5, 6, and 8 and adults. We probed participants' category structures in three tasks: one asking participants to group equations, one asking participants to make judgments about the similarity of given equations, and a one probing participants' understanding of numerical density given pairs of fractions or whole numbers. Data from the sorting task ($n = 123$) showed that students progress from reasoning about fractions and whole numbers as distinct categories to reasoning about them as an integrated system.

ID: 333 / PS-III: 26

Poster

Topics: Concepts/Categories, Infant Cognition, Theory of Mind

Keywords: Longitudinal Study, conceptual continuity

Conceptual Continuity from Infant Psychological Reasoning to Preschool Theory of Mind

Beate Sodian¹, Kristen-Antonow Susanne¹, Licata Maria¹, Woodward Amanda²

¹Ludwig-Maximilian-University Munich, Germany; ²University of Chicago, IL, USA; sodian@psy.lmu.de

In a longitudinal study of $N=88$ children from the age of 7 months to 6 years, the predictive relations between measures of infant psychological reasoning and the mastery of a battery of false belief tasks were studied. Significant predictive relations were obtained between the following measures of infant psychological reasoning and the age at which false belief tasks were consistently mastered (assessed at the ages of 4,5, and 6 years): Goal encoding at 7 months, declarative point production at 12 months, intention-based imitation at 18 months, and implicit false belief understanding at 18 months. These correlations remained significant when verbal IQ at 48 months was controlled for. These findings indicate conceptual continuity in the domain of psychological reasoning from infancy to the preschool years.

ID: 317 / PS-III: 27

Poster

Topics: Concepts/Categories, Culture, Social Cognition

Keywords: Free Will, Choice

Cross-Cultural Comparison of Children's Concepts of Freedom of Choice and Social Constraint: Singapore & America

Carissa Kang¹, Nadia Chernyak², Tamar Kushnir¹

¹Cornell University, United States of America; ²Boston University, United States of America; ck577@cornell.edu

Prior research has found that both age and culture influence whether children view social and moral norms as constraints limiting freedom of choice (Chernyak, Kushnir, Sullivan, & Wang, 2013). In this study, we looked into the mechanisms driving the previously found cultural differences, through analyzing children's explanatory responses. We interviewed 4 to 11-year-old children from the U.S. ($n = 42$) and from two different ethnicities in Singapore – 32 Chinese and 57 Malay/lower socioeconomic status (SES) children. Using a 9-item questionnaire, we explored children's beliefs about the freedom of choice across domains (e.g., harming others, violating social conventions). Results revealed that while American children tended to evoke consequences to the self when explaining their free choice judgments, Singaporeans referenced the self with respect to social norms. Further analyses will focus on within culture variability in Singapore to look at the potential role of ethnicity and SES on children's conceptual development.

ID: 494 / PS-III: 28

Poster

Topics: Infant Cognition, Social Cognition, Social Learning

Cues to Social Dominance Relationships in Infancy

Anthea Colleen Pun, Andrew Baron

University of British Columbia, Canada; antheacp@psych.ubc.ca

Detecting dominance relationships provides a clear fitness advantage because it helps individuals assess the costs and benefits of engaging in a competition. While 10 month old infants are capable of using physical size as a cue for social dominance, they fail to do so at younger ages.

Another cue associated with social dominance that may have greater ecological relevance is group size. Two studies examined whether infants can infer dominance relations between two groups that differ in numerical size, and whether this capacity emerges prior to their sensitivity to physical size. We found that infants (8.5 months) not only succeed at using the numerical size of two groups to infer dominance relations between agents from those groups, but do so prior to their ability to use physical size to infer such relationships. These findings suggest there that there is a developmental shift in infants' priority of cues to social dominance.

ID: 475 / PS-III: 29

Poster

Topics: Attention, Comparative Cognition, Culture

Cultural differences in how 3-year-old children visually recognize objects

Megumi Kuwabara¹, Linda Smith²

¹California State University, Dominguez Hills, United States of America; ²Indiana University - Bloomington; mkuwabara@csudh.edu

The evidence in human visual object recognition suggests a general progression from recognition based on piecemeal features to recognition based on the spatial relations among features and parts. A large set of experimental studies indicates systematic cultural differences in visual processing by adults from western and eastern cultures; a Western bias to attend to task relevant elements and an Eastern bias to process the relational structure among the elements (e.g. Nisbett & Miyamoto, 2005). Do these cultural differences in visual processing extend to the domain of visual object recognition?

With using three tasks, the evidence suggests a consistent set of cultural differences in which Japanese children are more likely to rely on the relations among features to recognize objects whereas U.S. children are more likely to rely on the piecemeal features to recognize objects. Implication of these differences in visual object recognition to developmental trajectories and to cognitive development will be discussed in this poster.

ID: 711 / PS-III: 30

Poster

Topics: Culture, Social Cognition, Social Learning

Keywords: Culture, Causal reasoning

Cultural differences in learning the form of abstract causal relationships

Adrienne Wentz¹, Katherine Kimura¹, Mari de los Angeles Fernández Flecha², Christopher Lucas³, Alison Gopnik¹

¹University of California, Berkeley, United States of America; ²Pontifical Catholic University of Peru; ³University of Edinburgh; adrieorchid@berkeley.edu

In this cross-cultural study, we explore children's ability to acquire abstract causal principles and generalize these principles to novel situations. Ninety 4-and 5-year-old Peruvian children were tested and compared to U.S. children from Lucas, Bridgers, Griffiths, and Gopnik (2014). Children were assigned to one of three conditions. In the conjunctive condition, participants were shown that two items were needed to activate a machine, in the disjunctive condition children were shown that one item was needed to activate a machine, and in the baseline condition children did not receive any evidence. Children were then asked to judge the causal efficacy of the objects as well as generate an intervention to activate the machine. Results indicate that children across cultures performed similarly in the conjunctive condition; however, in both the disjunctive and baseline conditions, Peruvian children were more likely than U.S. children to assume multiple items were needed to activate the machine.

ID: 657 / PS-III: 31

Poster

Topics: Infant Cognition, Language, Word Learning

Development in 11—15-month-olds' Noun and Verb Learning Following Extended At-Home Teaching

Elika Bergelson¹, Daniel Swingley²

¹University of Rochester, United States of America; ²University of Pennsylvania, United States of America; elika.bergelson@gmail.com

We conducted a naturalistic word-teaching study to address the noun advantage in very early word learning (Waxman et al., 2009; Bergelson & Swingley, 2013). 10–12-month-olds (n=18) and 13–15-month-olds (n=17) received at-home exposure to novel nouns and verbs for two weeks, using novel toys. Eyetracking tests revealed that only older infants learned the words (p=.0046 vs. p=.55; Wilcoxon Test). Mixed-effects model-comparison found that word-type (verb/noun) and word-frequency during the exposure phase did not significantly predict performance (ps>.05). Thus, nouns showed no advantage over verbs: performance for easily observable object-nouns and action-

verbs was equivalent. Furthermore, once infants were exposed to words and referents above a given threshold, word-frequency played a limited role in category- and label-learning. In contrast, age (and its concomitant cognitive development and life experience) contributed significantly to our results: even controlling for exposure with tested words and referents, 13-15-month-olds are better word-learners than babies two months younger.

ID: 449 / PS-III: 32

Poster

Topics: Concepts/Categories, STEM Learning
Keywords: Explanation, Folk Biology, Folk Physics

Development of Explanation Generality Preferences across Elementary and Middle School

Angie M. Johnston, Mark Sheskin, Samuel G. B. Johnson, Frank C. Keil

Yale University, United States of America; angie.johnston@yale.edu

Some explanations are more satisfying than others. In adulthood, our explanatory preferences usually guide us toward explanations that are widely applicable to novel situations and useful for making causal predictions (Lombrozo, 2012). However, less is known about how these preferences unfold over development. We tested whether children in elementary and middle school prefer relatively general explanations for biological (e.g., inheritance) and physical (e.g., gravity) phenomena, comparing explanations at the token (e.g., "This bear is made from a mixture of ingredients from its parents"), basic ("All bears..."), and general ("All animals...") levels. Middle school children, like adults, preferred general explanations in both domains. However, younger children had a weaker appreciation for explanation generality, especially in physics. These findings suggest potential domain differences between folk biology and folk physics in early development and suggest that an adult-like preference for explanatory generality does not develop until middle school.

ID: 771 / PS-III: 33

Poster

Topics: Attention, Memory

Developmental Contributions of Attention and Working Memory to Higher Cognition

Aaron K Cochrane, C Shawn Green, Vanessa R Simmering

University of Wisconsin - Madison, United States of America; simmering@wisc.edu

Prior research aimed at improving cognitive skills through working memory (WM) training has achieved mixed results. Here we consider whether specific sub-components of cognitive task performance relate more strongly to higher-level skills, therefore providing better targets for training with potential for more replicable training results. Recent studies with adults suggest that three characteristics of WM—precision, capacity, and filtering—are relatively independent, and shared with selective attention tasks. Their independence indicates that they will relate differentially to higher-level cognition; by extension, whichever characteristic relates most strongly should provide the best opportunity for intervention. Pilot data with 7- to 8-year-olds (n=20) in a task battery assessing precision, capacity, filtering, and fluid intelligence, provide initial evidence for separability of these sub-components during childhood. We will present a factor analysis of children's performance in our full sample (target n=50) evaluating the relations between these processes and higher-level cognitive skills.

ID: 656 / PS-III: 34

Poster

Topics: Language, Social Learning, STEM Learning
Keywords: Math anxiety, teachers, math learning

Differences in Pedagogy between High and Low Math Anxious Teachers and Subsequent Student Performance

Rachel Fine¹, Marjorie Weber Schaeffer¹, Erin Maloney¹, Gerardo Ramirez², Sian Beilock¹, Susan Levine¹

¹University of Chicago, United States of America; ²University of California, Los Angeles; mschaeffer@uchicago.edu

Math talk is important in developing early math skills (Gunderson & Levine, 2011). Knowing teacher's math anxiety correlates negatively with student math achievement (Beilock et al, 2010), we sought to explore if teacher's math-related word use varied by teacher math anxiety. While high and low math anxious teachers did not differ in the number of math-related words used in math class, we did find the impact of math-related words varied by teacher's math anxiety. For lower-math-anxious teachers, higher math-related word usage correlated with higher student math achievement. For higher-math-anxious teachers, use of more math-related words correlated with lower student math achievement. This is similar to findings that more homework help from highly-math-anxious parents relates to lower student math achievement across the school year (Maloney et al, in press). These results suggest that high and low math anxious teachers use math-related words differently and these differences relate to students' math learning.

ID: 344 / PS-III: 35

Poster

Topics: Attention, Executive Function

Differential Effects of Resting Heart Rate on Executive Functioning after Exergame Intervention

Tatiana Garcia Meza¹, Rachel Flynn², Rebekah Richert¹

¹University of California, Riverside; ²New York University; tatiana.garciameza@ucr.edu

This study examined whether resting heart rate (HR) was related to increases in EF after exercise or playing an exergame in 71 7- to 13-year-old participants ($M = 9.07$, $SD = 1.50$; 46.5% female). Children completed an age appropriate Flanker task before and after either engaging in 20 minutes of exercise or 20 minutes of an exergame. A 2 (time) x 2 (condition) Repeated Measures ANCOVA, with resting HR as the covariate, indicated a significant interaction between time and resting HR, $F(1,68) = 5.325$, $p < .05$, partial $\eta^2 = .073$. Children who had a higher resting HR had a smaller change in reaction time from pretest to posttest, $r = -.279$, $p = .019$, suggesting that a higher resting HR when taking a EF test may provide physiological benefits to performance, but may also then leave little room for EF improvements through short-term interventions.

ID: 529 / PS-III: 36

Poster

Topics: Comparative Cognition, Theory of Mind

Do Monkeys Expect Others to Make Inferences?

Lindsey Drayton, Laurie Santos

Yale University, United States of America; lindsey.drayton@gmail.com

Both human and nonhuman primates go beyond direct perceptual information to draw conclusions about the likely state of the world—that is, they make *inferences*. From early in infancy, humans also recognize that other individuals make inferences and use this fact to predict others' future behavior. Although much evidence suggests nonhuman primates are sensitive to some mental states in others, the extent to which nonhuman primates expect agents to make inferences remains unclear. We explored this question by testing whether rhesus macaques (*Macaca mulatta*) attribute inferences to others. We found that monkeys showed no evidence of expecting others to engage in inferential reasoning by exclusion (Experiments 1 & 2), but they did expect others to understand how nonvisible objects move in space (Experiments 3 & 4). Results suggest that rhesus monkeys may expect others to make very simple inferences and are discussed in light of similar work in human infants.

ID: 398 / PS-III: 37

Poster

Topics: Decision Making and Reasoning, Moral Cognition, Social Cognition

Do Preschoolers Transfer a Novel Prosocial Action from Stories?

Rose DeRienzo, Jennifer Van Reet

Providence College, United States of America; jvanreet@providence.edu

Stories are a common tool used to teach moral rules and prosocial behavior. However, recent research casts doubt on how well young children internalize the messages in such stories (Lee et al., 2014). Further, it is unclear whether fictional contexts are conducive to learning: children are more likely to transfer knowledge from realistic stories than fantastical stories in several domains (Richert et al., 2009; Walker et al., 2014). In this research, preschoolers ($N=88$) heard about a novel prosocial action from a realistic or fantastical story. They were then provided with the appropriate context to perform the action. A large main effect of age (5-year-olds performed the action more than younger children) and an interaction (transfer from the realistic story was easier with age) were found. These data add to recent work showing that learning from fiction is not automatic in preschoolers, with learning from fantasy seeming especially difficult.

ID: 535 / PS-III: 38

Poster

Topics: Executive Function

Keywords: executive function, training, preschool children

Does training improve response inhibition in preschool children?

Valerie San Juan, Katherine Gibbard

University of Calgary, Canada; valerie.sanjuan@ucalgary.ca

Response inhibition undergoes robust development during the preschool years and has important implications for other domains of cognition (Carlson & Moses, 2001). While research has shown that response inhibition can be effectively trained in school age children (Chevalier, Chatham, Munakata, 2014), there is little evidence to suggest that training would lead to similar improvements in younger children. In this study, we test the efficacy of response inhibition training on preschool children. Participants were trained over a single session with either a response inhibition or control task. For children trained on response inhibition ($n = 29$, $M_{age} = 4.78$), results indicate significant improvements in response accuracy (d) between pre- ($M = 1.23$) and post-training ($M = 2.70$), $t(28) = -2.74$, $p = .01$. Results for the control condition further suggest that these improvements are exclusively associated with response inhibition training.

ID: 325 / PS-III: 39

Poster

Topics: Infant Cognition, Social Cognition

Keywords: social relationships/categories

Early Reasoning about Affiliation and Caregiving

Annie Spokes, Elizabeth S. Spelke

Harvard University, United States of America; aspokes@fas.harvard.edu

Considerable research has examined infants' reasoning about and evaluations of social agents, but two questions remain unanswered: First, do infants organize observed social relations into larger structures, inferring the relationship between two social beings based on their relations to a third party? Second, how do infants reason about a type of social relations prominent in all societies: kinship relations that modulate caregiving? In a series of experiments using animated events, we ask whether 9-, 11-, and 15- to 18-month-old infants expect two babies who were comforted by the same caregiver, or two caregivers who comforted the same baby, to affiliate with one another. We find that older infants make these inferences in a caregiving context, but not in a different context involving social interactions among adults. Thus, infants are sensitive to at least one aspect of kinship relations—caregiving—and organize these relations into larger social structures.

ID: 674 / PS-III: 40

Poster

Topics: Moral Cognition, Social Cognition

Effects of emotional messages on 5-year-olds' resource distribution

Ha Na Yoo¹, Zi Hyun Lee², Hyun-joo Song³

¹University of Rochester; ²Yonsei Happy Mind Psychiatric Clinic; ³Yonsei University; hanapr15@naver.com

This study investigated whether considering others' emotions promotes 5-year-olds' fair resource distribution. In study 1, 5-year-olds participated in a dictator game in which they were asked to allocate 10 stickers between themselves and a puppet. The children allocated more resources to the recipients when they were told that the puppet would give them emotional messages on the amount he received than when they were not given such information. Study 2 examined whether the children in study 1 reacted to recipients' feedback itself, not to recipients' emotions. The participants were told that the puppet would simply give some message. Their resource distribution did not differ from decisions by those who anticipated no feedback from the recipient, suggesting that simply anticipating a feedback does not increase children's fair distribution. Taken together, the results suggest that preschoolers' emotional perspective taking can influence their fairness judgment.

ID: 608 / PS-III: 41

Poster

Topics: Language, Spatial Cognition

English- and Korean-speaking PreK children's acquisition of spatial vocabulary: Are there cross-linguistic differences?

Youjeong Park (International Fellow)¹, Marianella Casasola²

¹Seoul National University, Korea, Republic of (South Korea); ²Cornell University; ypark229@gmail.com

In this study we compared the acquisition of spatial language in English- and Korean-speaking children. Thirty-nine English-learning children and 80 Korean-learning children of ages 4 and 5 were tested with their comprehension and production of shape names (e.g., triangle, oval) and locative terms (e.g., in, front). English-speaking children produced and comprehended more shape names than Korean-speaking children. Also, different from English-speaking peers, Korean-speaking children used more general shape names (e.g., using one name "four corners" for rectangles and squares). In addition, although the two language groups were comparable in the number of locative terms produced and comprehended, some locative terms were more likely to be produced by Korean children (e.g., *above* and *below*), whereas others were more produced by English-speaking children (e.g., *under*). Together, the findings indicate cross-linguistic similarities and differences in young children's spatial language acquisition.

ID: 484 / PS-III: 42

Poster

Topics: Social Learning

Epistemological beliefs: The impact on adult explanations and children's subsequent learning

Katelyn Kurkul, Kathleen Corriveau

Merrimack College, United States of America; kurkulk@merrimack.edu

Children rely on adult explanations to learn about the world (Frazier, Gelman & Welman, 2009). Here, we examine the relationship between caregivers' epistemological beliefs, their explanations, and their children's ability to acquire new knowledge.

Forty parent-child dyads (18 female, $M=4;10$, $SD=6.3$ months) participated in 3 phases. First, in the exploration phase, parent-child dyads assembled a novel toy. Next, in the familiar extension, children assembled the toy alone. Finally, in the novel extension phase children independently assembled a new toy (similar function, different pieces). Caregivers' epistemological beliefs were measured using 4 questions following the exploration phase. Responses stated as a fixed truth were coded as *absolutist*, and as *evaluativist* if the response included evidence. Caregivers' epistemological stances predicted children's acquisition of a scientific concept $F(1, 38) = 9.73$, $p < .01$, $R^2 = 0.20$. We discuss the implications for these findings in terms of individual differences in children's conceptual understanding.

ID: 788 / PS-III: 43

Poster

Topics: Language, Word Learning

Keywords: morphology

Exploring 3- to 5-year-olds' Knowledge of Derived Forms

Kristina Marie Strother-Garcia, Roberta M. Golinkoff, Natalie Brezack

University of Delaware, United States of America; kmsg@udel.edu

Little is known about when and how children begin to understand derived forms (e.g., *painter*). To this end, we give 3- to 5-year-olds a derived form assessment (DFA) and compare this to their vocabulary and phonological awareness (sensitivity to phonological structures, such as syllables). Results indicate that derived form comprehension increases substantially from age 3 to 5, despite children's sparse production of derived forms during this time (see Berko, 1958; Clark, 1981). Furthermore, phonological awareness is over 1.5 times more effective than vocabulary at predicting DFA scores. Phonological skills are required to break down complex words into their constituent substructures, paving the way for the separation of affixes from roots (i.e., morphemic decomposition). Thus children who are most successful on the DFA may use morphemic decomposition to understand derived forms with greater accuracy than children who have not yet mastered this skill.

ID: 673 / PS-III: 44

Poster

Topics: Decision Making and Reasoning

Keywords: information search, active learning, 20-questions game, cognitive development.

Exploring potential sources of developmental change in the efficiency of information search

Azzurra Ruggeri^{1,2}, Tania Lombrozo¹, Thomas L. Griffiths¹, Fei Xu¹

¹University of California, Berkeley, United States of America; ²Max Planck Institute for Human Development, Berlin, Germany; a.ruggeri@berkeley.edu

We investigate how children and adults search for information to learn a novel causal relationship between a category of objects and a particular effect. We developed a novel task involving a hierarchically-structured domain, investigated both question asking and intervention, and provided formal analyses to explore potential sources of developmental change. We demonstrated that even children's information search is more efficient than that of a random learner and found evidence that: First, *both* children and adults can capitalize on hierarchical structure to ask efficient questions, although they are not able to do so when it came to interventions; Second, children's relative inefficiency does not result from adults' greater ability to ask questions targeting categories instead of individual objects; Third, children were significantly more likely than adults to continue their search for information beyond the point at which a single hypothesis remained, asking questions and selecting objects associated with zero information gain.

ID: 439 / PS-III: 45

Poster

Topics: Infant Cognition, Language, Number

Familiar Labels Help Infants Discriminate Item Size

Sophie Savelkouls, Sara Cordes

Boston College, United States of America; savelkou@bc.edu

Previous literature has shown that consistent verbal labels facilitate object categorization in infancy (Fulkerson & Waxman, 2007). However, no research has explored whether labels may also facilitate discrimination of quantitative information, such as item size. In this set of studies we examined whether familiar and unfamiliar verbal labels facilitate size discrimination in 8-month olds. Results reveal that, compared to infants exposed to no label (silence) or to an unfamiliar label ("Pagon"), only infants who heard a familiar label ("It's big") discriminated a 2-fold change in the surface area of a single element (Elmo face in a preferential looking paradigm). Thus, although familiar labels facilitate quantitative discriminations in infancy, in contrast to previous work involving object categorization, unfamiliar labels do not do so.

ID: 710 / PS-III: 46

Poster

Topics: Perception, Spatial Cognition

Flexibility of geometric processing: Evidence from reorientation

Sami Ryan Yousif, Stella Felix Lourenco

Emory University, United States of America; sryousi@emory.edu

A recent hypothesis regarding spatial reorientation by human children is that their ability to reorient in a navigable space depends exclusively on distance (i.e., spatial extent between two things) and direction (i.e., right/left) as opposed to cues such as length or angle (Lee, Sovrano, & Spelke, 2012). Here we test the question of specificity for distance by addressing a confound related to global shape. When this confound was removed, preschool-aged children were able to use length information to reorient ($p < .05$), contrary to previous findings. Furthermore, children only used distance when presented in the context of an egocentric reference frame ($p < .05$). Critically, they were unable to reorient in a space using allocentric distance cues ($p > .50$). Altogether, these findings provide evidence against the claim that distance is a privileged source of information for reorientation and shed light on the development of navigation processes.

ID: 600 / PS-III: 47

Poster

Topics: Decision Making and Reasoning

Keywords: Explanation, Metacognition

How Assessing One's Own Explanatory Knowledge Influences Children's Interest in Learning

Aubrey Williams¹, Candice Mills², Judith Danovitch¹

¹University of Louisville, United States of America; ²The University of Texas at Dallas, United States of America;
j.danovitch@louisville.edu

Children are prone to the illusion of explanatory depth (Mills & Keil, 2004), yet it is unclear whether recognizing the gaps in their understanding motivates children to seek out additional information. In this experiment, children ages 5 to 10 ($n = 75$) rated their understanding of 16 biological processes and mechanical devices. They then provided explanations for 8 of the items. Following each explanation, they rated their understanding, and indicated how interested they were in learning more about the topic. The results suggest that children who rate themselves as understanding more about a topic show greater interest in future learning about that topic. In addition, the size of children's illusion of explanatory depth was correlated with less interest in future learning, suggesting that recognizing the gaps in their explanatory knowledge does not motivate children to want to learn more, and may even discourage further learning.

ID: 340 / PS-III: 48

Poster

Topics: Decision Making and Reasoning, STEM Learning

Keywords: Causal learning

Hypothesis Testing and Argumentation from Evidence in Preschoolers

Özgül Köksal Tuncer, Beate Sodian

Ludwig Maximilian University Munich, Germany; ozgun.tuncer@psy.lmu.de

The present study investigates preschoolers' hypothesis testing and counter argumentation skills by using a causal exploratory task. Preliminary results ($n=30$, M age = 5;1, range=4;1- 6;4) suggest that there are mostly two hypothesis testing patterns in children's exploratory behaviors. 30% of the children followed a positive test strategy and tested only the starters; whereas 40% of the children made contrastive test where they intentionally both tested starters and nonstarters to form their belief. Moreover, approximately half of the children generated a valid counterargument to the false claim of the experimenter. Our preliminary results suggest that preschoolers are able to test their hypothesis before asserting a claim and can produce valid evidence to defend their claim when they are faced with a counterargument. Present findings indicate a beginning understanding of the relation between claims and evidence in preschool age.

ID: 401 / PS-III: 49

Poster

Topics: Media and Technology, Social Cognition

Keywords: Advertising knowledge, skepticism, media literacy

Increasing Children's Skepticism Toward Advertising

Susie Stanley, Chris Lawson

University of Wisconsin - Milwaukee, United States of America; shlocke@uwm.edu

The current study examined whether we could teach children to pay attention to the persuasive intent of commercials. The authors conducted a training in which children, 4- to 5-year-olds ($N = 26$), viewed commercials and were taught about various tactics advertisers used to get a consumer to want the product. Comparisons were made between the actual product and what was shown in the commercial. Children participated in tasks that measured attitudes and skepticism toward commercials. Participants also answered questions that measured their understanding of how people can be misleading through persuasive claims, self-reports, and biased decisions. Results indicate that children in the training condition were more vigilant about the persuasive intentions of commercials. We also found that children became more skeptical toward the statement of others. The results provide novel insights about the development of skepticism and children's understanding about persuasion.

ID: 452 / PS-III: 50

Poster

Topics: Attention, Executive Function

Individual Differences in Excessively Fast Response Times Relate to Intelligence More Than Very Slow Response Times for Preschoolers

Derek Montgomery, Casey Molloy, Amanda Nobis, Kristine Schmeling

Bradley University, United States of America; montg@fsmail.bradley.edu

The mean response time (M RT) of the slowest band of task RTs predicts general intelligence and executive function more than other RT bands for school-age children and adults. Excessively slow RTs presumably reflect attentional lapsing. Preschoolers, however, are distinctive in their propensity toward excessively fast, error-prone responding. We tested whether inattention is especially manifested in very fast RTs for preschoolers ($M = 54.46$, $SD = 4.96$). Sixty-two children (32 female) initially completed a seventy-trial Choice Response Time task (CRT) and the Peabody Picture Vocabulary Test (PPVT). Regression analyses with age, first (fastest), and fifth (slowest) quintile correct RTs indicated that only first quintile RTs from the CRT significantly predicted the PPVT, $p < .05$. Relatively slow M RTs at the first quintile positively related to the PPVT even upon its readministration four months later ($n = 35$). Individual differences in excessively fast RTs may distinctively mark inattention for preschoolers.

ID: 530 / PS-III: 51

Poster

Topics: Infant Cognition, Moral Cognition, Social Cognition

Individuation by sociomoral behavior in infants and adults

Erik Cheries, Hernando Taborda, Ashley Lyons

UMass Amherst, United States of America; echeries@psych.umass.edu

Infants readily interpret a character's actions towards another as 'helpful' or 'unhelpful'. An important open question, however, is whether such sociomoral behaviors are represented as an important part of an agent's individual identity (as opposed to something more superficial or transient). We tested this possibility in a classic individuation task with both infants (11-month-olds) and adults. Subjects were shown a puppet emerging from behind a screen to help and then subsequently hinder another character's goal. Infants' and adults' responses (looking time/explicit numerical judgment, respectively) were recorded to determine how many puppets they inferred being behind the screen. Our results indicate that subjects who observed an identical looking puppet engaging in *different* sociomoral actions on subsequent appearances/disappearances expected there to be two different individuals relative to baseline. This result suggests that infants' agent individuation is determined more by the type of sociomoral behavior those characters display than by their surface appearance.

ID: 335 / PS-III: 52

Poster

Topics: Attention, Infant Cognition, Memory

Infants remember object presented at event boundaries better

Trine Sonne, Osman Skjold Kingo, Peter Krøjgaard

Center on Autobiographical Memory Research, Department of Psychology, School of Business and Social Sciences, Denmark; trines@psy.au.dk

In this study sixty-eight 21-month-olds watched a 30s cartoon about a crab, with one of two event-relevant objects (spade or bucket) inserted for 3s either *at* event boundaries (EB) or *between* EB. Ten minutes later the infants watched both objects (familiar and novel) in a 10s visual-paired comparison test while being eye-tracked. Following *Event Segmentation Theory (EST)* (e.g., Kurby & Zacks, 2008; Swallow, Zacks, & Abrams, 2009), we hypothesized that objects inserted *at* EB would be processed more fully resulting in a stronger familiarity preference compared to objects inserted *between* EB. Only the infants in the boundary condition indicated memory of the object evidenced by a transient familiarity preference in the first 3s. Furthermore there was a significant difference in the familiarity preference between the two conditions. This study extends on another study illustrating that occlusion of boundary information has an effect on 20-month-olds' memory (Blinded).

ID: 350 / PS-III: 53

Poster

Topics: Infant Cognition

Infants' Expectations about the Properties of Sand

Erin Morgan Anderson, Susan J Hespos, Lance J Rips

Northwestern University, United States of America; erinanderson2014@u.northwestern.edu

Infants' reasoning about solid objects is well-documented. However, little is known about their understanding of substances like liquids or sand. In two habituation-dishabituation, looking-time experiments with 5- to 6-month-old infants, we find infants have expectations about the result of pouring sand. The first experiment shows that infants expect a single sand pile to appear after sand is poured in a single stream behind a screen and the screen is then removed. They look significantly longer when this expectation is violated ($F(1, 15) = 12.45, p < .01$). In an ongoing experiment, infants appear to make the opposite prediction when they see sand poured over a triangular roof-like structure located above the screen that divides the stream of sand in two. They now look longer at one pile than at two when the screen is removed. We discuss the perceptual cues that guide infants' ideas about how substances behave and interact.

ID: 410 / PS-III: 54

Poster

Topics: Concepts/Categories, Infant Cognition, Memory

Infants' working memory for object identities versus object categories

Michaela E. Buckley¹, Aimee E. Stahl², Melissa M. Kibbe¹

¹Boston University; ²The College of New Jersey; mebuckle@bu.edu

We investigated whether infants could remember an object's category (specifically, whether it was animate or inanimate) when they failed to remember the object's features. Eighteen-month-old infants received eight trials in which a single object (inanimate car or animate doll) was hidden inside of a box. On half of the trials, infants reached into the box and retrieved that same object (No-Switch trials). On the other half, infants retrieved a single new object, either from the same category as the hidden object (Within-Category Switch), or from a different category (Between-Category Switch). We found that, after retrieving the changed object, infants successfully searched the box for the missing hidden object during Between-Category Switch trials, but failed during Within-Category Switch trials, suggesting that infants remembered the object's category but forgot its features. These findings suggest that information about animacy may be stored more readily than featural information in 18-month-olds' working memory.

ID: 618 / PS-III: 55

Poster

Topics: Concepts/Categories, Spatial Cognition

Intuitive proportional reasoning and development in spatial memory

Hilary C. Barth¹, Ellen Lesser¹, Jessica Taggart^{1,2}, Emily Slusser^{1,3}, Ilona Bass¹, Sheri Reichelson¹, Anna Schwab¹

¹Wesleyan University, United States of America; ²U. of Virginia; ³San Jose State U.; hbarth@wesleyan.edu

Biases arising when we estimate remembered locations of objects in bounded spaces are commonly explained in terms of the Category Adjustment Model (Huttenlocher et al., 1991; Huttenlocher et al., 2000) in which estimates are made through a Bayesian combination of inexact, fine-grained information about a stimulus location and information about its spatial category. Category-level knowledge serves as prior information, which is combined in a weighted fashion with inexact stimulus values. Bias originates from the adjustment of estimates towards the category prototype (for a spatial category, usually the center of mass). We explore a different kind of explanation, focusing on a spatial reproduction task in undergraduates and children aged 6 through 10. Bias in position estimates over development was explained by a simple psychophysical model of proportion estimation (Spence, 1990; Hollands & Dyre, 2000), showing that these types of estimation biases don't necessarily provide evidence of Bayesian cue combination.

ID: 487 / PS-III: 56

Poster

Topics: Communication, Social Cognition, Social Learning

Knowing what he could have shown: The role of alternatives in children's evaluation of under-informative teachers

Hyowon Gweon, Mika Asaba

Stanford University, United States of America; masaba@stanford.edu

This study tests the hypothesis that the ability to represent alternative actions is critical for evaluations of under-informative pedagogy. Children sequentially rated two teachers who demonstrated toys to a naïve learner. We manipulated the informativeness of the teachers (fully informative vs. under-informative) and the order of the teachers. Replicating recent work (Gweon et al., 2014), 6-7 year-olds rated the under-informative teacher lower than the fully informative teacher regardless of order (Exp. 1). However, groups of 4- and 5-year-olds successfully evaluated the teachers only when they observed the fully informative teacher first (Exp. 2), suggesting that young children need concrete examples of "good teaching" to appropriately evaluate under-informative pedagogy. Given binary choice after seeing both teachers, even 4-year-olds preferred the fully informative teacher (Exp. 3). These results provide an important link between children's ability to detect violations of scalar implicature (e.g., Barner et al., 2011) and pragmatic inferences in pedagogical contexts.

ID: 760 / PS-III: 57

Poster

Topics: Concepts/Categories, Language

Learning about time: Temporal language exposure in the preschool classroom

Estelle Mayhew, Talia Waltzer, Judith Hudson

Rutgers University, United States of America; emayhew@rci.rutgers.edu

Preschool children are rarely explicitly taught time concepts, although instruction in the days, months, and seasons is sometimes included in preschool curricula. Given the lack of overt instruction, children's main avenue to understanding of time is exposure to temporal terms in conversation. The current study examined temporal language exposure in 20 preschool classrooms with children aged 3-6 yrs, during 180 hours of observation. Not surprisingly, teachers are the main users of temporal language in preschool classrooms, and most usage involves sequence terms (e.g. next, later, first, almost), even during times when time concepts such as days of week are taught. In general teachers direct more temporal language to 3-yr olds than to older children, and this includes more 'activity' time terms (e.g. naptime, cleanup time) and conventional temporal terms. Despite having less temporal language directed toward them, older children use almost twice as much temporal language as younger children do.

ID: 691 / PS-III: 58

Poster

Topics: Spatial Cognition

Keywords: Problem-solving, preschoolers

Let's Talk About It: Asking Preschoolers to Explain a Spatial Problem Can Help Them Solve It

Alyssa Iulianetti, Amy S. Joh

Seton Hall University, United States of America; amy.joh@shu.edu

Spatial reasoning, the ability to predict the movement of objects, can be difficult for young children. The current study links spatial reasoning with verbal explanations, which may assist children work through complex problems. Twenty-three 3-year-olds predicted where a ball would emerge when dropped into one of three intertwined tubes. They were also asked to explain their prediction. Children receive 12 test trials, and their responses were compared to those from previous studies in which children did not provide explanations. The explanation manipulation interacted with participants' age and trial block (first half vs. second half of 12 trials) ($p=.04$, $\eta_p^2=.04$). In the control condition, only older children improved across blocks ($p<.01$, $d=.48$). However, in the explanation condition, success was consistent across blocks because both younger and older children made more correct predictions starting in the first block. These findings suggest that talking may help younger children solve difficult spatial problems.

ID: 515 / PS-III: 59

Poster

Topics: Number, STEM Learning

Linking symbols to underlying quantities supports transfer in mathematics

Rebecca Boncodd¹, Andrew Young², Jordan Thevenow-Harrison², April Murphy², Molly Yunker², Charles Kalish², Martha Alibali², Timothy Rogers²

¹Central Connecticut State University; ²University of Wisconsin-Madison; boncodd@ccsu.edu

You can't learn a rich mental model if there is no structure in the environment. Unfortunately, mathematics is often presented (or may be perceived as) strings of arbitrary symbols. Such a format may obscure the underlying, quantitative, relations organizing the symbols. We tested whether arithmetic practice in a format highlighting quantitative relations better supports generalization compared to practice in a conventional symbolic format. Additionally, we tested whether an absence of underlying quantitative structure may lead learners to focus on distributional frequencies of symbols, (forming prototype-like representations) leading to inappropriate generalization. Our results provide evidence that highlighting quantitative relationships promotes generalization to different problem types, and reduces the negative impact of frequency effects.

ID: 516 / PS-III: 60

Poster

Topics: Decision Making and Reasoning, Social Cognition

Me, Myself & I's: Multiple identity mindsets boost children's flexible thinking

Sarah Gaither (Diversity Fellow), Samantha Fan, Katherine Kinzler

University of Chicago, United States of America; sgaither@uchicago.edu

Adult research suggests priming individuals to think about their multiple social or racial-group identities leads to more flexible, creative thinking. Here we investigated the developmental origins of the link between social identification and thinking from diverse perspectives. Forty-eight children (ages 6-7 years) were assigned to either a multiple-identities prime where they were reminded about their multiple identities (e.g., being a friend, reader, neighbor) or to a physical-traits prime where they were reminded about having multiple physical attributes (e.g., having legs, eyes, arms). Children completed four tasks assessing divergent and convergent thinking, essentialist reasoning, and social categorization. Priming a multiple identity mindset led to greater creativity and flexible thinking on all tasks including reduced essentialism compared to the physical-traits condition. Our findings are the first to investigate the association of identity flexibility, creativity, and social categorization for children and highlight the potential impact of having multifaceted views of one's social selves.

ID: 428 / PS-III: 61

Poster

Topics: Culture, Language

Keywords: metalinguistic awareness, false belief, inhibitory control

Metalinguistic Awareness Development: Different Pathways for Chinese- and English-speaking Preschoolers

Yao Guan, M. Jeffrey Farrar

University of Florida, United States of America; yaoguan@ufl.edu

Metalinguistic awareness refers to the ability to identify, reflect upon the language forms and manipulate linguistic units. It plays a critical role in reading development. The present study investigated Chinese- and English-speaking preschoolers' metalinguistic awareness. Of interest was the role of cognitive and linguistic abilities in its development. 42 Chinese-speaking and 36 English-speaking monolingual children completed a series of: metalinguistic awareness, false belief, inhibitory control, and receptive vocabulary tasks. The results indicated distinct pathways for the two language groups: English-speaking children had a more advanced level of phonological awareness and semantic awareness compared to their Chinese-speaking counterparts; inhibitory control was related to semantic awareness for Chinese-speaking children while receptive vocabulary was related to phonological awareness for English-speaking children. These differences may be attributable to the characteristics of the Chinese and English languages, as well as the pattern of linguistic and cognitive development in the two language groups.

ID: 728 / PS-III: 62

Poster

Topics: Communication, Spatial Cognition, STEM Learning

Multiple Modes of Representation in Communicating Geological Concepts in Developing Learners

Cori A. Bower¹, Lynn S. Liben¹, Adam E. Christensen¹, Kim A. Kastens²

¹The Pennsylvania State University, United States of America; ²Lamont-Doherty Earth Observatory, Department of Earth & Environmental Sciences and Columbia University; cbower@psu.edu

Gestures provide insights into learners' developing scientific and spatial concepts (Alibali, 2005; Goldin-Meadow, 1999). Here we examine the accuracy of iconic gestures when communicating spatially demanding geological concepts of strike and dip (SD). 98 adults with varied geological expertise (coursework) and spatial skills (water-level performance), read information about SD, completed SD tasks, and video-recorded explanations of SD for novices. Data coded and analyzed to date (n=30) show that angular accuracy of spontaneous gestures (e.g., gesturing a horizontal plane when saying "horizontal") correlates with accuracy of verbal explanations, suggesting the integrated use of words and gestures for communication with others. Interestingly, gestural accuracy was correlated with neither participants' geological expertise nor spatial skills. Findings suggest that gestures made while intentionally communicating to another person may reflect message-senders' sensitivity to message-recipients' needs more than

message-senders' conceptual understanding, and suggest the potential utility of using verbal and gestural communication tasks for educational purposes.

ID: 440 / PS-III: 63

Poster

Topics: Concepts/Categories, Social Cognition

Keywords: multiracial person perception, diverse samples, social cognition, hypodescent

Multiracial children's and adults' categorizations of multiracial individuals

Steven Roberts (Diversity Fellow), Susan Gelman

University of Michigan, United States of America; sothello@umich.edu

Individuals with black and white parentage (henceforth referred to as "multiracial individuals") are perceived as more black than white. This black-categorization bias has been studied from the perspective of monoracial adults and children, but not yet from the perspective of multiracial adults and children. Here we examine how multiracial adults and children (ages 4 to 9) categorize multiracial individuals (presented with and without parentage information), and how rates of inter-group contact predict their categorizations. When parentage information was provided, multiracial adults, but not children, reasoned that multiracial targets were neither wholly black nor wholly white. However, both multiracial adults and children categorized multiracial targets as more black than white (regardless of the absence or presence of parentage information). As expected, children's white-group contact predicted their black-categorization bias. Together, we show that this black-categorization bias emerges early in development even within multiracial samples, and is especially likely in predominantly white contexts.

ID: 650 / PS-III: 64

Poster

Topics: Developmental Disabilities, Executive Function, Reading

Keywords: Attention, fMRI, Intervention

Neural correlates of reading comprehension and stop-signal inhibition in struggling and typical readers

Mary Abbe Roe¹, Joel E Martinez¹, Jeanette A Mumford², Dana M DeMaster³, Jenifer J Juranek³, Leonel A Olmedo¹, Russell A Poldrack⁴, Sharon R Vaughn⁵, Jack M Fletcher⁶, Jessica A Church¹

¹University of Texas at Austin, Department of Psychology; ²University of Wisconsin Madison, Department of Biostatistics and Medical Informatics; ³University of Texas Health Science Center, Department of Pediatrics; ⁴Stanford University, Department of Psychology; ⁵University of Texas at Austin, Department of Special Education; ⁶University of Houston, Department of Psychology; maroe@austin.utexas.edu

A multi-modal neuroimaging study investigated brain activity in 4th grade children recruited from a multi-city, in-school reading intervention project. With a particular focus on reading comprehension and its interactions with executive functions, we collected neuroimaging data during a sentence reading task and a stop-signal task commonly used to measure response inhibition, an important executive function component.

Our fMRI analysis of the sentence task found greater activity in occipito-temporal and frontal cortex in struggling readers, suggestive of less fluent processing in struggling readers. Our investigation of the stop-signal task found different activation in putative task control regions during correct "go" trials and failed "stop" trials in the post-intervention readers relative to the pre-intervention readers. These data suggest that reading intervention-related brain change may occur on a different timeframe in control-related brain regions than in reading-related regions. Our results are interpreted in the context of age and reading intervention outcomes.

ID: 743 / PS-III: 65

Poster

Topics: Infant Cognition, Neuroscience Approaches

Keywords: Tool use

Neural processing of grasp appropriateness in infancy

Aine Ni Choisdealbha, Vincent Reid

Lancaster University, United Kingdom; a.nichoisdealbha@lancaster.ac.uk

Learning to shape one's hand appropriately is crucial to learning how to use tools. The neural responses of 9-month-olds to observed power and precision grasps on cups were recorded using 128-sensor EEG nets. The appropriateness of the grasp depended on the presence of a handle. Results from fifteen infants revealed a left fronto-central Nc effect, $t(14) = 2.74$, $p < 0.025$, with the component being larger for the inappropriate grasp. These results show that 9-month-olds attended more strongly to the inappropriate grasps, suggesting that by this age infants are encoding the appropriateness of the means of grasping an object on the basis of that object's structural features. A replication with 11.5-month-olds reveals an N400 peak in response to appropriate and inappropriate grasp stimuli (relative to baseline, $F(1,14) = 4.584$, $p < 0.05$), indicating a developmental change in processing.

ID: 786 / PS-III: 66

Poster

Topics: Concepts/Categories, Language, Word Learning

Keywords: Negation, Logic

Online processing of verbal negation in two-year-olds

Roman Feiman, Jesse Snedeker

Harvard University, United States of America; rfeiman@fas.harvard.edu

Logical linguistic connectives like “not” and “no” have meaning, not through reference to the world, but by applying a function to the meanings of the concepts and propositions they combine with. In Experiment 1 we tested online comprehension in a preferential looking task that provided greater pragmatic support. Children watched a video in which two characters both repeated an action, with accompanying narration (“They’re dancing! Look, they’re dancing!”) Then one character stopped and the narrator uttered either an affirmative (“Look! Now it’s different! John is dancing!”) or negative (“John is not dancing!”) sentence. In Experiment 2 a person played with one of two toys (“That looks like fun!”), then another person played with the other toy, (“Look, now it’s different! He’s (not) playing with the dax!”). In both experiments, 32-35 month-olds, but not younger children, rapidly looked at the correct referent on both negative and affirmative sentences.

ID: 495 / PS-III: 67

Poster

Topics: Language, Social Cognition, Word Learning

Keywords: conventionality learning

Only the demonstration of between object connection induce to taking the object labels as conventional

Tatyana Kotova¹, Alexey Kotov², Elizaveta Vlasova¹

¹The Laboratory of Cognitive Research, Russian Academy for National Economy and Public Administration, Russian Federation;

²The Laboratory of Cognitive Research, National Research University "Higher School of Economics", Russian Federation;

tkotova@gmail.com

Children can distinguish new words with conventional meaning from ones with only situational meaning basing on several cues: gaze direction, linguistic forms.

We explain effects of such cues by the inclusion of new words in differently structured joint actions. If the joint action is focused on between objects connection, new words will be perceived as elements of integrated shared knowledge (like a language) and taken as conventional. If the joint action is a series of separate operations, new words will be perceived as situational shared knowledge and taken as unconventional.

We gave 2-4-year-olds geometric-shaped objects named by legend words. The game consists either between objects connection or separate operations with objects. We estimated which words children would use addressing to a stranger. 2-3-year-olds from the connection condition used the legend words, but children from the separate actions condition named objects by shape. For elder children condition difference was irrelevant.

ID: 739 / PS-III: 68

Poster

Topics: Social Learning

Keywords: persistence, emotion, socialization

Parent Socialization of Shame Regulation Predicts Task Performance and Depressive Symptoms in Middle Childhood

Patricia A. Smiley¹, Hannah F. Rasmussen², Katherine V. Buttitta³, Jessica L. Borelli¹

¹Pomona College, United States of America; ²University of Southern California; ³Claremont Graduate University;

psmiley@pomona.edu

College-age students who focus on the possibility of performing poorly (“performance-avoidant”) are more likely to experience shame during exam preparation, and subsequently, to perform poorly (Pekrun et al., 2009). Shame around academic performance may be socialized in childhood with “negative conditional regard” (NCR), a practice of withdrawing affection /attention when children fall short of performance expectations. Mothers of 113 children (mean=11.57 years) reported use of NCR in response to academic underperformance. Children produced narratives about a shame experience (level of arousal and coping were coded), worked on four unsolvable puzzles, and completed a depressive symptoms inventory. Associations between mother-reported NCR and decrease in strategy use across the puzzles and between mother-reported NCR and depressive symptoms were mediated by shame regulation. Children’s ability to persist on challenging cognitive tasks, and overall mental health, may be impaired by unregulated feelings of shame that are socialized by parenting that is over-focused on performance.

ID: 421 / PS-III: 69

Poster

Topics: Number, Spatial Cognition, STEM Learning

Pattern, but not shape, knowledge predicts fifth grade math outcomes

Emily Ruth Fyfe, Bethany Rittle-Johnson, Kerry Hofer, Dale Farran

Vanderbilt University, United States of America; emily.r.fyfe@vanderbilt.edu

Exploring patterns and shapes is a common, and potentially important, mathematical activity for young children. However, the contributions of early pattern and shape knowledge to more formal math achievement remain unknown – largely because the majority of research on early mathematics focuses exclusively on numeracy. In the current study, children (n = 517) from low-income homes completed a variety of assessments at ages 5, 6, 7, and 11, spanning PreK to fifth grade. Assessments included measures of children’s pattern and shape knowledge. Pattern knowledge, but *not* shape knowledge, at ages 5, 6, and 7 predicted math achievement in fifth grade, over and above general math, reading, and oral language skills. This was also true for predicting

formal geometry in fifth grade, indicating that shape knowledge was not even predictive of the most direct math outcome. Results highlight the important role that patterning can play in the development of mathematics knowledge.

ID: 761 / PS-III: 70
Poster

Topics: Number

Preschool Predictors of Early Math Ability

Andrew Ribner¹, Emily Slusser², Anna Shusterman³

¹New York University, United States of America; ²San Jose State University, United States of America; ³Wesleyan University, United States of America; aribner@nyu.edu

While research has suggested that acuity of the approximate number system (ANS) is a predictor of math ability, this relationship may be mediated by other skills. We investigated which early-childhood factors best predict math ability, and which factors exhibit SES disparities. A diverse sample of preschool children was assessed on ANS acuity, number word knowledge, and receptive vocabulary. One year later, children repeated these measures and completed a test of math ability. All pretest skills predicted unique variance in math ability, suggesting independent systems that contribute to early academic math. SES positively correlated with all skills except ANS acuity. Mediation analyses indicated that number word knowledge and general vocabulary mediated the relation between SES and math ability, and that general vocabulary mediated the relation between SES and number word knowledge. We propose an integrated model in which general language affects number word knowledge, which in turn influences general mathematical understanding.

ID: 477 / PS-III: 71
Poster

Topics: Computational Approaches, Decision Making and Reasoning

Keywords: Exploration and self-directed learning

Preschoolers use probability information to guide exploration-exploitation

Elizabeth Lapidow, Elizabeth Bonawitz

Rutgers University - Newark, United States of America; lbaraff@gmail.com

Agents must choose between acting to investigate and resolve unknowns in the environment and acting to make use of already known resources; less is known about how children choose between these strategies. We presented preschool children (M=60mos, R=51mos-66mos) with a choice between a reward of a known amount and rewards sampled at random from distributions that varied in their expected values. Preschoolers employed one of three different strategies for choice: bias to almost always choosing the 'known' box (N=7); bias to choose the 'unknown' box (N=4); or responding with a mix of 'known' and 'unknown' choices (N=9). The behavior of the mixed-responders directly correlated to the probability ratios of known to expected rewards, demonstrating that children rationally trade-off exploration and exploitation in response to probability information. Ongoing testing is examining the consistency of individual strategy use and relating these strategies to other measures of curiosity, exploratory play, and executive function.

ID: 722 / PS-III: 72
Poster

Topics: Concepts/Categories, Language, Word Learning

Keywords: Time, Temporal Language, Temporal Judgments

Preschoolers' Understanding of Temporal Language

Meng Zhang, Judith Hudson

Rutgers University, United States of America; meng.zhang0904@rutgers.edu

Children's understanding of temporal language indicates their understanding of time. This study used a picture-sentence matching paradigm to test children's understanding of past and future. Preschoolers (N=56) viewed two pictures of an object with a visible change of state (e.g., a carved pumpkin and an intact pumpkin) while listening to a sentence indicating the time of the action (e.g., "I carved the pumpkin yesterday"). Twelve sentences referred to the past and 12 referred to the future. Half of the sentences included a temporal adverb (*yesterday* or *tomorrow*) and half did not. All age groups performed equally poorly on future sentences (only 39% correct). However, 5-yr-olds were more accurate (78% correct) than 4-yr-olds (68% correct) on past sentences, and 4-yr-olds were more accurate than 3-yr-olds (58% correct). The presence of a temporal adverb did not improve children's accuracy. Results suggest that children's understanding of the past develops earlier than their understanding of the future.

ID: 372 / PS-III: 73
Poster

Topics: Social Cognition, Social Learning, Theory of Mind

Keywords: collaboration, prosociality, social cognition, social learning, theory of mind, representative sample, low income

Proximate and Cognitive Predictors of Preschoolers' Spontaneous Peer Collaboration

Christopher John Vredenburgh, Tamar Kushnir

Cornell University, United States of America; cv92@cornell.edu

Young children's early social coordination and its potential evolutionary benefits are well documented. Here, we investigated proximate predictors of preschoolers' peer collaboration. Specifically, we used a multi-step toy construction task involving age-

matched dyads (Age: $M = 4.49$ years) to investigate whether preschoolers modulate when and how much they collaborate depending on the difficulty of the step, children's skill at completing similar tasks, and their theory of mind. We coded children's actions and visual attention during the task in one second intervals. We recruited a representative sample, including low income dyads. Our findings indicate preschoolers initiate and sustain collaborative bouts to meet the demands of the task (Step Difficulty: $\beta = 1.474$, Wald's $\chi^2 = 39.587$, $p < .000$), but act independently when collaboration is unnecessary. We will also report on the significance of children's visual attention to one another and individual differences in children's theory of mind and ability.

ID: 427 / PS-III: 74

Poster

Topics: Spatial Cognition

Puzzles and Prompts Support the Development of Spatial Language During the Preschool Years

Alycia M. Hund

Illinois State University, United States of America; amhund@ilstu.edu

The goal was to specify the role of scaffolding and overhearing in facilitating 3- to 5-year-old children's use of the complex spatial terms *between* and *middle*. Children ($n = 154$) hid a mouse between two identical furniture items and then told a doll where the mouse was hiding. They were prompted with the terms *between* or *middle*, were asked to provide more information, or overheard adult conversations containing *between* or *middle*. Parents completed surveys regarding child spatial language and related activities. As expected, children who received direct prompting were highly likely to use *between* or *middle*. In contrast, children who received less directive prompting or who overheard conversations evinced limited use of these complex terms. Playing with puzzles and singing songs were related to child language production, even after controlling for gains over age. These findings highlight the importance of direct support and activities such as puzzles and songs.

ID: 542 / PS-III: 75

Poster

Topics: Social Cognition, Social Learning

Rational optimism in children's social reasoning

Shari Liu, Felix Warneken

Harvard University, United States of America; shariliu01@g.harvard.edu

Action understanding demands inference about unobservable cause from sparse evidence. Previous work shows that young children readily infer causal relations from observing very few examples (Gweon & Schulz, 2011), but also appear committed to the irrational assumption that agents are competent and good (Boseovski, 2010). The present experiments are the first to take these two portraits of early social reasoning—one of flexible rationality and the other of naïve optimism—to explore children's causal attributions for generous and selfish action outcomes given varying patterns of evidence about cause. Across two studies ($Ns = 60$), we demonstrate that children rationally predict future outcomes given what they previously observed. Nevertheless, we find that children are overgenerous in attributing positive outcomes to the niceness of agents. Our findings indicate that early social causal reasoning is characterized both by commitment to the evidence and the biased assumption that good outcomes are caused by people.

ID: 486 / PS-III: 76

Poster

Topics: Concepts/Categories, Decision Making and Reasoning, Social Cognition

Keywords: Psychological essentialism

Reassessing Adults' Social Essentialist Beliefs: The Case of Social Induction

R. Cole Eidson, John D. Coley

Northeastern University, Boston, MA; r.eidson@neu.edu

Essentialist beliefs including inductive potential - a belief that due to a shared underlying nature, category members will share similar properties - have been increasingly examined within the social domain. While children exhibit inductive potential for a range of social categories, adults often fail to do so (e.g., Diesendruck & haLevi, 2006). However, Eidson and Coley (2014) suggested that adults hold fast, automatic essentialist beliefs that are suppressed in traditional developmental tasks. We had adults complete a dyadic inference task to assess inductive potential which, unlike past inference tasks, allowed for independent category judgments. Results show participants ascribed inductive potential to racial, gender, religious, and political categories with race/gender promoting shared physical properties and religion/political affiliation promoting shared behaviors. Faster responses were also associated with increasing essentialist beliefs. These findings support the notion that essentialism is fast, automatic, and pervasive but potentially suppressed later in development and adulthood.

ID: 390 / PS-III: 77

Poster

Topics: Language, Spatial Cognition

Relation between language and spatial cognition: Uncovering mechanisms

Hilary E. Miller, Haley A. Vlach, Vanessa R. Simmering

University of Wisconsin-Madison, United States of America; hemiller@wisc.edu

Children's spatial language production predicts their spatial skills, but the mechanism underlying this relation is still a source of debate. Across two experiments, we examine whether skills in selecting task-relevant spatial information underlie this relation. In Experiment 1 ($N = 42$), we tested whether children's ability to select relevant language cues in the moment of a task is more predictive of their spatial performance than is their productive spatial vocabulary. Children's selection of relevant cues (both spatial and non-spatial) was more predictive of their spatial performance than was their productive spatial vocabulary. In Experiment 2 [$N = 43$ (60 planned)], we are testing whether this relation between selection in language use and spatial skills is not specific to language but reflects a more general process of attending to and remembering task-relevant spatial information. These findings suggest that selection is an important process underlying the relation between language and spatial cognition.

ID: 525 / PS-III: 78

Poster

Topics: Neuroscience Approaches, Social Cognition

Relation between Neural Selectivity for Biological Motion in Middle Childhood and Individual Differences in Behavior

Laura Christine Anderson, Katherine Rice, Kayla Velnoskey, Elizabeth Redcay

University of Maryland, United States of America; lander10@umd.edu

Children demonstrate both behavioral and neural changes in processing biological motion during middle childhood, but little work has investigated the relation between these neural and behavioral changes and their relevance to children's developing social abilities. The purpose of this study was to determine whether developmental neural selectivity for biological motion relates to social competence and biological motion discrimination abilities. Children aged 7-12 ($N = 18$) viewed point-light displays of biological motion in the fMRI scanner and completed a behavioral task measuring biological motion processing. Parents and children completed questionnaires indexing social competency. Children showed a selective neural response to biological motion in social brain regions. Individual differences in biological motion discrimination and social competence predicted neural selectivity for biological motion in right superior temporal sulcus and amygdala. Findings suggest that neural selectivity for biological motion is behaviorally-relevant and related to real-world social skills, which may have implications for atypical social development.

ID: 634 / PS-III: 79

Poster

Topics: Executive Function

Keywords: Head Start, Stress, Socioeconomic Status

Roles of Self-Regulation and Familial Economic Stress on Head Start School Readiness

Alexandra Nancarrow, Ansley Gilpin, Caroline Boxmeyer, Jason DeCaro, John Lochman

University of Alabama, United States of America; agilpin@ua.edu

Researching factors related to school readiness has become critical as preschool demand increases (Griffith et al., 2010). Factors such as stress and low SES may have detrimental effects on school readiness as poverty adds stressors that inhibit development (e.g., self-regulation; Blair, Granger, & Razza, 2005; Fitzpatrick, McKinnon, Blair, & Willoughby, 2014). Head Start preschoolers ($N = 217$) completed self-regulation measures of school readiness such as executive functions (EF) and vocabulary. Teachers reported on child self-regulation and school readiness with parents reporting their stress and demographics. Results demonstrated inverse relations between parent stress and child EF ($r = -.27, p = .009$) as well as parent income and child EF ($r = -.17, p = .047$). Positive relations were also found between school readiness measures (i.e. EF and vocabulary; $r = .35, p < .001$). Results are discussed in terms of the effect of stress and poverty on child school readiness.

ID: 353 / PS-III: 80

Poster

Topics: Concepts/Categories, STEM Learning

Science matters: Children's explicit knowledge of science relates to their scientific inference capacities

Deena Skolnick Weisberg¹, Tiffany Tassin², Kathy Hirsh-Pasek³, David M. Sobel²

¹University of Pennsylvania; ²Brown University; ³Temple University; deena.weisberg@psych.upenn.edu

Early science education aims to develop children's understanding of the nature of science. But does this understanding bear on their scientific reasoning abilities? Across two studies, we show that this understanding indeed relates to the ability to make causal inferences. In Study 1, 5- to 8-year-olds ($N=72$) engaged with a causal learning environment that simulated a scientific reasoning measure. Those who defined "science" as a process were more likely to draw the proper causal conclusion warranted by the data, independent of age and language usage. Further, age and exposure to science education alone did not increase the probability that children would provide mature definitions of "science" (Study 2). These results show that children who can articulate an understanding of science that matches the pedagogical goals of inquiry-based curricula are more likely to possess the domain-general causal reasoning capacities that enable the construction of scientific knowledge.

ID: 651 / PS-III: 81

Poster

Topics: Attention, Perception

Keywords: selective attention, intersensory

Selective looking to audiovisual redundancy: A new method demonstrates fine-grained, acoustically-driven visual exploration in young children

Lorraine E Bahrick, Kasey C Soska, James Torrence Todd

Florida International University, United States of America; ksoska@fiu.edu

We developed the Intersensory Processing Efficiency Protocol (IPEP) to characterize individual differences in selective attention to intersensory redundancy, a gateway to learning and memory. Children (3.5-5 years) were shown a grid of 6 events depicting women speaking (social; N=32) or objects striking a surface (nonsocial; N=32). A block of audiovisual (soundtrack synchronized with one of the 6 events) and a block of silent, visual control trials were presented (12 6-s trials per block). Gaze was recorded with a Tobii X120 eye-tracker. Summing across fixations, children fixated the target on more trials and gazed to it longer on audiovisual than on silent, visual trials. For individual fixations, children distributed their fixations across more events and returned to the target more often on audiovisual than silent trials (consistent across social/nonsocial conditions). Children demonstrated acoustically-driven visual exploration. The IPEP provides a fine-grained, novel measure of individual differences in selective attention to intersensory redundancy.

ID: 620 / PS-III: 82

Poster

Topics: Concepts/Categories

Keywords: categories; labels; induction;

Some Features Influence Children's Inductive Inferences More than Others

Nick Noles

University of Louisville, United States of America; nicholaus.noles@gmail.com

The present study explores the influence of different kinds of features on preschool aged children's classification and induction behaviors. After learning two categories of creature, children viewed creatures that either fit into a prototypical category or had features and labels from competing categories, and they were asked to perform classification (e.g., identify a creature's category) and induction (e.g., identify a creature's missing features, given a category label). The feature dimensions tested, shape and color, were selected in order to evaluate the relative salience of different kinds of features. When presented with prototypical category members, children's classifications and inductions were accurate. When presented with creatures with counter-predictive features, neither feature unduly influenced children's classifications. In contrast, when children were asked to make inductions about creatures with features that conflicted with their category labels, color was found to significantly influence inductions while shape did not.

ID: 716 / PS-III: 83

Poster

Topics: Social Cognition, Spatial Cognition, STEM Learning

Spatial Anxiety and the Effects of Gender Stereotypes on Young Girls' Spatial and Mathematical Performance

Katherine L. Boice, Jillian E. Lauer (Diversity Fellow), Stella F. Lourenco

Emory University, United States of America; jillian.lauer@emory.edu

Research demonstrating that the salience of gender stereotypes influences young girls' math performance (Ambady et al., 2001) has raised questions about the development of gender stereotypes and the mechanisms by which such stereotypes influence girls' performance on gender-stereotyped tasks. In the present ongoing study, we examined the role of explicit gender stereotypes and task-related anxiety in young girls' (current $n = 30$) susceptibility to stereotype threat during spatial and mathematical tasks. Initial analyses did not suggest that 6- to 8-year-old girls' were susceptible to stereotype threat. However, analyses of individual differences indicated that girls' experiences of anxiety while performing spatial and mathematical tasks increased significantly with age, and girls' performance was associated with their perceptions of boys' and girls' capabilities on the relevant tasks. Together, these findings suggest that stereotypes regarding women's cognitive abilities and increasing anxiety about gender-stereotyped tasks may interact to influence young girls' spatial and mathematical performance.

ID: 724 / PS-III: 84

Poster

Topics: Language, Word Learning

Keywords: Analogy

Structure-Mapping in Word Learning: Alignable Differences Promote Fast Mapping

Ruxue Shao, Dedre Gentner

Northwestern University, United States of America; ruxueshao2018@u.northwestern.edu

Fast mapping refers to the phenomenon in which young children are able to acquire new information through limited exposure (Carey & Bartlett, 1978; Heibeck & Markman, 1987). We propose that analogical processes, such as *structural alignment*, facilitate children's detection of *alignable differences* and promote fast mapping.

We tested this claim by varying the alignability of the objects that participants were exposed to in a fast mapping task for a novel color word. Children in the High Alignability (HA) condition saw two objects that differed only in color, while those in the Low Alignability (LA) condition saw objects that varied in both color and shape. Participants were later assessed on their understanding of the novel word in a Yes-No Sorting Task. Children in the HA condition were significantly better at identifying chromium objects than those in the LA condition. A second study ruled out a purely informational account.

ID: 627 / PS-III: 85

Poster

Topics: STEM Learning

Keywords: control-of-variables strategy (CVS), inquiry skills, science education, development of process skills

The development of different facets of the control-of-variables strategy

Martin Schwichow (International Fellow)

IPN - Kiel, Germany; schwichow@ipn.uni-kiel.de

The control-of-variables strategy (CVS) incorporates the important scientific process skills of designing and interpreting controlled experiments. Therefore, CVS is a prominent concept in numerous science standards. CVS consists of four sub-skills: (a) understanding the indeterminacy of uncontrolled experiments, (b) planning, (c), identifying and (d) interpreting controlled experiments. This quasi-longitudinal study with $N = 1289$ German high school students investigates the development of the four CVS sub-skills from 5th to 13th grade (ages 10 to 18). The raw data are transformed in Rasch-measures before they are analyzed. The results show that students in the 5th grade can already plan, identify, and interpret controlled experiments but that they do not understand the indeterminacy of uncontrolled experiments before 10th grade. In conclusion, even young students can utilize science process skills but do not understand why they have to use these skills. Implications for science instruction and further research are discussed.

ID: 789 / PS-III: 86

Poster

Topics: Concepts/Categories, Language, Spatial Cognition

Keywords: gesture; time; metaphor

The development of explicit and implicit spatial representations of time

Katharine Allen Tillman¹, **Tyler Marghetis**¹, **Sara Al Mughairy**², **David Barner**¹, **Maresh Srinivasan**²

¹University of California, San Diego; ²University of California, Berkeley; katillman@ucsd.edu

Space and time are intimately linked by human culture, via linguistic metaphors, practices like reading and writing, and artifacts like timelines. When English-speaking adults talk about time, they also spontaneously employ systematic metaphorical gestures, for example pointing leftward to refer to the past, and rightward for the future. Here we investigate children's spatial representations of time using both an explicit timeline task and an implicit gesture task. Remarkably, by age 4, children can use bidirectional timelines to represent both the ordering and past/future status of events (e.g., breakfast) and time words (e.g. *yesterday*) better than chance. By 5, some children also spontaneously employ systematic co-speech gestures to convey these temporal relations. Over the next 3 to 4 years, gesture and timelines are used in an increasingly adult-like fashion, revealing a protracted period over which mappings between space and time are refined and conventionalized.

ID: 432 / PS-III: 87

Poster

Topics: Memory

The effects of conceptual and spatial chunking cues on young children's working memory

Mariko Moher¹, **Alida A. Davis**^{1,2}

¹Williams College, Department of Psychology; ²Columbia University Medical Center, Department of Psychiatry; mariko.moher@williams.edu

In two experiments, 3- to 7-year-old children watched 6 to 8 images of common animals, foods, objects, and/or clothing items being presented, and then were asked to find a specific target (e.g., "where did the dog go?"). On some trials, the items were organized spatially (e.g., 4 items on the left side, 4 items on the right), and on some trials, the items were organized conceptually (e.g., 4 animals and 4 food items). On some trials, items were organized using both cues (e.g., 4 animals on the left, 4 food items on the right). Children's performance, including their error patterns, suggested that these chunking cues helped them better remember the target location. Although young children may struggle to self-impose chunking cues in order to boost their memory, these results suggest that they are able to take advantage of cues that are available in the environment.

ID: 612 / PS-III: 88

Poster

Topics: Media and Technology

Keywords: Metacognition, Middle Childhood

The Effects of Interactive Media on Metacognition in Middle Childhood: Different Game Play, Different Outcomes?

Ashley A. Ricker (Diversity Fellow), **Rebekah A. Richert**

University of California, Riverside, United States of America; ashley.ricker@email.ucr.edu

This study evaluated the relationship between interactive media (IM-exposure; i.e., videogames) and metacognitive-skills in children ages 6 to 10 ($N=44$, $M_{age}=8.31$). Parents reported time spent by their child on different IM-devices, and responded to questions regarding specific videogames their child had played. Different types of videogames were investigated, as they were hypothesized to have differential impacts based on the opportunities for metacognitive-experience they provide. Researchers rated games on level-of-control, feedback, and adaptivity (coded: High-Opportunity vs. Low-Opportunity). Additionally, children completed a metacognition interview in the lab (metacognitive-skills; 8-item sum, $\alpha = .69$). Multiple-regression results indicate that IM-exposure significantly predicts children's metacognitive-skills ($R^2=.15$, $p=.04$). However, High-Opportunity exposure is predictive ($\beta=.45$,

$p=.01$) while Low-Opportunity exposure is not ($\beta=-.16$, $p=.36$). These results support the hypothesis that different types of videogames provide children with differential opportunities for metacognitive-experience. These findings have implications for future research investigating interactive media, metacognition, and their impacts on memory and learning.

ID: 422 / PS-III: 89

Poster

Topics: Word Learning

Keywords: Statistical Learning; Learning and Retrieval; Contextual Effect

The Effects of Learning and Retrieval Contexts on Statistical Word Learning

Chi-hsin Chen, Chen Yu

Indiana University, United States of America; chen75@indiana.edu

Many aspects of early cognitive development depend on aggregating statistical regularities in the environment. Prior research suggests that humans are able to use different types of statistical information in isolation to perform various tasks. However, natural linguistic environments usually provide structured input at multiple levels. For example, semantically-related words (e.g., milk, water, juice) usually co-occur in the same contexts. Experiment 1 of the current study examined whether the structures of learning contexts (semantically-themed vs. non-themed) and retrieval contexts (semantically-themed vs. non-themed) affected adults' statistical word learning. Results showed that semantically-themed learning contexts facilitated learning. In contrast, the retrieval contexts did not affect performance. Experiment 2 is an ongoing project which investigates whether semantically-themed learning structure also facilitates preschoolers' novel word acquisition. The current research points to the importance of grounding statistical learning in context. It also shed light on our understanding of how contextual support enhances word learning.

ID: 748 / PS-III: 90

Poster

Topics: Decision Making and Reasoning, Moral Cognition, Social Cognition

The extraordinariness of (extra)ordinary giving

Arber Tasimi¹, Susan A. Gelman², Henry M. Wellman²

¹Yale University, United States of America; ²University of Michigan, United States of America; arber.tasimi@yale.edu

Generosity is a central feature of everyday life, yet little is known about people's expectations regarding others' generosity beyond their preference for fairness. In the current research, we report a developmentally unchanging intuition that individuals do not give away all that they have. Two studies with 160 preschoolers, 7- to 9-year-olds, and adults examined expectations regarding others' giving, when cost is minimal (sharing a snack). Despite the mild context, we find a strong expectation in all age groups that others will not engage in total giving. Moreover, this expectation is independent of whether the resulting distribution of resources is fair or unfair. We suggest that this basic intuition serves as a basic principle for people's understanding of generosity.

ID: 791 / PS-III: 91

Poster

Topics: Media and Technology, Memory, Symbol Use

The Impact of Contextual Differences on Toddlers' Object Retrieval using Touchscreens

Koeun Choi¹, Heather Kirkorian¹, Tiffany Pempek², Elizabeth Schroeder¹, Roxanne Etta¹

¹University of Wisconsin-Madison; ²Hollins University; kchoi38@wisc.edu

Toddlers exhibit difficulty in transferring information from video to real-life objects (Anderson & Kirkorian, 2015; Troseth, 2010) due to the mismatch between encoding and retrieval contexts (Barr, 2013). When learning is assessed in a single trial, infants transfer more easily within one context (e.g., video to video) than across contexts (video to real-life or vice-versa; Zack et al., 2009). We examined the role of contextual differences across multiple trials using an object-retrieval task. After watching hiding events on a tablet computer, two-year-olds (N=44) found a hidden object either on a 3D board (Between-Context) or another tablet (Within-Context). The Within-Context manipulation improved object retrieval during earlier trials only; this effect reversed for later trials with increased perseverative errors. Thus reducing contextual differences may facilitate transfer initially but disrupt transfer later on by making it more difficult for children to distinguish between different mental representations (current hiding event versus previous search event).

ID: 483 / PS-III: 92

Poster

Topics: Decision Making and Reasoning, STEM Learning

Keywords: problem-solving, mathematics learning

The Influence of Non-Directive Information on Problem-Solving Strategies

Sarah A. Brown, Andrea Marquardt Donovan, Martha W. Alibali

University of Wisconsin-Madison, United States of America; sbrown23@wisc.edu

Learners are often presented with information in the form of direct instruction. However, there are other types of information from which learners draw. This research investigates whether information presented in a non-directive manner influences learners' strategy use. In Study 1, children are introduced to manipulatives as toys or math tools before receiving a lesson about equivalence using manipulatives. Non-directive information about ways to use manipulatives led to different patterns of learning from the lesson. In Study 2, undergraduates are exposed to a target strategy, either in isolation or paired with a distractor strategy that is either

novel or familiar. Non-directive information about possible strategies led to high rates of strategy adoption, especially when only a single alternative strategy was presented. Initial findings from both studies suggest that information presented in a non-directive manner influences participants' strategy use. Ongoing work investigates learner characteristics that influence susceptibility to non-directive information.

ID: 769 / PS-III: 93

Poster

Topics: Communication, Social Cognition, Theory of Mind

The Influence of Parent Testimony on Children's Predictions of Future Desires

Craig Elliott Smith

University of Michigan, United States of America; craigsm@umich.edu

Children's thinking about the external world is influenced by others' input. Are children similarly influenced about *internal* phenomena, such as one's own desires? In a baseline condition with 3-12-year-olds ($n = 79$), 80% of children preferred pretzels over water for a snack the next day. In a control condition, after eating pretzels, most thirsty children ($n = 41$) made a forecasting error; only 40% anticipated wanting pretzels. In a 'simple input' condition, parents suggested that children ($n = 48$) would want pretzels the next day; this did not decrease the percentage of forecasting errors. In a 'relevant input' condition, parents explicitly addressed the nature of the forecasting error when talking to their thirsty children ($n = 33$); 64% of children anticipated wanting pretzels, a significant increase. Children favor their intuitions about future mental states when given simplistic verbal input, but are swayed when the input addresses relevant cognitive errors.

ID: 541 / PS-III: 94

Poster

Topics: Developmental Disabilities, Language, Theory of Mind

The Link Between Language and Theory of Mind: Evidence from Deaf Children with Autism

Aaron Shield¹, Amber Martin², Jennie E. Pyers³

¹Miami University, United States of America; ²Hunter College, United States of America; ³Wellesley College, United States of America; jpyers@wellesley.edu

Studies with typically developing children, language-delayed children, and children with ASD have identified that language (spoken or signed) plays a key role in the development of social cognition, particularly false-belief understanding (FB). In this first study investigating language and theory-of-mind development in native-signing children with ASD, we tested 17 native-signing children with ASD and 18 age- and IQ-matched typically-developing (TD) native-signing deaf children on FB, visual perspective-taking (VPT), mental rotation, and American Sign Language (ASL) comprehension. TD children significantly outperformed children with ASD on ASL comprehension ($p < .0001$), ToM ($p = .02$), and VPT ($p < .01$), but not on mental rotation ($p = .12$). Thus, native-signing children with ASD exhibit similar ToM delays as non-signing children with ASD. Crucially, children with ASD whose language was on par with the TD children also performed equally well on FB and VPT. Taken together, these results highlight the importance of language in the development of social cognition.

ID: 569 / PS-III: 95

Poster

Topics: Decision Making and Reasoning

Keywords: future thinking, saving, preschoolers

The relation between saving and an understanding of future self-continuity in preschoolers

Angeline Sin Mei Tsui, Caitlin, L. Atkinson, Julian, S. Caza, Cristina, M Atance

University of Ottawa, Canada; atsui029@uottawa.ca

Individual differences in adults' saving behaviour are predicted by perceptions of future self-continuity; that is, how "connected" one feels to one's future self (Hershfield, 2011). To explore whether this is also the case in young children, we created "future self-continuity" tasks, including ones that measure the connection between current and future selves, future self-understanding, and future-self liking. We then examined the relation between 3-, 4-, and 5-year-olds' ($N = 32$) performance on these tasks and their performance on a marble saving task (Metcalfe & Atance, 2011). Significant age effects were found on the future self-understanding task, $F(2, 29)$, $p = 0.020$, and on number of marbles saved, $F(2, 29)$, $p = 0.028$. Although we did not detect any significant relations between our future self-continuity measures and saving, after controlling for children's understanding of social distance, there was a marginally significant correlation between our connection between current and future selves task and saving, $r(13) = 0.500$, $p = 0.082$.

ID: 562 / PS-III: 96

Poster

Topics: Number, STEM Learning, Word Learning

The relative effectiveness of comparison and contrast to teach number words

Dominic Gibson, Talia Berkowitz, Susan Levine

University of Chicago, United States of America; dominic.gibson@gmail.com

We taught children the meaning of a number that they had yet to fully grasp by either comparing multiple examples of that number (e.g. two triangles and two squares) or by contrasting that number with another number (e.g. two triangles and three triangles). We then tested children's number knowledge by presenting them with one card depicting the target number and a second card

depicting a different number and asking them to find the target number. We tested the generalizability of this number knowledge by varying the objects that form the sets (trained objects like triangles or untrained objects like plus signs). We found that children who were trained on contrasting numbers (e.g. two triangles and three triangles) performed above chance on test trials, regardless of object type ($p < .001$) whereas children who were trained on multiple examples of the same number did not perform significantly different from chance ($p = .81$).

ID: 362 / PS-III: 97

Poster

Topics: Language, Number, STEM Learning

The Role of Bilingualism and Working Memory on Early Math Development in Preschoolers

Emily Nina Daubert (Diversity Fellow), Geetha Ramani

University of Maryland, College Park, United States of America; edaubert@umd.edu

Bilingual children exhibit enhanced working memory (WM) skill relative to monolingual children (Bialystok, 1999; Morales et al., 2013), which could have implications for early math development. Competency in mathematics is supported by conceptual and procedural knowledge, as well as underlying cognitive processes, such as WM (Geary & Hoard, 2005). This study examined relations between WM and numerical knowledge in monolingual and bilingual children. Fifty-six children aged 3-5-years-old from middle- to high-income backgrounds completed a nonverbal WM task, number identification, nonverbal addition, symbolic and nonsymbolic magnitude comparison tasks. For both monolinguals and bilinguals, greater WM was associated with better accuracy on addition problems, symbolic and nonsymbolic magnitude comparison. However, bilinguals performed significantly better on WM and number identification than monolinguals. Furthermore, the relation between bilingualism and number identification was fully mediated by WM. Results will be discussed in relation to the role of WM and bilingualism on children's early numerical development.

ID: 745 / PS-III: 98

Poster

Topics: Spatial Cognition, STEM Learning

The Role of Gender in Verbal versus Spatial Mental Rotation Strategies

Mahala R. Femovich¹, Courtney R. Gray², Noora Hamdan³, Alexander D'Esterre⁴, Elizabeth A. Gunderson³

¹Ursinus College, United States of America; ²St. Thomas Aquinas College, United States of America; ³Temple University, United States of America; ⁴University of Maryland, United States of America; mafemovich@ursinus.edu

When solving mental rotation (MR) tasks, girls rely more on verbal strategies while boys prefer visual-spatial strategies (Pezaris & Casey, 1991). Some MR tasks can be solved using verbal feature-matching strategies (e.g., "both have pointy parts") (Feature-MR), while others require discriminating mirror-reversed images, precluding verbal strategies (Mirror-MR). Because both tasks are widely used to measure spatial skills, understanding their relationship is critical. Second- and 3rd-graders' (N=114) Feature-MR and Mirror-MR scores were not strongly correlated ($r(112) = .18, p = .06$). Feature-MR correlated with verbal ability and spatial working memory (WM) ($r_s > .28, p_s < .01$), while Mirror-MR correlated with spatial WM ($r(105) = .24, p = .01$) but not verbal ability ($p > .10$). The relation between Feature-MR and verbal ability was significant for females ($r(64) = .36, p < .001$) but not males ($r(40) = .22, p = .15$), suggesting that females are more inclined to use verbal strategies. By understanding both verbal and spatial strategies, we may be able to improve MR in testing contexts and real-world situations.

ID: 583 / PS-III: 99

Poster

Topics: Moral Cognition, Social Cognition

The Role of Group Membership on Action Comprehension

Nathan Malagaiv Vasquez¹, Lauren H. Howard², Zoe Liberman¹, Amanda L. Woodward¹

¹University of Chicago, United States of America; ²Franklin and Marshall College, United States of America; nmalagaiv@uchicago.edu

Adults and children use many cues (e.g., gender, race, language) to form social groups, and they tend to prefer ingroup members (e.g. Kinzler, Dupoux, & Spelke, 2007). Knowing whether someone is an ingroup member also influences behavior, such as imitation or sharing (e.g. Howard, Henderson, Carazza, & Woodward, 2014). The current study asks how group membership affects the inferences we make about others over early childhood. We introduced 3-10 year old (current $n = 35$), English-speaking participants to pictures of pairs of children where one child spoke English and the other spoke French. Participants were then asked which of the two children was more likely to do a specific action. The actions were positive, neutral, or negative. Preliminary results suggest that children are more likely to attribute positive actions to ingroup members and negative actions to outgroup members ($p < .04$). This data can help us understand how and when ingroup biases emerge.

ID: 491 / PS-III: 100

Poster

Topics: STEM Learning

Keywords: causal reasoning, explanation, exploration

The role of parent / child interaction in children's exploration, causal explanation and learning outcomes

Justin Thomas Albert Busch¹, Cristine H Legare¹, Dave M Sobel², Maureen Callanan³

¹The University of Texas at Austin, United States of America; ²Brown University; ³University of California Santa Cruz; justin.ta.busch@gmail.com

Two components of curiosity are exploration of causal connections, and explanation of unexpected phenomena. The present study examines, a) the role of exploring and explaining in causal learning, b) how parents guide this learning, and c) how this varies by family background.

Seventy-two parent/child dyads ($N=144$) participated at a museum's gear exhibit. Parents were instructed to prompt their child to explain, to explore, or to act as they normally would. In the explain condition, parents provided more functional explanations and questions seeking out functional information. In the exploration condition parents focused more on directing children's attention. In the exploration condition, parents more frequently manipulated the stimuli ($M=22.3$ manipulations) than children ($M=12.1$ manipulations). Parents in the baseline condition provided fewer utterances overall ($M=2.3$ utterances) and exhibited less behavior ($M=5.5$ manipulations). This study provides evidence of how parent/child interaction can be harnessed as a powerful tool for the development of scientific literacy.

ID: 565 / PS-III: 101

Poster

Topics: Culture, Social Cognition

Keywords: pretend play, fantasy orientation, parenting

The Role of Parenting Styles and Dimensions in Children's Fantasy Orientation

Melissa McInnis Brown¹, B. Allyson Phillips²

¹Texas Woman's University, United States of America; ²Ouachita Baptist University, United States of America; mmcinnis2@twu.edu

Given the documented wide-ranging cognitive and socioemotional benefits associated with being a fantasy-oriented child, it is critically important to examine relations between fantasy orientation and social contexts that potentially influence its development. Although research has examined ways in which particular cultural communities have influenced fantasy orientation as well as ways in which parenting influences executive functions, an aspect of development shown to be linked with fantasy orientation, no research has investigated how parenting interacts with children's predisposition towards fantasy. The present study aims to elucidate this relationship by surveying 100 mothers of children between the ages of 3 and 10 on their parenting styles, dimensions, and stress, as well as their children's fantasy orientation. Preliminary results indicate a positive relationship between parental warmth and parental encouragement of pretend play, $r(28) = .408$, $p = .031$. Final results will be presented, with feedback welcomed on theory and methodology.

ID: 343 / PS-III: 102

Poster

Topics: Executive Function, Social Cognition, Theory of Mind

Theory of Mind, Executive Function, and Mood in Emerging Adulthood

Melissa Smith

University of North Carolina at Asheville, United States of America; msmith@unca.edu

Existing research demonstrates a strong relationship between theory of mind (ToM) and executive function (EF) in childhood. However, it remains unknown if these areas continue to be positively correlated during emerging adulthood, when a depressed mood may interfere with ToM decoding. The present study examines the relationship between affective ToM (Reading the Mind in the Eyes, Film, and Voice), cognitive ToM (Sally-Ann silent video), mood (BDI-II), and EF (running span, trail making, Stroop, verbal fluency) in 18- to 25-year-old adults ($n=23$). Participants scored significantly better on cognitive than affective ToM tasks (but were not at ceiling), exhibited a range of EF scores, and 39% reported mild to moderate depressive symptoms. Depression was negatively correlated with specific components of EF as well as affective ToM, but not cognitive ToM decoding. Discussion focuses on how these data support some, but not all, previous research on ToM during emerging adulthood.

ID: 560 / PS-III: 103

Poster

Topics: Concepts/Categories

Keywords: causal learning, theory revision

Theory revision in children and adults

Katherine Kimura, Alison Gopnik

University of California, Berkeley; kkimura@berkeley.edu

Children form theories rapidly and accurately—sometimes even more accurately than adults. In the present study, we investigated why children outperform adults by applying a Bayesian account to ask whether this developmental pattern was due to a difference in priors or in the ability to search through one's hypothesis space. To establish a common knowledge base with equitable priors, children and adults were taught a rule about how a set of novel toys worked. Participants then observed evidence supporting a different rule and afterwards were asked to activate a novel toy. Unlike adults, who revised their theories even when it was irrational, children updated their theories only when it was appropriate. This finding suggests that children's remarkable ability to attend to relevant cues, while ignoring irrelevant information, may not necessarily depend on prior experience but may instead reflect a striking difference in how children and adults search their hypothesis space.

ID: 479 / PS-III: 104

Poster

Topics: Executive Function, Social Cognition
Keywords: Friendships

Thoughtful Friends: The Relationship between Friendship Quality, Executive Function and Responses to Friendship Transgressions

Brittany Marie Nielsen¹, Stephanie E. Miller¹, Rachael D. Reavis²

¹University of Mississippi, United States of America; ²Earlham College; bmniels1@go.olemiss.edu

Although friendships are associated with many positive outcomes in childhood (Parker & Asher, 1993), research on the cognition underlying friendships is scarce. Eighty 2nd graders completed measures of friendship quality, responses to friendship transgressions, and executive function (i.e., EF or cognitive control). Although cognition in response to friendship transgressions (i.e., problem solving, goals, interpretations) was not related to friendship quality, a large number of children said these transgressions rarely happened to them. Children who experienced transgressions often had more negative cognitions in response to transgressions and lower friendship quality, specifically related to conflict in friendships. Working memory was negatively related to friendship quality, whereas cognitive flexibility and inhibition were related to positive goals—particularly in boys. Results of the current study show there is a link between cognition and friendships, but gender and experience with conflict seem to be important considerations when examining this relationship.

ID: 610 / PS-III: 105

Poster

Topics: Executive Function, Language

Translation Equivalents and Early Executive Function in Simultaneous Bilinguals

Yushuang Liu¹, Diane Poulin-Dubois², Pascal Zesiger³, Margaret Friend¹

¹San Diego State University, United States of America; ²Concordia University; ³Université de Genève; YLIU@mail.sdsu.edu

Research suggests that bilingualism confers benefits in executive function (EF). However, research on young, simultaneous bilinguals is scarce. We are interested in whether such benefits obtain in Spanish-English bilingual toddlers and whether the acquisition of translation equivalents (TEs), an index of bilingual proficiency, predicts early EF. The cognitive effort in managing two languages may be the key to benefits in EF. Language production was assessed in English monolinguals and Spanish-English bilinguals at 24 and 31 months. A battery of EF tasks, including set-shifting and delay tasks, was administered at 31 months. We performed a median split on TE growth from 24 to 31 months and divided bilinguals into high and low growth groups. Bilinguals with high TE growth performed better on set-shifting tasks than either monolinguals or bilinguals with low growth in TEs. This study provides a new insight on the role of TEs in predicting this cognitive benefit.

ID: 615 / PS-III: 106

Poster

Topics: Infant Cognition, Social Cognition

Twelve-month-old infants can anticipate the goals of others' pointing actions.

Eun Young Kim, Hyun-joo Song

Yonsei University, Korea, Republic of (South Korea); majilake@gmail.com

By 12 months of age, infants can encode the goals of others' pointing actions (e.g., Woodward & Guajardo, 2002). The current research investigated whether 12-month-olds can predict the goals of others' pointing actions. The infants in the experimental condition watched familiarization events in which an actor pointed to one of two objects. Then, the locations of the objects were switched. During the test trial, we measured the infants' eye fixations while the actor simply sat and paused between the objects. The procedure of the control condition was identical to that of the experimental condition except that only one object was present in the familiarization events. The infants in the experimental condition looked reliably longer at the goal object than at the non-goal object, whereas those in the control condition looked about equally at the two objects. These results indicate that 12-month-olds can predict others' goals based on previous pointing actions.

ID: 501 / PS-III: 107

Poster

Topics: Social Cognition

Two and Three-Year Olds Selectively Help Others Based on Contextual Cues

Elizabeth Ake¹, Alia Martin², Kristina Olson¹

¹University of Washington, United States of America; ²Harvard University; akee@uw.edu

What cues motivate children to help others? In the current study we investigated two cues that may influence when two and three-year-old children are more or less likely to help: a child's familiarity with a person needing help and whether the child was aware that the potential beneficiary knew they were available to help. In a study of 32 children, we found that both cues influenced children's helping. Children were more likely to help a familiar beneficiary than an unfamiliar beneficiary, $p = .023$, and they were also more likely to help when the beneficiary knew they were present than when she did not, $p = .005$. These results show that even young children's helping behavior is influenced by small cues in the environment. Cues that might reflect upon children's reputation in the eyes of a beneficiary might be especially likely to increase prosocial actions.

ID: 704 / PS-III: 108

Poster

Topics: Number, STEM Learning
Keywords: rational numbers, magnitudes, addition estimation

Use of Magnitudes in Addition Estimation

Jing Tian^{1,2}, Robert Siegler^{1,2}

¹Carnegie Mellon University, United States of America; ²Siegler Center for Innovative Learning, Beijing Normal University, China; jtian@andrew.cmu.edu

Previous research frequently found that magnitude knowledge of rational numbers (fractions and decimals) correlated with arithmetic performance. Two explanations for this relationship were proposed and widely accepted: magnitude knowledge facilitates to reject flawed procedures that produce implausible answers; and correct execution of arithmetic procedures provides more opportunities to learn magnitudes. However, the assumption behind these two accounts – students spontaneously access magnitudes of rational numbers when executing arithmetic procedures – has never been explored. Given the previous research, the current study aimed at investigating 1) whether students access magnitudes in addition estimation; and 2) whether a hint of magnitudes helps. We found that in fraction addition estimation, middle school students rarely used magnitude knowledge and did not benefit from the hint; while their use of magnitudes was more often in decimal problems and improved significantly after the hint. Theoretical and practical implications of these results were discussed.

ID: 720 / PS-III: 109

Poster

Topics: Attention, Infant Cognition

Visual search for emotional expressions by 4-month-old infants

Carolyn R Peckham¹, Ann E Ellis¹, Lisa M Oakes²

¹Grinnell College; ²UC Davis; peckhamc17@grinnell.edu

To understand infants' attention to emotional expressions, we presented 4-month-old infants with 5-s trials of arrays of two, four, or six faces. All images in each array depicted the same female face; one had either a happy or sad expression, and the other(s) had a neutral expression. Infants looked longer at faces in 2-item arrays than in larger arrays; especially when a sad face was depicted, set size X emotion, $F(2, 28) = 4.27, p < .05$. Further, in 2-item arrays infants' preference for the neutral face was stronger when it was paired with happy faces ($M = .63, SD = .25$) than when paired with sad faces ($M = .47, SD = .11$), $t(14) = 2.64, p < .05$. These results suggest that young infants (1) have difficulty rapidly identifying emotional expressions in arrays of multiple faces, and (2) differentiate neutral and happy faces, but not neutral and sad faces.

ID: 567 / PS-III: 110

Poster

Topics: Communication, Social Cognition, Theory of Mind

When (or when not) to adopt her view? Adults and children consider others' epistemic states to selectively take their visual perspectives.

Xuan Zhao¹, Bertram F. Malle¹, Hyowon Gweon²

¹Brown University, United States of America; ²Stanford University, United States of America; xuan_zhao@brown.edu

Taking others' visual perspectives is essential for effective communication. Prior work shows children's difficulty taking others' perspectives even with explicit requests. Here we show that children (4-5 yrs) spontaneously consider others' epistemic and intentional states when taking (or not taking) their visual perspectives. Participants faced a puppet (Sally) gazing at a number "6" ("9" from participants' view). Sally either indicated that she didn't know about numbers and wanted to learn ("Puppet-Learning" condition), or she knew about numbers and wanted to teach ("Puppet-Teaching" condition). Given Sally's question, "What's the number on the table?", both adults and children reported "6" more frequently in the Puppet-Learning condition than in the Puppet-Teaching condition (Exp1). Children also preferred an agent who answered "6" over one who answered "9" in the Puppet-Learning condition compared with the Puppet-Teaching condition (Exp2). These results suggest that visual perspective taking can be modulated by higher-level mental state inferences.

ID: 499 / PS-III: 111

Poster

Topics: Culture, Social Cognition, Social Learning

Who would you rather learn from? Children's justification of informant preferences in cultural learning

Kimberly Elizabeth Marble (Diversity Fellow), Janet J. Boseovski, Stuart Marcovitch, Cherie Boyer, Robin Hancock, Candace Lapan (Diversity Fellow)

University of North Carolina at Greensboro, United States of America; kemarle@uncg.edu

The present study examined whether children prefer to learn novel cultural information from a knowledgeable informant (i.e., member of relevant culture) as compared to a racial in-group member. One hundred and one 3- to 7-year-olds were given conflicting information about a Samoan cultural practice from a knowledgeable Samoan informant and a less knowledgeable in-group informant. Participants indicated their learning preferences and were asked to justify their responses. Younger children were more likely than older children to prefer to learn from an in-group informant, ($\beta = .53, Wald = 6.11, p = .01$). Participants that chose the in-group informant were less likely to provide meaningful justifications for their selection. In contrast, those who selected the Samoan informant provided justifications referring to the nationality and learning method or prior experience of the informant, $\chi^2(4, N = 101) = 19.97, p = .001$. Implications for models of social learning will be discussed.

ID: 709 / PS-III: 112

Poster

Topics: Executive Function

Keywords: cognitive training, children

Working memory training, Inhibitory control training and the mutual transfer effects in 6-year-old children

Qiong Zhang¹, Cuiping Wang¹, Qianwen Zhao¹, Martin Buschkuehl², Susanne Jaeggi³

¹Department of psychology and behavioral science, Zhejiang University, Zhejiang, China, China, People's Republic of; ²MIND Research Institute, Irvine, CA; ³University of California, Irvine, CA; zhanqqiongqzgh@hotmail.com

Numerous studies targeted Working memory (WM) and inhibitory control (IC) training separately, but whether there are mutual transfer effects between them is not established. Sixty three 6-year-old children were assigned to WM training group, performing a 15-minute daily training session for 20 days; IC training group, experiencing a Stroop and Stop-signal Task training program for 20 days; Control group, having usual activities in kindergarten. All participants tested Digit Forward Task, Digit Backward Task, ANT and AX-CPT in Pretest, Post-test 1 and Post-test 2, conducting within a week before, after the training and three months after the training separately. We found evidence of a significant training effect of both training groups, significant improvement of proactive control after WM training, and significant improvement of reactive control after IC training, suggesting that targeted WM training could transfer to proactive control, while it is hard for IC training to transfer to working memory capacity.

ID: 359 / PS-III: 113

Poster

Topics: Culture, Social Cognition, STEM Learning

Young children's STEM interest and gendered STEM stereotyping

Molly A. Schlesinger¹, Rachel M. Flynn², Rebekah A. Richert¹

¹University of California, Riverside, United States of America; ²New York University, New York, United States of America; mschl003@ucr.edu

Cultural stereotypes claim girls are less interested and able to engage in STEM than boys. Social Cognitive Theory suggests children's cognitive activation of these negative stereotypes may undermine their confidence and hinder performance in STEM education, however research has not examined the age at which these gender-based stereotypes about STEM abilities emerge. In this study, 53 4- to 6-year-old children (54.7% male) provided ratings of their interests in STEM activities, and their intuitions about novel and familiar agents' STEM expertise (e.g. stereotyping). Children's interest in STEM did not differ by gender, however there were differences in STEM stereotyping in preschoolers. Girls reported similar STEM expertise ratings for male and female agents. However, boys claimed male agents were significantly more likely to be STEM experts than female. These results indicate boys' awareness of negative STEM stereotypes about girls emerges during early childhood, and foreshadow how stereotyping impacts developmental trajectories.

ID: 587 / PS-III: 114

Poster

Topics: Culture

Keywords: Education, Motivation

"I try to learn as much as I can" vs. "I try to get the best grade I can": A study of children's ideas about learning and school

Jamie J Jirout

Rhodes College, United States of America; jiroutj@rhodes.edu

Two influences of children's motivation and learning are 1) their beliefs about their abilities, and 2) their reasons for why they want to learn. This study investigated children's ideas about school in regards to these two influences, looking specifically at differences between children in low-income and higher-income populations, and in kindergarten and 1st grade. Children were asked to choose which of two puppets were most similar to how they felt, between choices that demonstrated 1) either an entity or incremental mindset (8 items), and 2) either mastery or learning-oriented achievement goals (7 items). Preliminary analyses of low-income (N=32) and upper-income (N=14) children suggest that the two populations do not differ on mindset items, but that low-income children tend to hold more performance-oriented learning goals, while upper-income children demonstrate more mastery-oriented learning goals. No age differences were observed. We discuss the potential implications of these results for addressing achievement gaps.

ID: 611 / PS-III: 115

Poster

Topics: Memory, Moral Cognition, Social Cognition

"Oh well!" Children remember when transgressors fail to apologize

Marissa Britt Drell, Vikram K Jaswal

University of Virginia, United States of America; mbd8zm@virginia.edu

Do children have a better memory for transgressors who fail to apologize than those who do? 6- and 7-year-olds (N=36) heard several vignettes about characters who committed accidental transgressions (e.g., knocked a jar off a table) and said "I'm sorry" or "Oh well." Children's memory for the faces of the transgressors was good regardless of whether the transgressors had apologized

(68%) or not (63%). However, when they were asked to indicate whether a given individual had apologized or not, children were better at remembering that the unapologetic transgressors had failed to apologize (52%) than at remembering that the apologetic transgressors had apologized (38%). These findings are consistent with other work suggesting a negativity bias in young children: Enhanced memory for unapologetic transgressors may serve as a mechanism to help children avoid these individuals in the future.

The contribution has been withdrawn.

Imitation Practice Makes Imitation Perfect: Imitation enhances motor-spatial learning by preschoolers in a brief training study

Francys Subiaul¹, Laura Zimmermann², Rachel Barr²

¹George Washington University, United States of America; ²Georgetown University, United States of America; subiaul@gwu.edu

ID: 413 / PS-III: 117
Poster

Topics: Social Cognition, Social Learning, Theory of Mind

Keywords: imitation, preschool, cooperation

Preschoolers' non-conscious imitation of task-irrelevant movements depends on their social context

Sarah Dunphy-Lelii

Bard College, United States of America; sdl@bard.edu

Despite the ubiquity of the “chameleon effect” and the mimicry-affiliation link in the adult literature (e.g., Chartrand & Bargh, 1999), very little is known about the developmental emergence of the relation between unconscious imitation and affiliation. In order to investigate this, preschoolers were exposed to one of three conditions: cooperative (child and experimenter worked together to build a tower), competitive (child and experimenter built identical towers simultaneously) and neutral (child built while the experimenter simply looked on). In all conditions, the experimenter engaged in subtle, irrelevant movements (face touching, finger tapping) and children’s spontaneous imitation of these movements was recorded. Preliminary results suggest that preschoolers do engage in mimicry of an adult’s task-irrelevant movement, and this occurs more frequently when children are affiliatively engaged -- not simply when they find another’s actions salient. The relation between imitation and affiliation as an underpinning of more sophisticated prosociality is discussed.

[Single Presentation of ID 304]

Time: Saturday, 10/Oct/2015: 2:30pm - 4:00pm · *Location:* George Bellows DEF
Session Chair: Jonathan D. Lane, Vanderbilt University
Session Chair: Lindsay Caroline Bowman, Harvard Medical, Boston Children's Hospital

ID: 304

Symposium

Topics: Social Cognition, Social Learning, Theory of Mind

Social-cognitive development: Disposition influences theory of mind and social competence across infancy, early childhood, and adulthood

Chair(s): **Jonathan D. Lane** (Vanderbilt University), **Lindsay C. Bowman** (Harvard University)

Social cognition is shaped through social experience. Siblings, peers, and parents influence developing conceptions of one's own and others' minds. However, individuals also play an active role in this process as they observe and seek social interactions, and shape their own social contexts. Thus, dispositional factors--e.g., temperament--may also influence social-cognitive development. This symposium explores how individuals' dispositions predict and interact with social-cognitive development. Using several methods, we examine relations between disposition and theory-of-mind (ToM) in infancy, the preschool years, and adulthood. The first presentation demonstrates that infants rated as more socially-observant during laboratory play show better explicit false-belief understanding at 4 years. The second presentation explores both concurrent and longitudinal links between temperament and ToM in preschoolers from two cultures. Results indicate that more aggressive preschoolers demonstrate poorer explicit false-belief performance; whereas socially withdrawn preschoolers--especially those with low physiological reactivity (i.e., cortisol response to stress)--demonstrated advanced performance. The third presentation demonstrates that infant temperamental reactivity (coded behaviorally at 4 months) moderates the relation between children's explicit ToM (assessed at 3 years) and their social competence in unfamiliar-peer interactions (assessed at 4 years); thus, temperament additionally influences *how* ToM is used in social contexts. The final presentation reveals that even into adulthood, a dispositional tendency to attend to/care about what other people think and feel interacts with ToM abilities to influence peer-rated social competence. Collectively, these studies demonstrate the importance of examining disposition and real-world social interactions in unpacking the origins and outcomes of social-cognitive development.

Presentations of the Symposium

The role of early infant social disposition in later theory of mind development

Kimberly Brink, Henry M. Wellman

University of Michigan

Infant temperament is argued to reflect important individual differences in infancy that influence infants' experiences and interactions within their social worlds. However, few studies have examined how these temperaments might relate to the child's social interactions and behavior later in development. Do early social interactions in infancy predict later preschool social competencies? Forty-three children participated in a series of social interaction and social-cognitive assessments: mother-infant interactions at 10- to 12-months of age and theory of mind tasks at 4 years. Social behaviors were measured by observing caregiver and infant in a 16-minute free play session. By tallying the quantity of different interactive behaviors, four aggregates were formed: quality of mother-infant interaction, socially-observant temperament, joint attention, and imitation. Children's preschool theory of mind was assessed with two explicit false-belief tasks: a standard, contents false-belief task (from Wellman & Liu's, 2004, theory-of-mind scale) and a standard, change-of-locations task (a Sally-Anne task of the type first used by Baron-Cohen, Leslie, & Frith, 1985). Of the social-interactive measures, socially-observant infant temperament, in particular, was an important predictor of later, preschool social cognition. Infants who noticed their parent's facial expressions, liked to sit and watch their parents do things, and made talking or vocal sounds when parents talked to them demonstrated better false-belief understanding at 4-years of age. We discuss the importance of investigating early individual differences in social interactions when predicting later social competencies.

Preschoolers' temperament predicts their theory of mind development

Jonathan D. Lane

Vanderbilt University

Temperament influences children's participation in and attention to social interactions, which in turn can influence children's social-cognition. Thus, two studies explore relations between individual differences in socially-relevant dimensions of children's temperament--aggression, shyness, reactive social withdrawal--and theory-of-mind. In the first study (N=146), U.S. children's temperament was assessed via standard parent-report questionnaires (Rothbart et al., 2001; Achenbach, 1992) at 3.5 years, and social-cognition was assessed via explicit false-belief understanding (Bartsch & Wellman, 1989) 2 years later. Children's shyness at 3.5 years predicted better theory-of-mind at 5.5 years; whereas aggression predicted poorer theory-of-mind. A second study (N=102) replicated these results with concurrent measures of theory-of-mind and parent-reported temperament, across both U.S. and Chinese preschoolers (Mage=4.4 years). An additional measure of physiological reactivity (salivary cortisol) during stressful tasks helped reveal that different types of social withdrawal differentially relate to theory-of-mind. Specifically, children who were socially-withdrawn and nonreactive (i.e., shy) evidenced advanced theory-of-mind (like children from the first study). However, children who were both socially withdrawn and physiologically reactive (i.e., reactively-withdrawn) evidenced poorer theory-of-mind. Collectively these studies demonstrate that aggression is a consistently negative predictor of preschool theory-of-mind, whereas certain forms of social disengagement--particularly, a shy yet calm disposition--may foster social-cognitive development. In both studies, relations between temperament and theory-of-mind persisted after accounting for general cognitive functioning (e.g., executive functions, IQ), and temperament was specifically related to theory-of-mind, not general cognitive functioning. Potential mediators of these relations will be discussed.

Theory of mind works differently for different children: Temperamental influence on preschoolers' developing social cognition and social competence

Lindsay C. Bowman¹, Kathryn A. Degnan², Nathan A. Fox²

¹Harvard University, ²University of Maryland

There is intriguing heterogeneity in children's developing Theory of Mind (ToM), and in how this cognitive system influences social interaction. Understanding contributions to this heterogeneity is central to understanding origins and outcomes of social-cognitive development. We identify children's temperament (biologically based predispositions in reactivity and regulation) as a primary source of heterogeneity in emerging social cognition and behavior. We argue that individual differences in temperament shape children's developing representations of their social environment, which has consequences not only for their cognitive development, but also for how cognition influences social interaction. Longitudinal data (N=74) support this proposal. We found that infant temperament (assessed at 4-months-old, as motoric and affective reactivity to novelty) moderated relations between children's ToM (assessed at 3-years-old via explicit desire-, knowledge-, and belief-understanding tasks) and their social competence (assessed at 4-years-old as positive engagement, affect, and communication during interactions with unfamiliar peers): For infants with average reactivity to novelty (control sample), better ToM performance at age 3 predicted better social competence at age 4; whereas for infants with negative reactivity to novelty (negative temperament), better ToM at age 3 predicted worse social competence at age 4. Results suggest that ToM development influences real-world social interactions differently depending on temperament. Specifically, negative temperaments could negatively bias representations of a social partner's mental states, resulting in less positive social engagement. We consider these results in light of existing social-information-processing models, and discuss the importance of examining dispositions and real-world social interactions for unpacking origins and outcomes of social cognitive development.

The role of theory of mind skill and disposition in mature social cognition

Amanda C. Brandone, Wyntre Stout

Lehigh University

Theory of mind (ToM) research has traditionally focused on questions related to the nature and origins of mental state concepts present early in development. However, much can be learned from examinations of ToM capacity and use in mature adults. Specifically, adults present unique opportunities to examine how the fully developed ToM system varies across individuals and is used in everyday life. Here we propose a possible moderator of ToM use in adults, namely a dispositional tendency to pay attention to or show concern with what other people think and feel--ToM Disposition. We present a series of studies examining the role of both self-report ToM Disposition (Davis, 1980; Baron-Cohen et al., 2003) and observed ToM Skills (Baron-Cohen et al., 2001; Dziobek et al., 2006) in predicting success in social interactions. Results support two main conclusions. First, the direct relation between ToM Skills and ToM Disposition is nonsignificant, suggesting that this dispositional construct may be independent of traditional measures of ToM abilities. Second, results demonstrate that ToM Disposition moderates the effect of ToM Skills on peer assessments of real world mentalizing. Specifically, ToM skills are only predictive of peer-assessments for individuals who are highly motivated to pay attention to and care about the mental states of others. Overall, these data provide initial support for a promising dispositional construct that has consequences for social cognition. We consider the implications of this construct for theoretical approaches to ToM and its development, and for defining and measuring ToM across the lifespan.

Oral Papers III: Language

Time: Saturday, 10/Oct/2015: 2:30pm - 4:00pm · Location: Elijah Pierce A and B
Session Chair: David Barner, UCSD

ID: 176 / Oral Papers III: 1
Individual Oral Paper

Topics: Attention, Language, Reading

Seeing and Knowing: Attention to Illustrations during Storybook Reading and Narrative Comprehension in 2-year-olds

Tanya Kaefer¹, Ashley M Pinkham², Susan B Neuman³

¹Lakehead University, Canada; ²West Texas A&M University; ³New York University; tkaefer@lakeheadu.ca

Research (Evans & Saint-Aubin, 2005) suggests systematic patterns in how young children visually attend to storybooks. However, these studies have not addressed whether visual attention is predictive of children's storybook comprehension. In the current study, we used eye-tracking methodology to examine 68 two-year-olds' ($M = 27.63$ months; 57% girls) visual attention while being read an unfamiliar storybook. Immediately following reading, they completed a 5-question comprehension assessment. Children who visually attended to illustrations depicting key narrative events during the initial reading demonstrated stronger comprehension than children who focused on text, irrelevant illustrations, or failed to attend to the book. Importantly, visual attention to pertinent illustrations was also positively related to parental reports of vocabulary knowledge ($r = .37$). Collectively, this supports a reciprocal model of early knowledge development: vocabulary knowledge facilitates visual attention, and visual attention to storybook illustrations facilitates subsequent learning.

ID: 280 / Oral Papers III: 2
Individual Oral Paper

Topics: Language, Number, Word Learning

Beyond Knower Levels: Early partial knowledge of number words

Katie Wagner¹, Franc Marušič², Vesna Plesničar², Tina Razboršek², Jessica Sullivan³, Rok Žaucer², David Barner¹

¹UC San Diego, United States of America; ²University of Nova Gorica, Slovenia; ³Skidmore College, United States of America; kgwagner@ucsd.edu

Although both syntax and number words can indicate quantity, only numbers can specify large exact quantities. Do children use syntax to bootstrap preliminary meanings of number words before mastering precise meanings? We compared errors across languages on a Give-a-Number task in non-knowers (who have adult meanings for no number words) and subset knowers (who have adult meanings for fewer than five number words). Participants included learners of English, Spanish, French, and two dialects of Slovenian. One dialect, Central Slovenian, has rich number morphology including singular, dual, small plural, and large plural (for 5+). In all languages, subset knowers and some non-knowers demonstrated better than random responding for at least 2 number words beyond the largest number word they comprehended precisely. Additionally, Central Slovenian-learning non- and 1-knowers responded more accurately to requests for higher numbers than their counterparts in other languages, suggesting that rich plural marking may bootstrap number word meanings.

ID: 207 / Oral Papers III: 3
Individual Oral Paper

Topics: Computational Approaches, Word Learning

Keywords: Cross-Situational Learning, Statistical Learning, Head-Mounted Cameras

Statistical Learning in the Real World: Mechanisms of Cross-Situational Word Learning

Chen Yu¹, Linda Smith¹, Sumarga Suanda¹, Alexa Romberg²

¹Indiana University, United States of America; ²University of Maryland at College Park; chenyu@indiana.edu

Recent evidence has shown how early word learners might make use of noisy co-occurrence data between words and referents to discover word-referent mappings. However, other research suggests that children's learning processes might be too fragile for statistical learning to work in contexts of high ambiguity. This talk will present new observational and experimental evidence on statistical learning in the real world. First, through child-perspective video recordings, we quantified the degree of ambiguity in everyday learning environments. We find both transparent word-referent moments for which infants might not need powerful statistical inference mechanisms to learn the correspondence, and noisy moments that would require statistical learning mechanisms. Additionally, the results from two laboratory experiments indicate that young learners exploit both kinds of data. These two studies provide converging evidence that constrains theoretical proposals about the underlying mechanisms, mechanisms we suggest are important not only to word learning but cognitive development more generally.

ID: 223 / Oral Papers III: 4
Individual Oral Paper

Topics: Executive Function, Language

Dimensions matter: the relationship of home language with development of executive functions in young bilinguals

Sibylla Leon Guerrero¹, Sara Ashley Smith², Laura Mesite¹, Sarah Surrain¹, Gigi Luk¹

¹Harvard University; ²California State University, East Bay; sleonguerrero@g.harvard.edu

Bilingual children in the U.S. grow up in diverse linguistic environments. Dichotomous group comparison may thus mask meaningful variation in experience. Daily use of more than one language at home is one dimension of bilingualism that may support the development of executive functions (EF), in particular, cognitive flexibility, the ability to switch between changing goals. We examined variation in home language usage and cognitive flexibility through switching costs to accuracy in 75 preschool and 85 fourth-grade children. We found (1) no group differences between monolinguals and broadly defined bilinguals; (2) differential and nonlinear outcomes in subgroups with different proportions of bilingual home language use. In both age groups, speaking a more balanced mixture of two languages at home was associated with lower switching costs to accuracy. Results suggest that multidimensional, rather than categorical, measurement of bilingualism can aid in understanding how this life experience interacts with EF development during childhood.

ID: 278 / Oral Papers III: 5

Individual Oral Paper

Topics: Concepts/Categories

Keywords: Analogy and Relational Learning

Language in the development of relational reasoning: Friend or foe?

Dedre Gentner, Christian Hoyos, Ruxue Shao

Northwestern University, United States of America; christianhoyos2016@u.northwestern.edu

Recent studies report a striking decline in the ability to notice *same-different* relations at around age 3 (Gopnik, 2015). We conjecture that such a decline could result from an object focus induced by preschoolers' avid noun-learning. To test this, we gave 4-year-olds (who normally pass this task) an object-labeling pretask. If object labeling induces an object focus, this should disrupt their performance on the relational match-to-sample (RMTS) task.

Four-year-olds were randomly divided into three groups. The Object-naming group labeled 39 pictures of familiar objects (e.g., "pencil"). The Action-naming group labeled events (e.g., "kicking"). Then these two groups, plus a Baseline group that received no prior task, completed the RMTS task. Both the Baseline and Action-naming groups scored over 70% correct. However, the Object-naming group performed at chance (50%). This suggests that language learning may have a temporary negative influence on early relational reasoning.

[Single Presentation of ID 205]

Time: Saturday, 10/Oct/2015: 2:30pm - 4:00pm · Location: Emerson Burkhart A
Session Chair: Andrew Shtulman, Occidental College

ID: 205

Symposium

Topics: Concepts/Categories, Culture, Decision Making and Reasoning

How Children Reason About Events at the Cusp of Possibility

Chair(s): Andrew Shtulman (Occidental College), Ori Friedman (University of Waterloo)

Children and adults alike spend much time contemplating acts of the imagination, reasoning not just about facts and certainties but also about counterfactuals and hypotheticals (Gopnik, 2009; Harris, 2000). The development of this kind of reasoning has implications for many different cognitive activities, from assessing the likelihood of future events to predicting the outcomes of hypothetical interventions, and from enjoying works of fiction to evaluating the truth of what others tell us. Previous research in this area has focused on children's judgments of what entities are real (Prentice & Gordon, 1986; Harris, Pasquini, Duke, Asscher, & Pons, 2006) and what events are possible (Cook & Sobel, 2010; Shtulman & Carey, 2007). The proposed symposium will extend this research by delving more deeply into the reasoning behind such judgments. Talks 1 and 2 will explore the relation between children's judgments of physical possibility and their explanations for physically extraordinary events. Talk 3 will explore the extent to which children's judgments of physical possibility are differentiated from related forms of judgment, namely, judgments of moral permissibility. Talk 4 will explore how parental and cultural input shapes children's judgments of physical possibility. A consistent finding across all four talks is that children are inclined to deny the possibility of events that defy their expectations, but they can be induced to accept those events on the basis of additional information, particularly causal information.

Presentations of the Symposium

She bought the unicorn from the pet store: Children have a default tendency to generate naturalistic explanations

Ori Friedman, Shaylene Nancekivell

University of Waterloo

Children's explanations are informative about their understanding of possibility. In explaining events, young children use two kinds of explanations: They use naturalistic explanations, which reference possible and realistic causes, and they use supernatural explanations, which reference magical and religious forces (e.g., Legare et al., 2012). In two experiments, we show that although children use both kinds of explanations, they have a strong tendency to use naturalistic explanations, and they often use these when explaining events that are impossible. Both experiments examined 6- and 7-year-olds' explanations of improbable and impossible outcomes. In Experiment 1, children (N = 32) heard about outcomes that were either improbable (e.g., woman with pet peacock) or impossible (e.g., woman with pet unicorn). Children judged both kinds of outcomes to be impossible (replicating Shtulman & Carey, 2007). However, when asked to explain the outcomes, they predominantly gave naturalistic explanations in both conditions, citing realistic and plausible causes. In Experiment 2, children (N = 32) only heard about impossible outcomes, which were either about regular people (woman with pet unicorn) or magical beings (fairy with pet unicorn). Children again said that both kinds of outcomes were impossible. However, now their explanations differed by condition: Children predominantly gave naturalistic explanations for the outcomes about regular people; in contrast, their explanations about outcomes with magical beings included naturalistic and supernatural causes. These findings suggest that children may have a default tendency to explain events using naturalistic causes; however, this default may be abandoned when explaining outcomes about magical beings.

The roles of magic, explanation, and familiarity in children's understanding of possibility

Jacqueline Woolley, Maliki Ghossainy (Diversity Fellow), Chelsea Cornelius

University of Texas Austin

In four studies, we trace the roles of magic, explanation, and familiarity in children's understanding of possibility. In Study 1 we presented children with characters who wanted to perform impossible (violations of physical laws) versus improbable (violations of social norms) events. Three- and 4-year-olds said that the character would need magic for impossible but not for improbable events. In Study 2 we asked whether having an explanation for an impossible event would increase belief in it. We gave 4- and 5-year-olds physical, magical, and no explanation for impossible events. We found that stories with physical explanations were judged as real more often than both stories with both magical explanations and those with no explanation. In Study 3 we extended this to improbable events. Shtulman and Carey (2007) suggest that children claim that improbable events cannot happen because they can't imagine how they could occur. So we gave 4- and 6-year-olds explanations for improbable events in three conditions: no explanation, physical explanation, and psychological explanation. However, we found no effects on belief, suggesting that being able to imagine how an event could occur is not critical. It may be that the events used in these studies were too odd or unfamiliar. In Study 4 we provided 5- to 9-year-olds with familiar but still improbable events. We found that even 5- and 6-year-olds differentiated between improbable and impossible events and treated improbable events as equivalent to possible ones. Findings are discussed with regard to the development of children's understanding of possibility.

When "could" and "should" were one: Development of the ability to differentiate physical possibility from moral permissibility

Andrew Shtulman¹, Jonathan Phillips²

¹Occidental College, ²Harvard University

Differentiating possible events from impossible events is a critical skill for evaluating the truth of hypothetical ideas, like those conveyed by testimony. Children appear to develop this skill slowly over the first decade of life (Shtulman, 2009; Shtulman & Yoo,

2015). At age four, they deny the possibility of any event that defies their expectations, regardless of whether the event is genuinely impossible (e.g., walking through a wall) or merely improbable (e.g., owning a lion for a pet). Not until age eight or later do children reflect on the validity of their expectations, distinguishing expectations grounded in physical laws from those grounded in more superficial considerations. In the present study, we expanded the scope of our task to include events that violate children's moral expectations (e.g., lying to a parent), on the prediction that children will treat moral violations similarly to physical violations and judge both types of events impossible. Consistent with this prediction, children between the ages of four and seven (n = 80) judged immoral events impossible nearly as often as they judged improbable events impossible. We have also begun asking children to judge the moral permissibility of physically extraordinary events. Thus far (n = 40), we have found that preschoolers deny the permissibility of impossible events just as they deny the possibility of immoral events. These findings suggest that reasoning about physical possibility and reasoning about moral permissibility draw on the same cognitive resources and that children must learn to differentiate them in the course of development.

Parental “help” in negotiating the bounds of reality

Karl S. Rosengren¹, Isabel Gutierrez², Peggy Miller³

¹University of Wisconsin, ²Raritan Community College, ³University of Illinois

This talk will examine how children come to differentiate what is and what is not possible. A theoretical argument will be presented that examines how factors related to the child, the child's larger contextual environment, and specific tasks within his or her everyday life shape the manner in which he or she views the reality status of various entities or events. A particular focus will be on how parents and the culture at large provide a supportive context for initially widening and then narrowing the range of what is considered possible. Data will be presented from a variety of research studies that examine situations where children are presented with entities or events that many adults view as impossible. The primary focus will be on data collected in around Puebla, Mexico concerning concepts and beliefs surrounding the Day of Dead celebration. Evidence will be provided based on ethnographic interviews of families, one-on-one interviews with 60 children, and observations of the practices and events occurring during the Day of the Dead celebration. Parents in this community actively encourage participation in the Day of the Dead celebration, and both directly and indirectly encourage belief that ancestors return to visit the living during this event. Children reported a variety of different types of evidence that convinced them that their dead relatives had returned. A second study involving interviews with white, middle-class parents regarding the encouraging of different fantasy beliefs will be used to contrast and compare different cultural inputs provided to children.

[Single Presentation of ID 142]

Time: Saturday, 10/Oct/2015: 2:30pm - 4:00pm · *Location:* Emerson Burkhardt B
Session Chair: Melissa M. Kibbe, Boston University

ID: 142

Symposium

Topics: Infant Cognition, Social Cognition

Keywords: object cognition

Objects in a social world: Interactions between object cognition and social cognition in infancy

Chair(s): **Melissa M. Kibbe** (Boston University)

Object cognition and social cognition in infancy are typically studied separately. Yet as infants observe a world full of objects and people, object and social cognitive processes may interact, yielding representations that are distinct from those that arise from non-social contexts alone. Social cues, such as an agent exhibiting a preference or initiating communication, may impact how infants encode objects. In turn, object representations may impact how social cues, such as referencing, are interpreted. The purpose of this symposium is to bring together new research exploring these interactions. Paper 1 shows that infants can use information about objects' social affiliation and ownership status to "chunk" objects, increasing the number of objects they can represent concurrently. Paper 2 shows that the social significance of objects (e.g. if an agent prefers one object over another), can impact the amount of identifying information infants remember about objects. Paper 3 shows that the presence of ostensive communicative signals determines whether infants process objects as exemplars of a kind. Finally, Paper 4 explores how linguistic cues give rise to object representations in the absence of visual input, and how infants' understanding of object categories can impact their interpretation of social reference cues. Together, this work suggests that social and object cognition interact in a transformative way, impacting the way infants process, retain, and generalize information about the world. This symposium presents novel research that takes cognitive development in a new direction, integrating previously separate domains to yield a new and robust set of findings.

Presentations of the Symposium

Infants use social knowledge to chunk items in working memory

Aimee Stahl, Lisa Feigenson

Johns Hopkins University

Without spatial, linguistic, or semantic chunking cues, infants fail to remember more than three identical objects at once (Feigenson & Halberda, 2004; 2008). Here we asked whether infants can use abstract social knowledge to mentally bind representations of individual objects into sets, or "chunks," thereby overcoming the three-item working memory limit.

In the first experiment, we show that 16-month-olds can use cues of affiliation and contingent interaction to chunk items into sets. When infants saw four identical dolls each face and interact with the infant, and then those dolls were hidden in a box, infants failed to represent all four dolls. However, when infants saw the same four identical dolls face each other and interact contingently in pairs, infants successfully chunked the dolls into social dyads and represented all four.

Next, we show that 16-month-olds can use cues of personal ownership to chunk items in memory. When two distinct social agents were each shown to possess two identical blocks, and these blocks were then hidden inside of a box, infants successfully represented all four hidden blocks. In contrast, when a single agent was shown to possess all four blocks, or when two distinct inanimate, non-social objects each "possessed" two blocks, infants failed to chunk.

Current studies are investigating whether infants can harness their linguistic knowledge to chunk social agents into sets depending on what language they speak. Together, our results suggest that infants can leverage their early social knowledge to reorganize and expand the contents of memory.

Social relevance impacts infants' working memory for object identities

Melissa M. Kibbe¹, Alan M. Leslie²

¹Boston University, ²Rutgers University

Six-month-old infants can typically remember the identity of only a single object in working memory. However, in the real world, object identities often have social relevance - identity information can help distinguish agents from non-agents, and agents may preferentially interact with objects depending on the objects' identities. We asked whether infants' ability to encode object identities could be affected by objects' social relevance.

In experiment 1, we tested infants' working memory for objects from distinct social categories. In experiment 1a, we hid two socially distinct objects, a humanlike doll and a ball, in two locations. We found that 6-month-olds, who typically can only remember one object identity, could remember both objects. In experiment 1b, we confirmed that infants' success in experiment 1a was not due to perceptual differences in the objects. In experiment 1c, we found that infants' success is not due simply to preferential encoding of social versus nonsocial objects: infants failed to remember the identities of two different dolls.

In experiment 2, we asked whether social context would impact infants' ability to encode object identities. We familiarized infants to scenarios in which an agent showed a preference for one of two distinct shapes. The objects were then hidden while the agent watched. We found that infants anticipated where the agent would reach for her preferred shape, suggesting that the agent's preference induced infants to encode more object identities than they can in non-social contexts.

Together, this work suggests that objects' social relevance impacts how infants encode objects' identities.

Acquiring generic knowledge through non-verbal ostensive communication

Rubeena Shamsudheen (International Fellow), Gergely Csibra

Central European University

Children can learn generic knowledge from generic statements that express kind-encompassing information. However, young infants cannot utilize such complex linguistic expressions. We propose that young infants can interpret ostensive non-verbal communication as generic expressions, which allows fast-mapping generic knowledge similar to how generic statements work. We tested 18-month-old infants on how likely they were to extend a dispositional property demonstrated on a single exemplar to other objects of the same kind. We measured their persistence in eliciting the property from a novel exemplar after they had been presented with counter-evidence: an identical exemplar that did not have the property. We found that 18-month-old infants learned the property as generic and persisted in eliciting the property when the demonstration was ostensive and all objects had been labeled by the same word prior to demonstration. However, labeling or ostensive demonstration alone was not sufficient. Our findings confirm the hypothesis that ostensive demonstration can lead 18-month-olds to take an ostensively demonstrated property as generic to the kind, but, in order to generalize this property to other objects, they require further information that allows them to identify other objects as kind members. Counterintuitively, mere similarity (i.e., identical shape) does not seem to fulfill this function.

Our results also indicate that the role of labels in learning about kinds is to help in identifying kind members, while generic information can be learned through non-linguistic communicative referential acts—what we term nonverbal generics.

Object representations affect infants' responding to language

Maria Osina¹, Megan Saylor¹, Patricia Ganea²

¹Vanderbilt University, ²University of Toronto

Understanding speech about the absent requires activating relevant object representations and engaging in social reasoning to identify the referent of the speaker's verbal message. Across two studies, we investigated infants' responding to the mention of absent objects. To respond, infants had to use their representation of a specific object in its location (Study I) and their knowledge of object categories (Study II). In Study I, 12-month-olds searched for hidden objects in response to hearing their labels when the objects were accessible, but not when they were inaccessible. Infants did not forget about inaccessible objects as they responded robustly when previously inaccessible hidden objects were moved to accessible locations before the request. Rather, when infants tagged the referent as inaccessible it inhibited their ability to engage in communication about it.

In Study II, 16- and 20-month-old infants were asked to find an object in the box (e.g., "Find a shoe!"), and then they were allowed to search. On target trials (e.g. retrieved a shoe), infants did not attempt to find other objects. On distractor trials, infants in both groups searched again in the box when distractors were unrelated to targets (an apple instead of a shoe). When distractors were perceptually dissimilar, but categorically close to targets (a sock instead of a shoe) only older infants searched again. When distractors were perceptually similar to targets, but unrelated categorically infants in neither group searched again. Altogether, the specifics of infants' object representations affect the way they engage in communication about the absent.

[Single Presentation of ID 163]

Time: Saturday, 10/Oct/2015: 4:15pm - 5:45pm · *Location:* George Bellows DEF

Session Chair: Kristina Olson, University of Washington

Session Chair: Kristin Shutts, University of Wisconsin - Madison

ID: 163

Symposium

Topics: Concepts/Categories, Social Cognition

The Development of Social Categories: Insights from Understudied Populations

Chair(s): **Kristina Olson** (University of Washington), **Kristin Shutts** (University of Wisconsin)

Discussant(s): **Susan Gelman** (University of Michigan)

What leads children to notice and attach meaning to particular social categories? How do social categories affect children's thoughts about, and behavior toward, different individuals? Such questions have traditionally been answered through studies of children who can easily identify as male or female, Black, White, or Asian, developed in a limited set of environments (e.g., attending traditional schools). The goal of this symposium is to highlight how studying children with less normative social identities and social experiences can shed light on theories and mechanisms underlying the development of social categorization. We focus on the two most-studied groupings in cognitive development—race and gender—and consider three cases of increasing prominence across the globe: biracial children (one of the fastest growing youth demographics), transgender and gender-nonconforming children (increasingly visible groups of gender minorities), and children who attend gender-neutral schools (an increasingly common practice in Sweden). The first speaker will discuss recent work examining how having a biracial identity influences children's learning from and preferences for people from different racial categories. The second speaker will examine how sitting outside children's binary gender categories influences gender identity, preferences, and essentialism. The third speaker will describe recent work exploring the impact of gender-neutral schooling on children's gender encoding, preferences, and stereotypes. Finally, our discussant will provide her perspective on how broadening the field to include participation of the members of minority groups as well as children from diverse environments can enhance our understanding of social categorization in childhood.

Presentations of the Symposium

Racial Identity Flexibility in Biracial Children: Differences in Learning and Social Preferences

Sarah E. Gaither (Diversity Fellow)¹, **Eva Chen**², **Kathleen Corriveau**³, **Paul Harris**⁴, **Nalini Ambady**⁵, **Samuel Sommers**⁶

¹University of Chicago, ²University of Hong Kong, ³Boston University, ⁴Harvard University, ⁵Stanford University, ⁶Tufts University

Despite the fact that biracial children represent the fastest growing youth demographic, we know little about how having multiple racial ingroups may affect how biracial children learn and socially affiliate. Past studies show children prefer learning from and affiliating with their racial ingroup and that the racial background of teachers and classmates predicts how much children learn in school. However, since biracial children have two racial ingroups with which to identify, learning and social environments may be more challenging to navigate. Biracial (Black/White, Asian/White) and monoracial (White, Black, Asian) children (N = 246, 3-8 years) had their racial identity primed—for biracial children, half had their White identity primed and half had their racial minority identity primed. In a learning preferences task, participants determined the function of a novel object after watching adults (White, Black, and Asian) demonstrate its uses. In a social preferences task, participants saw pairs of children (White, Black, and Asian) and chose with whom they most wanted to socially affiliate. Biracial children showed flexibility in racial identification during both learning and social tasks based on racial priming. Interestingly, minority-primed biracial children chose to learn from a racial minority teacher more often than monoracial minority children, suggesting growing up in a biracial household may boost flexible learning abilities. However, biracial children were not more likely than monoracial minorities to socially affiliate with other minority children, indicating that biracial child ingroup preferences may be contextually based.

Gender Identity and Categorization in Transgender and Gender Nonconforming Children

Kristina Olson, **Madeleine DeMeules**, **Lily Durwood**

University of Washington

Understanding how children develop and use gender categories, including how they come to understand their own membership in a gender category, the influence of gender on their decision-making, and their understanding of the stability of gender categories, has been a central topic in developmental psychology. However, one limitation to this work is that nearly all of this work has focused on typical gender development. This singular focus on typical gender development can often make it difficult to ascertain which factors (e.g., parental input, peer socialization, genetics, etc.) are necessary, sufficient, merely correlated with, or play no role in determining gender identity, cognition, and behavior throughout development. In this talk, I will discuss recent work from a cross-sectional study comparing gender categorization in transgender (N=65) and gender nonconforming children (N=22) to two control groups—their siblings (N=59) and unrelated gender conforming controls (N=65). First, I provide evidence concerning identity, finding convergence in transgender children's gender identity across implicit and explicit measures that mirrors their outwardly expressed identity—at odds with their sex assignment at birth, but equal in magnitude to the identities of non-transgender participants. In contrast, gender nonconforming children—including those who identify as male and female—show an implicit identity between male and female. Then, I discuss work showing that gender appears to equally influence decision-making (peer choice, preferences for clothes and objects) in transgender and non-transgender youth. Finally, I discuss work showing the influence of transgender and gender nonconforming identities on understanding gender constancy and essentialism.

Early Social Environments and Gender: Effects of Pedagogy

Kristin Shutts¹, **Ben Kenward**², **Christine Fawcett**²

¹University of Wisconsin, ²University of Uppsala

A small number of preschools in Sweden have recently adopted “gender-neutral” pedagogical practices for teachers and children in classrooms. Such settings provide a unique opportunity to investigate the role of social experience in guiding children’s consideration of gender as a social category. Participants in the present research were 3- to 6-year-old children (N = 80) from two kinds of preschool settings in Sweden: Some participants attended a preschool with several specific school policies and practices aimed at actively creating a gender-neutral environment, while other participants attended more typical Swedish preschools.

Children in both schools completed measures designed to assess their gender-based social preferences, stereotypes, and automatic encoding. Compared with children in typical preschools, a greater proportion of children in the gender-neutral school were interested in playing with unfamiliar other-gender children. Additionally, boys attending the gender-neutral preschool showed less gender stereotyping than boys in typical preschools; this was not true for girls. However, children at both kinds of schools were equally likely to automatically encode other people’s gender. The findings suggest that gender-neutral pedagogy has moderate effects on how children think and feel about people of different genders, but may not affect children’s tendency to spontaneously notice gender. Beyond contributing to theories of gender categorization, research focused on the factors supporting young children’s social attitudes and stereotypes can contribute practical suggestions for how to reduce intergroup biases.

Oral Papers IV: Math and number

Time: Saturday, 10/Oct/2015: 4:15pm - 5:45pm · Location: Elijah Pierce A and B
Session Chair: Nicole M. McNeil, University of Notre Dame

ID: 293 / Oral Papers IV: 1
Individual Oral Paper

Topics: Concepts/Categories, Number, STEM Learning

Neural tuning to numerosity in 3- to 6-year-old children predicts numerical development

Alyssa J Kersey, Jessica F Cantlon

Department of Brain & Cognitive Sciences, University of Rochester, Rochester, NY, United States of America;
akersey@bcs.rochester.edu

The intraparietal sulcus (IPS) represents numerosity in monkeys and humans, including children. Previous research with monkeys and human adults indicates that neural activity in this region is modulated by numerical ratio such that neural signaling is more reliable as numerical disparity increases. Currently, it is unknown how these tuning curves first emerge in humans and what their relation is to cognitive development. Using functional magnetic resonance imaging (fMRI) we show that children as young as 3 years of age exhibit number preferences in the IPS and that neural tuning to number matures faster in the right hemisphere than in the left. Further, we show that children's numerical cognition can be predicted by the development of neural tuning to number. These data are the first to use task-based fMRI to measure brain activation in 3-year-old children and suggest that neural tuning to numerosity is fundamentally related to numerical development.

ID: 279 / Oral Papers IV: 2
Individual Oral Paper
Topics: STEM Learning

The Effects of Error Reflection on Middle School Students' Algebra Learning

Christina Barbieri (Diversity Fellow), Julie L. Booth

Temple University, United States of America; christina.barbieri@temple.edu

An in-vivo classroom experiment was conducted to determine the influence of promoting error reflection on students' algebra learning. Middle school students ($n = 110$) were randomly assigned within classroom to one of four conditions: a problem-solving control group, a correct worked examples control group, a correct worked examples group that promoted error reflection, or an incorrect worked examples group that promoted error reflection. Being in the Incorrect Example Error Reflection condition resulted in greater learning of both procedural and conceptual knowledge. Being in either the Correct Example Error Reflection condition or the Correct Example control group was equally beneficial for conceptual learning. A significant interaction found between conceptual knowledge at pre-test and being in the Incorrect Example Error Reflection condition revealed that students who began the study with low conceptual knowledge benefitted most from being in the Incorrect Example Error Reflection condition. Theoretical and educational implications will be discussed.

ID: 264 / Oral Papers IV: 3
Individual Oral Paper
Topics: Number, STEM Learning

Proficiency with Number Sets in Kindergarten Predicts Understanding of Math Equivalence in Second Grade

Caroline Byrd Hornburg, Nicole McNeil, Brianna Devlin, Mary McKeever

University of Notre Dame, United States of America; cbyrd@nd.edu

Most children (ages 7-11) struggle to develop a formal understanding of math equivalence. However, some children succeed, despite attending the same schools and having the same narrow experience with arithmetic. One potential source of individual differences in understanding of this fundamental concept is proficiency with number sets. This skill requires focus on a number set as a whole and quick identification of multiple instantiations of the same value that vary in surface form (Geary et al., 2007). A prospective, longitudinal study ($N = 104$) was conducted to test whether this skill precedes and predicts understanding of math equivalence. As hypothesized, proficiency with number sets in kindergarten predicted understanding of math equivalence in second grade, even after controlling for SES, IQ, inhibitory control, number identification, and kindergarten math achievement ($p = .004$, $r = .287$). Results suggest that proficiency with number sets may provide an early foundation for understanding math equivalence.

ID: 175 / Oral Papers IV: 4
Individual Oral Paper

Topics: Comparative Cognition, Number, Spatial Cognition

Counting and Left-to-Right Spatial Mapping Biases in Toddlers

Koleen Cathryn McCrink, Jasmin Perez, Erica Baruch, Eva Kerman

Barnard College, United States of America; kmccrink@barnard.edu

Non-human animals map vertical space to horizontal space with a left-to-right bias. Here we examine whether 2- and 3-year-olds exhibit the same phenomenon, by training 96 toddlers to locate a toy in one of five vertical locations. Half of the children were given verbal numerical labels for the locations, and half were not. After training, the array was surreptitiously turned 90 degrees, and the child was asked to locate the toy. Children in the non-numerical condition failed to search efficiently after transposition, and most often went to the middle cup. Children in the numerical condition searched more efficiently than those in the non-numerical condition, and most often went to the cup indicated by a left-to-right mapping strategy. Children's pre-existing spatial-numerical

associations, as measured by a counting task, predicted their left-to-right mapping strategy in the numbered condition. These results suggest that spatial mapping behavior in young children is not inherently asymmetric.

ID: 247 / Oral Papers IV: 5
Individual Oral Paper

Topics: Number, Spatial Cognition, STEM Learning

Cognitive Mechanisms of Cultural Differences in Mathematics

John Opfer¹, Dan Kim¹, Robert Siegler², Lisa Fazio³, Jike Qin⁴, Xinlin Zhao⁴

¹The Ohio State University, United States of America; ²Carnegie Mellon University, United States of America; ³Vanderbilt University, United States of America; ⁴Beijing Normal University, China; opfer.7@osu.edu

Chinese children routinely outperform American peers in mathematics. While much is known about differences in education, nothing is known about the cognitive skills that mediate the effect of these national differences on early math development. To test this, 95 Chinese and US kindergartners completed tests of arithmetic, IQ, and 6 cognitive skills (symbolic and non-symbolic number comparison, approximate addition, and number-line estimation). Chinese kindergartners scored higher than US in math ($p < .01$) but not IQ, and each cognitive skill was correlated with math scores ($ps < .01$). Although Chinese children outperformed US children in symbolic number comparison ($p < .05; d = .48$), symbolic approximate addition ($p < .01; d = .56$), and symbolic ($p < .01; d = .65$) and non-symbolic number-line estimation ($p < .0001; d = .91$), they did not differ otherwise. Most stunningly, we found that if the total effect of nationality on arithmetic scores is the magnitude of the "learning gap", 98.9% of this gap was reduced by achieving equivalently high levels of symbolic and spatial numeric proficiency.

[Single Presentation of ID 208]

Time: Saturday, 10/Oct/2015: 4:15pm - 5:45pm · *Location:* Emerson Burkhart A
Session Chair: Nora M. Isacoff, New York University

ID: 208

Symposium

Topics: Language, Word Learning

Vocabulary and cognitive development: Crossing the basic-applied divide.

Chair(s): **Nora M. Isacoff** (New York University)

The relationship between vocabulary and other aspects of cognition is a central theme in both basic and applied developmental research. On both sides of the basic-applied divide, researchers investigate how children come to understand and describe the world around them and how biological and social factors affect these developments. However, rarely do basic and applied researchers come together to share methodologies and findings. This symposium will join basic researchers whose work has translational implications with applied researchers whose work has strong theoretical grounding. Paper 1 investigates the multi-modal nature of vocabulary development, demonstrating how children's motion-related words are constrained by the way humans move. Papers 2 and 3 both demonstrate the importance of contextualizing vocabulary instruction in the classroom. In particular, Paper 2 establishes the benefit of teaching children about the relationships between words and about how these words map onto complex conceptual structures; Paper 3 argues for teaching vocabulary through play. Both papers also reveal the connection between vocabulary and literacy development. Finally, Paper 4 presents a study co-led by a basic researcher and a speech-language pathologist, who demonstrate that early exposure to books, to rich language environments, and to play reduces at-risk infants' chances of being late talkers at 24 months. The goals of this symposium are to inspire cross-collaborations that will augment both basic and applied approaches to the study of vocabulary development and to highlight the connections between vocabulary and other aspects of cognition.

Presentations of the Symposium

Learning the Language of Locomotion: Do Children Use Biomechanical Structure to Constrain Hypotheses about Word Meaning?

Barbara C. Malt¹, Gert Storms², Anne White², Eef Ameel²
¹Lehigh University, ²University of Leuven

Although most studies of word learning focus on children aged 3 and below, a growing body of evidence documents that children continue to refine word meanings and patterns of word use into middle childhood and beyond. This extended development occurs even for common words appearing in early vocabulary. In the current investigation, we focus on where children diverge from adults and where they more closely approximate them during later lexical development, and why. We use the domain of human locomotion to ask whether children are sensitive to structure in the world that constrains adult word use, and whether appreciation of this constraint is apparent by age 4 or emerges only gradually during later lexical development. We asked children ages 4-9 to label video clips of human locomotion. Results showed that they are immature in their labeling of locomotion in several respects. The children had fewer vocabulary words than adults, and they overextended those they had to cover all instances. Despite the substantial overextension, though, their word use shows sensitivity to a fundamental biomechanical distinction between pendulum-type gaits and impact-and-recoil type gaits. Like adults, they respected the basic gait by restricting their use of individual words to one type of gait or the other.

Contextualizing vocabulary instruction: Insights for basic and translational cognitive development research

Nora M. Isacoff, Brianna M. Avenia-Tapper
New York University

This large-scale study investigates how developments in vocabulary, concepts, literacy, and reasoning can scaffold each other in the classroom. Forty-eight Pre-K-through-first grade "treatment" classrooms from 12 high-poverty schools participated in the World of Words curriculum, a year-long intervention in which explicit vocabulary instruction is integrated into themed units involving text study (fiction and nonfiction), categorization language (e.g., "a cube is a kind of shape"), and an emphasis on explanation (e.g., "a banana is healthy because it gives my body energy"). Forty-eight control classrooms from the same 12 schools followed their standard curriculum. Eight students from each treatment and control classroom were assessed on five measures at the beginning and end of the academic year including measures of general and curriculum-specific vocabulary, concepts, literacy, and reasoning. Preliminary results from hierarchical linear modeling indicate that the treatment group improved more on general as well as specific measures compared to the control group (all p s < .05). Consistent with our theoretical model of vocabulary learning, these results suggest that contextualizing vocabulary instruction can improve children's cognitive abilities exponentially, which could help remedy the word and knowledge gaps between high- and low-income children.

Learning through Play: Improving Vocabulary Knowledge for Low-Income Preschoolers

Tamara Spiewak Toub¹, Brenna Hassinger-Das¹, Hande Ilgaz², Deena Skolnick Weisberg³, Kimberly T. Nesbitt⁴, Molly F. Collins⁵, Jessica Eye⁶, Elizabeth Hadley⁵, Bretta Rivera⁵, Roberta Golinkoff⁷

¹Temple University, ²Bilkent University, ³University of Pennsylvania, ⁴University of New Hampshire, ⁵Vanderbilt University, ⁶Lehigh University, ⁷University of Delaware

Early vocabulary knowledge powerfully predicts later language skills (NELP, 2009), and low-income preschoolers typically have lower vocabulary knowledge than their peers (Hart & Risley, 1995). Thus, we must identify effective classroom techniques for promoting early word-learning. Enriched book-reading is one promising approach (Dickinson & Porche, 2011), as is the child-directed, adult-supported play method known as guided play (Hirsh-Pasek et al., 2009). The Read-Play-Learn Project examined a

book-reading plus guided play approach for promoting low-income preschoolers' vocabulary. In Study 1, adults read two books with triads of children (N=239). During and after readings, the adult taught 10 vocabulary words per book. Then, children could play with story-related toys either on their own (Free Play), or the teacher joined children's play (Guided), or the teacher led a story-reenactment (Directed). The adult-supported Play conditions incorporated targeted vocabulary. On receptive and expressive vocabulary measures, children in Guided Play outperformed children in Free Play ($d=0.39$, $d=0.25$), as did children in Directed Play ($d=0.35$, $d=0.31$). Guided and Directed conditions did not differ ($d=0.06$, $d=0.07$). During Study 2, teachers taught 16 words while reading one book. They further reviewed 8 words through guided play and the other 8 through a picture card activity. Children (N=101) gained more expressive knowledge of play words than of picture card words ($d=0.41$). We argue that guided play might foster learning by creating a *mise en place*—a positive disposition toward meaningful learning experiences (Weisberg et al., 2014). Results suggest that play is more than just fun but a valuable teaching tool.

Risk and Protective Factors for Late Talking: An Epidemiological Perspective

Beverly Anne Collisson¹, Susan Graham¹, Jonathan L. Preston², Sarah Rose³, Sheila McDonald³, Suzanne Tough¹

¹University of Calgary, ²Syracuse University, ³Alberta Health Services

Late talkers are toddlers between 18 and 35 months who fall at the bottom of the population distribution for productive vocabulary, with or without a concomitant delay in understanding their ambient language. Using a community-based prospective longitudinal pregnancy cohort of 1023 mother-infant pairs, we examined risk and protective factors for late talking. Mother-infant pairs were followed across five time points; before 25 weeks gestation, between 34-36 weeks gestation, and at 4, 12, and 24 months postpartum. Toddlers who scored < 10th percentile on The MacArthur-Bates Communicative Development Inventories - Words and Sentences form between 24 and 30 months were identified as late talkers. Results identified two key risk factors for late talking: male gender and family history of speech/language delay. Protective factors included: daily interaction with picture books starting between 12 and 24 months, engaging in informal play opportunities and being primarily cared for in Child Care centers (compared to all other forms of care). These findings demonstrate that risk for late talking may be decreased by enveloping infants and toddlers in language rich environments (inside and outside of their homes) that include talking, playing, reading, and sharing books. Book reading, play opportunities, and child care centers are all examples of opportunities for language-based social interaction with a variety of communication partners. Together these findings are consistent with language acquisition research demonstrating that infants are highly sensitive to variability in the speech input, and this variability may play a critical role in supporting word learning.

[Single Presentation of ID 165]

Time: Saturday, 10/Oct/2015: 4:15pm - 5:45pm · *Location:* Emerson Burkhart B
Session Chair: Rebekah Richert, University of California, Riverside

ID: 165

Symposium

Topics: Culture, Social Learning

Ritual, Religious, and Cultural Practices Shape Cognitive Development

Chair(s): **Rebekah Richert** (University of California, Riverside)

This symposium will present research on how engagement in traditional cultural and/or ritual practices shapes children's cognitive development. From a cultural psychology viewpoint (Bruner, 1990; Gauvain, 2001; Vygotsky, 1978), to understand the psychological mechanisms influencing the development of concepts and cognitive processes, one must first understand the cultural context in which those processes are taught and learned with a view toward studying the concepts and processes that are meaningful and relevant for that particular cultural group. To that end, this symposium incorporates cutting-edge approaches to examining both within-culture and cross-cultural variation in the influences of participation in cultural and ritual practices on cognitive development. The papers incorporate a variety of methodologies (survey, clinical interview, experimental), represent participants from a wide-range of religious and cultural backgrounds and settings (American Indian, South African Bushman, Protestant Christian, Roman Catholic, Muslim, Mormon-Latter Day Saints, Religiously Non-Affiliated), and study a range of cognitive outcomes (executive functioning, self-regulation, concept formation, social cognition, imitation). The first two papers describe research examining how participation in specific family, cultural and religious ritual practices structures specific aspects of children cognitive development, namely the development of executive functioning, self-regulation, and abstract concepts. The second two papers unpack how the nature of rituals promotes children adopting a "ritual" stance that guides the unique ways in which children imitate ritual actions (in ways they do not imitate other kinds of actions). As a whole, the papers will encourage attendees to consider the fundamental and inescapable ways in which cultural practices shape developing cognitions.

Presentations of the Symposium

Prayer structures God concepts in Christian, Muslim, and religiously Non-Affiliated children

Rebekah A. Richert, Nicholas Shaman, Anondah Saide, Kirsten Lesage

University of California, Riverside

Despite the fact that prayer is one of the first shared religious activities in which children engage, minimal research has examined the influence of engaging in prayer on children's developing religious thinking. Previous research has indicated that the physical actions of prayer are especially salient for preschool-aged children (e.g., Wolley & Phelps, 2001). As children are often introduced to the concept of God through ritualized prayer, one hypothesis is that children view the actions of prayer as crucial for God's understanding may have a more anthropomorphic view of God (because of the implication that God needs humans to perform specific actions in order to know that they are praying). The current study examined if parents' and children's views about the function of actions involved in prayer (e.g., bowing head) are related to children's anthropomorphic conception of God. Protestant, Catholic, Muslim, and Religiously Non-Affiliated (N = 126) preschool-aged children and their parents were interviewed. Children's view that prayer actions helped God hear the person praying better was related to children's anthropomorphic views of God, $r = 0.246$, $p = .005$. Furthermore, parents' who viewed the function of prayer actions as helping the person praying to communicate with God had children with more anthropomorphic views of God, $r = 0.178$, $p = .046$. Descriptive findings will present differences in views of prayer and God by religious tradition, and these findings will be discussed in terms of the implications for the ways in which prayer serves as a context of religious concept development.

Active Participation in Family and Cultural Rituals Promotes Positive Development in Middle Childhood

Monica Tsethlikai

Arizona State University

How does children's participation in family and cultural rituals impact the development of their executive functions (EF) and ability to self-regulate? Diamond (2012) theorized participation in programs or interventions that (a) increase feelings of joy and social belonging, (b) engage core EF skills, and (c) involve physical exertion support the development of EF skills and promote positive developmental outcomes. Expanding upon Diamond's model, Study 1 explored whether children's participation in family rituals (attending church regularly, reading scripture together) and regular activities (camping or skiing) were related to their EF skills, assessed with both parent reports (BRIEF) and child performance-based assessments (Wisconsin Card Sorting Task, Contingency Naming Test, Color Trails). In keeping with Diamond's model, children (M = 9.77 years old, N = 149) who routinely engaged in family rituals reported higher levels of social support and better self-regulatory skills than children who did not routinely participate in these activities. A second, ongoing study is exploring whether active engagement in family, as well as cultural and spiritual rituals, promotes the development of EF and self-regulatory skills in urban American Indian children (current N = 50). To date, children participated in 2.5 cultural activities on average and participation in more cultural activities was related to better performance on several child performance-based indicators of EF. Together these studies support Vygotsky's theory that children's self-regulatory skills develop first on the interpsychological plane and then move to the intrapsychological plane with children's EF skills a possible mediator of positive developmental outcomes.

Instrumental versus ritual interpretations of behavior are associated with distinct behavioral outcomes in early childhood

Jennifer M. Clegg, Cristine H. Legare

The University of Texas at Austin

Children engage in flexible imitation as a means of learning both instrumental skills and the rituals of their social groups (Herrmann et al., 2013; Legare et al., in press; Watson-Jones et al., 2014). This study examined the behavioral outcomes associated with interpreting a behavior instrumentally or ritualistically. Four tasks examined the effect of an instrumental language cue (i.e., "I'm going to make a necklace.") versus a ritual language cue (i.e., "Everyone always does it this way.") on children's (N = 199, 3-6-year-olds) imitative fidelity of a necklace-making activity, their memory and transmission of the activity, and their reasoning about the functions of the stimuli used in the activity. The necklace-making activity incorporated both instrumental elements (e.g., bead stringing, a behavior physical-causally linked to the construction of a necklace) and conventional elements (e.g., novel gestures, behaviors not causally relevant to the construction of a necklace). Children in the ritual condition imitated the conventional elements with higher fidelity ($F(1, 182) = 17.33, p < .001$), transmitted more of the modeled behavior ($F(1, 197) = 13.26, p < .001$), and showed higher levels of functional fixedness than children in the instrumental condition ($X^2(3, N = 114) = 12.03, p < .01$). There were no differences in children's memory of the activity between conditions demonstrating that memory alone does not explain differences in imitative fidelity. Data from multiple tasks provide convergent evidence for distinct behavioral outcomes associated with interpreting behavior instrumentally versus ritualistically.

Social learning and the propensity for ritualistic behavior among South African Bushman children

Mark Nielsen¹, Ilana Mushin¹, Keyan Tomaselli²

¹University of Queensland, Australia, ²University of KwaZulu-Natal, South Africa

Cultural conventions such as rituals, are universal features of human behavior. Reflecting the human propensity for ritual, recent research (Nielsen, Kapitány & Elkins, 2015) has shown that young Western children, when presented with a social learning task, will imitate entire action sequences, including components that obviously have no causal utility by virtue of occurring after the ostensible goal of the actions has been achieved (e.g., tapping the top of a box after it has been opened and a toy made easily available for retrieval). In this talk, I will present new data collected from children living in remote Bushman communities in South Africa, showing that this behavior not only extends to descendants of Africa's first people but that it is intensified when the goal-state is de-emphasized (e.g., when actions are executed on a box that is revealed to not contain anything). This work highlights how children readily adopt the ritual stance and are heavily inclined to use this stance to govern their approach to learning new behavior.

PS-IV: Poster Session IV

Time: Saturday, 10/Oct/2015: 5:45pm - 7:00pm · Location: George Bellows ABC

Cash bar and light snacks

ID: 442 / PS-IV: 1

Poster

Topics: Concepts/Categories, Executive Function, STEM Learning

Keywords: relational reasoning

The Role of Executive Functions on Children's Relational Reasoning and Mathematics Learning

Kreshnik Nasi Begolli¹, Lindsey Engle Richland², Susanne Madlaina Jaeggi¹

¹University of California, Irvine, United States of America; ²University of Chicago, United States of America; kbegolli@uci.edu

Children's executive functions (EF) are theorized to underpin many aspects of children's cognitive development, including reasoning development. Yet, few studies have examined the relations between EF and development in ecologically valid contexts. This study explores the contributions of individual differences in EF on children's learning from a recommended reasoning opportunity: an analogy between three solution strategies to a single mathematics problem. We examined working memory (WM) and inhibitory control (IC) impacts on successful schema-formation. Overall, WM and IC explained distinct variance in gains in procedural knowledge, procedural flexibility, and conceptual knowledge after a 1-week delay. WM & IC were rarely predictive at immediate post-test, suggesting that these functions are not simply correlated with all mathematics procedure acquisition, but may be particularly important for durable schema-formation through structure-mapping. These results suggest that individual differences in EF may systemically impact children's school learning, leading to differential knowledge gains from the same inputs.

ID: 571 / PS-IV: 2

Poster

Topics: Decision Making and Reasoning, Social Learning

Spontaneous relational talk and analogical development

Nina Kathleen Simms, Leah Hirschfeld, Lindsey Engle Richland

University of Chicago, United States of America; nsimms@uchicago.edu

The relationship between spontaneous talk about relations among parent-child dyads and analogy task performance was examined in preschoolers. Children independently completed an analogical reasoning task. After, children and their parents solved ambiguous A:B::C:? problems with potential to elicit talk about both similarities among relationships and surface features. Results reveal differences in parent routines for engaging children in relational talk that seem to matter for children's reasoning performance. Children's independent analogy scores were predicted by how often children themselves, but not their parents, described relations. Further, overall dyadic talk about the analogous C:? relation positively predicted analogy scores, whereas non-solution oriented and non-analogous C:? relational talk negatively predicted performance. The data suggest that mere exposure to parental talk about relations may not be sufficient to encourage analogical skill development; rather, children may need to discursively engage in the cognitive work of constructing relations and finding relational similarities to advance these skills.

ID: 488 / PS-IV: 3

Poster

Topics: Concepts/Categories, Social Cognition

Children's Inferences about the Scope of Social Behaviors

Annie Riggs, Charles Kalish, Martha Alibali

University of Wisconsin-Madison, United States of America; aeriggs@wisc.edu

These studies investigated whether children utilize covariation evidence and contrasting cases to infer the scope (i.e. level of generality) of opaque social behaviors. In Study 1, 80 children (4-5 year-olds and 7-8 year-olds) observed sequences of animated videos that provided evidence about the scope of a behavior (general to a country, state, or individual). Children then predicted and explained the behaviors of novel characters from varying social groups. 7 and 8 year-old children's predictions and explanations were consistent with the evidence, whereas 4 and 5 year-old children tended to overgeneralize. In Study 2, we familiarized 30 4 and 5 year-old children to potential differences and similarities between people from different social groups prior to the sequences. Their predictions and explanations were largely consistent with the evidence they received. Together, these studies suggest that children track patterns of experience to determine the scope of behaviors they observe in the social world.

ID: 418 / PS-IV: 4

Poster

Topics: Concepts/Categories

Conjunctive Categorizations with Perceptual Features: Developmental Differences Between Children and Adults

Nigel Noll, Haley Vlach, Charles W. Kalish

University of Wisconsin - Madison, United States of America; nnoll@wisc.edu

Previous research has revealed that both children and adults can categorize objects by a single perceptual feature (e.g., shape, color, motion). However, less is known about whether and how children categorize information conjunctively based upon multiple perceptual features. To this end, we investigated developmental differences in conjunctive categorizations with perceptual features.

In a learning task, preschool-aged children ($N = 91$) and adult participants ($N = 40$) were presented with multiple novel objects. Each novel object consisted of paired combinations of perceptual features (i.e., color, shape, and motion path). At a forced choice test, participants were asked to categorize objects conjunctively using two features. The results revealed striking developmental differences between children and adults. These findings suggest that, while preschool-aged children are able to readily categorize objects by a single feature, the ability to conjunctively categorize information may have a more protracted course of development.

ID: 514 / PS-IV: 5

Poster

Topics: Concepts/Categories

Keywords: Learning, Inductive Inference

Focus and Flexibility in Learning Correlated Attributes

Charles Kalish, Annie Riggs, Nigel Noll

uw-madison, United States of America; cwkalish@wisc.edu

In discriminative learning models, children may learn a single pattern efficiently but at the cost of ignoring other, potentially relevant patterns. Conversely, in generative learning models, children spread their attention across multiple patterns, with the cost of not learning any particular pattern very well. This study examines how developmental and task factors can be optimized to promote efficient learning with the least cost. Across several experimental conditions children (4-5yrs, 7-8yrs) were exposed to stimuli consisting of two correlated sets of binary features and tested to see how well they learned each correlation. Results suggest differences in the efficiency and types of patterns children learn at different ages and across different types of tasks. For example, young children seem to benefit from focused exposure and have difficulties with the task demands of flexible learning.

ID: 496 / PS-IV: 6

Poster

Topics: Infant Cognition, Moral Cognition, Social Cognition

Keywords: prosocial development, sharing

7.5-Month-Old Infants Learn to Share

Jing Xu, Lucie Saether

University of Washington, United States of America; jingxu1983@gmail.com

This study investigated whether 7.5-month-old infants would learn to share objects following an intervention. Participants made two visits to the lab, spaced between 7 and 14 days apart. At Visit 1, infants interacted with experimenters in the Sharing Game (experimental condition, $n=16$) or the Bucket Game (control condition, $n=16$). Then, parents practiced the respective game with infants at home. In the Sharing Game, infants were encouraged to release a toy into the experimenter's hand. In the Bucket Game, infants were encouraged to release a toy into a hand-sized container. At Visit 2, infants in both conditions were tested in the Sharing Game.

Results showed that infants in the experimental condition at Visit 2 shared significantly more than at Visit 1, and they shared significantly more than infants in the control condition.

These results suggest the role of experience in driving the early emergence of sharing behavior.

ID: 360 / PS-IV: 7

Poster

Topics: Attention, Computational Approaches, Executive Function

A model based approach to selective and flexible attention

Anastasia Nicole Kerr-German, Aaron Thomas Buss

University of Tennessee, Knoxville, United States of America; akerr2@vols.utk.edu

Selective and flexible attention are typically studied as separate processes. Recent theoretical work suggests they may stem from common mechanisms (Hanania & Smith, 2010). Buss and Spencer (2014) proposed a neurocomputational model to explain the emergence of flexible attention in ages 3-5, suggesting it emerges from a dimensional attention mechanism that is grounded in label learning. We generalized this account to explain the development of selective attention in the triad-classification task. Our model demonstrates that both flexible and selective attention can emerge from dimensional attention and that distinct neural signatures in a frontal-temporal-parietal network are associated with each. We tested this using fNIRS with 3- and 4-year-olds. Based on our model and findings we conclude that this explicit dimensional attention mechanism, grounded in dimensional label learning, can give rise to both selective and flexible attention at behavioral and neural levels.

ID: 492 / PS-IV: 8

Poster

Topics: Decision Making and Reasoning

Against the Odds: Preschoolers Predict Outcomes that are Desirable but Unlikely

Zachary Hollingsworth Morgan, Robyn L Kondrad

Appalachian State University, United States of America; morganzh@email.appstate.edu

Adults have a desirability bias (DB) – overpredicting the occurrence of desirable outcomes and underpredicting undesirable ones (Windshittl et al., 2010). Our study is the first to investigate the ontogenesis of the DB using a new, child-friendly version of the

marked-card paradigm. Adults and 4- to 5-year-olds learned how many “critical” cards were in a deck, then predicted if one would be randomly drawn. Drawing critical cards was either rewarded (winning a sticker) or punished (losing a sticker). Both groups showed a DB: they predicted that a critical card would be drawn more often than they should (given the odds) when it was desirable, and less often when it was undesirable. Both groups were similarly influenced by desirable outcomes, but children were more influenced than adults by undesirable outcomes. The DB emerges by at least four years of age, but, unlike in adults, it is more pronounced for undesirable outcomes.

ID: 451 / PS-IV: 9

Poster

Topics: Decision Making and Reasoning, Theory of Mind

Keywords: Expectations, Emotion

Are there costs to high expectations? Children's and adults' reasoning about how expectations shape emotions

Karen Marie Hjortsvang, Kristin Hansen Lagattuta, Hannah J. Kramer

University of California, Davis, United States of America; kmhjortsvang@ucdavis.edu

We investigate 4- to 12-year-olds' and adults' (anticipated $N=180$) recognition that expectations shape emotions. Individuals respond to six scenarios involving three protagonists with varying expectations about the same uncontrollable event. For instance, one character thinks she will win a big prize (high expectation), another thinks she will lose (low expectation), and the last thinks about something else (no expectations). Participants forecast characters' emotions on a 7-point scale from very bad to very good. Next, participants predict how characters feel after three different outcomes: high expectation met (e.g., all win big prize), high expectation attenuated (all win small prize), and low expectation met (all lose). Preliminary results ($N=21$) reveal that prior to outcomes, adults believe that high expectations make people feel best. Post-outcomes, however, adults judged that those who held low expectations feel best. We anticipate older children to mirror this reasoning, but younger children to focus more on objective outcomes.

ID: 326 / PS-IV: 10

Poster

Topics: Social Cognition, Social Learning, Theory of Mind

Artifacts as windows into other minds: Pre-school children use artifacts to infer others' mutual interests

Adena Schachner, Deborah Kelemen

Boston University, United States of America; aschach@bu.edu

Adults form quick and accurate judgments about another person's traits, interests, and social affiliations from the artifacts they own, wear and carry. Do pre-school children infer others' preferred activities from the artifacts they possess – and do so rationally, only when those artifacts were freely chosen? Four-year old children saw a character with a toy he/she brought; and two others with toys (a)for the same activity, and (b)for a different activity (but more perceptually similar). When asked who liked the same games/activities (and not when asked control questions), children reliably selected the character with the toy for the same activity over the perceptual match. Children only did so when the toys were freely chosen, not when the characters received the toys without knowing what they were. Thus, by four years of age, children show a sophisticated ability to draw adult-like, rational conclusions about others' interests based solely on their artifacts.

ID: 470 / PS-IV: 11

Poster

Topics: Language, Social Learning, Word Learning

Keywords: Selective Trust, Reliability Judgment

Associative information is insufficient for reliability judgments in the verbal domain

Elena Luchkina, David M. Sobel, James L. Morgan

Brown University, United States of America; elena_luchkina@brown.edu

Multiple researchers found that preschoolers can selectively learn new information from reliable informants. However, the mechanisms underlying this ability remain unclear. Children may rely on associative mechanisms or they may incorporate social information into reliability judgments. For example, children may perceive erroneous ostensive labeling as intentionally misleading. We investigated selective trust given just exposure to labels. Participants watched two informants ask questions about object labels – one always using an accurate label (for a book, asking, “Is this a book?”) and one always using an inaccurate label (for a star, asking, “Is this a dog?”). These two informants then labeled novel objects. Three- and 4-year-olds accepted novel labels equally from both informants. However, they hesitated more when presented with the inaccurate speaker, touching the distractor object before picking up the target object. While preschoolers keep track of informants' accuracy, associative information alone is insufficient to make reliability judgments.

ID: 757 / PS-IV: 12

Poster

Topics: Comparative Cognition, Culture, Social Learning

Behavioral flexibility in children (Homo sapiens) and chimpanzees (Pan troglodytes): Relinquishing and building on witnessed behaviors to improve efficiency

Sarah J. Davis^{1,3}, Cristine H. Legare², Jennifer M. Clegg², Rachel E. Watson-Jones², Steven J. Schapiro³, Susan P. Lambeth³, Andrew Whiten¹

¹Centre for Social learning and Cognitive Evolution, School of Psychology & Neuroscience, University of St Andrews; ²The University of Texas at Austin, Department of Psychology; ³Department of Veterinary Sciences, Michale E. Keeling Center for Comparative Medicine and Research, The University of Texas MD Anderson Cancer Center; sjd62@st-andrews.ac.uk

Evidence for culture in non-human species continues to grow, yet there are few examples of cumulative culture outside of humans' uniquely complex behaviors. Prerequisites for cumulative culture include not only the ability to build on established behaviors but also to relinquish old solutions and flexibly switch to more productive or efficient ones. To better understand the emergence of behavioral flexibility in the developing child, as well as in hominin evolutionary history, we compare the ability of children aged 3-5 and adult chimpanzees to relinquish a practiced solution to a problem in favor of an observed more efficient strategy. From pilot data, we predict that chimpanzees and younger children will show comparable levels of inflexibility, but older children will begin to show greater ability to flexibly upgrade to more efficient behaviors. This may in part account for the continuing evolution of hominin culture and the relative stasis of that of chimpanzees.

ID: 649 / PS-IV: 13

Poster

Topics: Decision Making and Reasoning, Moral Cognition, Social Cognition

Beyond Retribution: Children's Reasoning About the Functions of Punishment

Jessica Bregant, Katherine Kinzler, Alex Shaw

University of Chicago, United States of America; jessica.bregant@gmail.com

How do children view the function of punishment? Is punishment seen as strictly retributive, or do children view punishment as serving other ideals that are of consequence to individuals and to society? Here we presented 5-8-year-old children (N=80) with vignettes about a crime of theft that occurred in two cartoon worlds – one where the wrongdoer was punished and another where she was not. We investigated children's evaluation of the perpetrator, victim, and bystander in these two worlds and found that children thought punishment would deter perpetrators from future negative acts, but punishment had no effect on bystanders or victims' behavior. We also found that punishment communicates important social information to children, including messages about the social status of the victim. Finally, we present striking evidence that an understanding of the value of punishment to the social contract increases with age—only older children prefer a world with punishment.

ID: 441 / PS-IV: 14

Poster

Topics: Concepts/Categories, Infant Cognition

Keywords: abstract rule learning, statistical learning, pattern learning

Can 3- and 4-month-old infants learn abstract rules in the visual modality?

Brock Ferguson, Sandra R. Waxman

Northwestern University, United States of America; brock.ferguson@gmail.com

Research on infants' ability to learn and generalize abstract relations ("abstract rules," e.g., ABB/ABA) has primarily focused on auditory input (e.g., speech). Nevertheless, infants must also learn and generalize relations from visual input if they are to successfully understand and interact with their environments. To better understand the origins of rule learning and the conditions that best support it in the visual modality, we adapted an existing paradigm (Saffran et al., 2007) for the youngest infants tested to date, 3- and 4-month-olds. In two experiments (N=54), they successfully learned visual rules from sequences of dogs (Exp. 1) and geometric shapes (Exp. 2). These results reveal that very young infants' rule learning is robust across stimuli and modalities. Moreover, when compared with prior results (e.g., Johnson et al., 2009), they suggest that rule learning in the visual modality is best supported by opportunities to simultaneously compare elements in each sequence.

ID: 629 / PS-IV: 15

Poster

Topics: Computational Approaches, Infant Cognition, Memory

Keywords: PDP, causal reasoning, infant causal reasoning, blinket, blinket detector, habituation, computational modeling

Causal learning in infants

Deon T. Benton, David Rakison

Carnegie Mellon University, United States of America; dtbenton@andrew.cmu.edu

Previous research has demonstrated that causal perception—using launching events—emerges between 6.5 and 10 months (Leslie & Keeble, 1987; Oakes & Cohen, 1990). This ability is proposed to be implicit and hierarchical (Oakes & Cohen, 1995). In contrast, the ability explicitly to reason about causal events does not emerge until roughly 2.5 years of age. This research has tended to use the blinket-detector design. Despite this research, little is known about (1) the transition from causal perception to causal reasoning and (2) the mechanism(s) that underpin these abilities. To address these questions, we tested 6- and 9-month-olds in a habituation version of the blinket detector with backward-blocking events. A PDP computational model of these tasks was also built. Preliminary behavioral data suggest that infants are neither processing the events associatively nor according to Bayesian principles.

ID: 545 / PS-IV: 16

Poster

Topics: Social Cognition, Social Learning

Children and Adults Differ in their Strategies for Social Learning

Zi Lin Sim¹, Falk Lieder¹, Jane C. Hu², Thomas L. Griffiths¹, Fei Xu¹

¹University of California, Berkeley, United States of America; ²Institute of Learning & Brain Science, University of Washington, United States of America; me.zilin@gmail.com

Adults and children rely heavily on other people's testimony. However, domains of knowledge where there is no consensus on the truth (e.g. cultural beliefs and practices, preferences, etc.) are likely to result in conflicting testimonies. Previous research has demonstrated that in these cases, learners look towards the majority opinion to make decisions. However, it remains unclear how learners evaluate social information, given that considering either the overall valence or the number of testimonies, or both can lead to different conclusions. We therefore formalized several social learning strategies and compared them to the performance of adults and children. We found that while adult judgments were consistent with Bayesian inference, children appeared to rely more often on simpler heuristics. This finding suggests that the development of social learning may involve not only the acquisition of knowledge and representations, but also the discovery of cognitive strategies.

ID: 513 / PS-IV: 17

Poster

Topics: Communication, Social Cognition, Theory of Mind

Children Consider the Costs of Learning When Teaching Others

Sophie Elizabeth Colby Bridgers, Hyowon Gweon

Stanford University, United States of America; sbridge@stanford.edu

Can children reason about the expected costs of learning when deciding what to teach? Five- to seven-year-olds (N=40) learned to activate two novel toys: a low-cost toy (intuitive and easy to learn) and a high-cost toy (counterintuitive and difficult to learn). Children were then asked either (1) which toy should be taught to a naïve learner who would play later with the toys (Teach condition), or (2) with which toy they themselves would like to play (Play condition). Significantly more children in the Teach condition chose the high-cost toy than in the Play condition (55% vs. 15%, $p = 0.012$). These results suggest that children do not simply teach what they find more interesting. Rather, they use their own experience to reason about the expected costs of self-guided learning (e.g., time and effort required to figure out a toy) and selectively teach information that minimizes such costs for the learner.

ID: 695 / PS-IV: 18

Poster

Topics: Culture, Social Cognition

Keywords: Race, Essentialism

Children's Beliefs about the Innate Potential of Race

Amber Daione Williams, Steven Othello Roberts (Diversity Fellow), Stephanie Rowley, Susan Gelman, Robert Sellers

University of Michigan, Ann Arbor; amberdw@umich.edu

Children believe that a child will have the same race as their biological parents, even when they have been adopted by other-race parents (Hirschfeld, 1995). Research, however, has not yet explored whether children believe that additional individual traits are inherited by virtue of inheriting race (i.e., the innate potential of race). To test this, we showed 80 Black and White children (ages 4-12) stories in which Black and White target children were adopted by same- or other-race parents. Children were asked whether the target children would have the same characteristics (e.g., skills) as either their biological or adoptive parents. Preliminary results show that Black 10-12-year-olds viewed Black target children as more like their biological parents than White target children, suggesting that they conceptualized "blackness" as innately more potent than "whiteness." These findings have important implications for children's concepts of essentialism and for social group differences in race-based cognition.

ID: 677 / PS-IV: 19

Poster

Topics: Social Cognition

Children's evaluation of information sharers and non-sharers

Rachel Marie Stevens, Helana Girgis, Douglas A. Behrend

University of Arkansas, United States of America; rmstevens@uark.edu

Young children treat new information as conventional and public, but little research has examined when children differentiate between information types. This study examines how children evaluate others who share or don't share information. Seventy-five preschoolers watched a story about four characters. In the privileged condition, one character shows two others his favorite toy, then hides it and leaves. In the public condition, the character shows the other characters a toy and then leaves it visible before leaving. In both conditions, a new character then enters and asks for the location of the toy. One character shares the location and the other does not. Participants were then asked with whom they want to be friends. Participants chose the character who didn't share the privileged information ($M=61%$) more often than the character who didn't share the public information ($M=34%$) suggesting they understand that not all information can be shared freely.

ID: 633 / PS-IV: 20

Poster

Topics: Concepts/Categories, Social Cognition

Keywords: social groups, minimal groups, group bias, intergroup relations

Children's Evaluations of Social Groups versus Minimal Groups

Cai Guo¹, Fan Yang², Yarrow Dunham²

¹Dickinson College, United States of America; ²Yale University, United States of America; guoc@dickinson.edu

We compare the strength and inferential properties of minimal group membership to real-world social group memberships (i.e., gender, race, and language). Four-to 7-year-old children are randomly assigned to a minimal group based on shirt color. They then make judgments about individuals who share one group membership but not another (e.g., gender ingroup but minimal outgroup). First, we assess the relative preference for the real group versus the minimal group membership. Next, we assess whether children expect a novel property to be shared by a real versus minimal ingroup member. Finally, children judge whether a character will direct positive or negative actions towards a real versus minimal ingroup member. Preliminary results suggest that while children showed stronger preferences for some real groups, they relied more on minimal group memberships to make behavioral and moral inferences. The results have implications for understanding the early development of intergroup thinking.

ID: 604 / PS-IV: 21

Poster

Topics: Social Cognition, Social Learning, Theory of Mind

Keywords: social learning, individual differences, epistemology, theory of mind

Children's Understanding of How Others Reason: Developmental Trends and Individual Differences

Sarah Suárez (Diversity Fellow), Melissa Koenig

Institute of Child Development, University of Minnesota, United States of America; suare062@umn.edu

Preschoolers prefer learning from knowledgeable speakers (K&H, 2005); however, what makes someone knowledgeable? Do children monitor the rationality of informant thinking? This work programmatically examines whether (1) children's developing understanding of the active, inferential mind influences their trust in informant testimony; and (2) if parent epistemology (Kuhn) corresponds to individual differences in children's social learning. Study 1 (N=150) indicates that by age 6, children avoid learning from individuals who guess or reason with irrelevant evidence. Furthermore, children of evaluativist parents (who value the role of evidence as a basis for belief) are less likely to learn from questionable reasoners. Such children were more likely to explain their judgments in terms of speakers' use of evidence, whereas children who trusted speakers "because he said so" tended to have parents with absolutist epistemologies. Current research will be framed in terms of the individual and developmental differences in children's assessments of others' reasoning.

ID: 458 / PS-IV: 22

Poster

Topics: Concepts/Categories, Language

Keywords: inference

Comparisons intended to express gender equality can actually imply differences in natural ability

Eleanor Chestnut, Sarina Soriano-Taylor, Ellen Markman

Stanford University, United States of America; eleanor.chestnut@gmail.com

Statements such as, "Girls are as good as boys at math," are often used to express gender equality. Directional comparisons such as these (i.e., comparisons with items in the subject and complement positions), however, frame boys (the complement) as the typical cognitive reference point, subtly suggesting that boys, and not girls, are the ones who typically do math. In three studies, we investigate another implication of such directional comparisons: that the complement is naturally more skilled than the subject. In Study 1, we show that adults readily infer from comparisons intended to express equivalent ability (e.g., "Boys are as good as girls at freeching") that the complement is naturally more skilled whereas the subject has to expend more effort at the activity. In Studies 2 and 3, we explore the developmental course of this inference, asking whether children ages four to nine also associate complements with greater natural skill.

ID: 795 / PS-IV: 23

Poster

Topics: Concepts/Categories, Infant Cognition

Keywords: Learning

Consistency and diversity in everyday play with objects

Jessica E Kosie, Caitlin M Fausey, Dare A Baldwin

University of Oregon, United States of America; jkosie@uoregon.edu

Repeatedly interacting with the same object (consistency) as well as with a range of distinct objects (diversity) each promotes memory and generalization (e.g., Dueker & Needham, 2005; Goldenberg & Sandhofer, 2013). Here, we ask how these key properties of experience arise in the stream of everyday play. Caregiver-infant dyads (n=32, 8-16 months) played with a set of toys that included three familiar and three novel objects for 15 minutes. Dyads interacted with all available objects (M=5.5), but a single object occupied most of the play time (M=.41). This dominant object was familiar for younger infants but novel for older infants. Ongoing analyses evaluate this apparent sensitivity to infant's growing knowledge in another dataset where familiarity is defined

with respect to each infant's vocabulary. The rhythm of play may support building knowledge by offering a supportive mix of local consistency and diversity that is globally tuned to the learner's cumulative experience.

ID: 512 / PS-IV: 24

Poster

Topics: Social Cognition, Theory of Mind

Keywords: cooperation, competition, conflicting desire

Cooperation, but not competition, improves 4-year-old children's understanding of conflicting desires

Jie He (International Fellow), Xinyi Jin, Mowei Shen

Zhejiang University, China, People's Republic of; jiehe@zju.edu.cn

The present study focused on the boosting effect of cooperation and competition on understanding conflicting desires at 4-year-olds. Children interacted with an adult experimenter in a 3-minute's cooperative / competitive game, and then selected a gift for the partner between the adult's and their own preferences (Experiment 1). It came out that (1) children at age 4 were still struggling with the understanding of conflicting desires, (2) cooperation, but not competition, increased their chance of correctly selecting the adult's preference. This failure of competition was not due to children's resistance to satisfy the opponent (Experiment 2). The boosting effect of cooperation was not limited to reading the partner's desire, but also general to their understanding of someone else's (Experiment 3). Taken together, our result reveals a strong correlation between social interaction and the development of theory of mind, and highlights the cognitive improvement of cooperation.

ID: 660 / PS-IV: 25

Poster

Topics: Developmental Disabilities, Social Cognition

Keywords: Dynamics, Motor Coordination

Coordination Dynamics and Intervention Outcomes in Autism Spectrum Disorders

Daisy Bueno (Diversity Fellow), Steve Croker

Illinois State University, United States of America; dbueno@ilstu.edu

The aim of the study is to examine the temporal motor dynamics of imitation and coordination in children with Autism Spectrum Disorder (ASD) and typically developing (TD) children. By recording hand movements on goal-directed and non-goal-directed imitation tasks, and single and joint drumming tasks, we can examine differences in movement patterns between ASD and TD children. Our preliminary data show lower levels of entropy, or variability, in the hand movements of children with ASD than TD children ($p = .007$). Such results suggest reduced degrees of freedom in ASD, which may inhibit flexibility (Dixon et al., 2010), and contribute to our understanding of developmental differences. We will examine the relationship between imitation, coordination, and performance on Discrete Trial Training interventions for ASD children. Furthermore, we will explore whether imitation and coordination improve with practice, and whether this improvement leads to better treatment outcomes for children with ASD.

ID: 319 / PS-IV: 26

Poster

Topics: Concepts/Categories, Social Cognition, Social Learning

Detecting Social Groups: How Visual Cues Acquire Social Meaning

Ashley E. Jordan (Diversity Fellow), Elizabeth L. Brey, Charles W. Kalish, Kristin B. Shutts

University of Wisconsin-Madison, United States of America; ashleyelizajordan@gmail.com

How do arbitrary features such as dress or hairstyle become markers of social groups? We tested whether children would associate dress with behaviors known to indicate significant social groups (cooperation and competition). Participants ($N=80$, 5-6 years) first watched cartoon individuals who shared either the same hat color (hat condition) or the same shirt color (shirt condition) cooperate with one another and compete against individuals who lacked that feature. At test, children answered questions about new characters; they could either use hat or shirt color to guide their responses about which characters were friends and which characters spoke the same language. Performance on language questions did not differ by condition, but responses to friendship questions did: Children in the shirt condition were more likely to infer friendship using shirt color. Thus, even in the absence of labels, patterns of cooperation and competition highlight visual appearance cues to social group boundaries.

ID: 414 / PS-IV: 27

Poster

Topics: Decision Making and Reasoning, Executive Function

Keywords: metacognition

Developing metacognitive monitoring and control: Evidence from 5-year-olds, 7-year-olds, and adults

Allison Paige O'Leary, Vladimir Sloutsky

The Ohio State University, United States of America; oleary.83@osu.edu

According to metacognitive theories, people must monitor aspects of a task (e.g., how difficult it is) to control behavior accordingly (e.g., use a strategy to make the task easier). We investigated the development of monitoring and control abilities in 5-year-olds, 7-year-olds, and adults. Participants completed a numerical discrimination task at two levels of difficulty (1:2 vs. 9:10 ratio), each corresponding to a color, and were allowed to choose which game (e.g., red or blue) to play throughout the task. Adults readily optimized performance by choosing the easier task, whereas 5- and 7-year-olds did not. We then gave participants feedback about

their performance (to aid monitoring), instruction to choose the easier task (to aid control), or both. Feedback improved task monitoring similarly across ages. Instruction improved 5-year-olds' control, but benefited 7-year-olds more. These findings suggest a dissociation between strategy formation and execution, and that execution drives differences between 5- and 7-year-olds.

ID: 363 / PS-IV: 28

Poster

Topics: Number, STEM Learning

Keywords: mathematical development, fraction learning

Developmental Growth Trajectories in Fraction Magnitude from Fourth through Sixth Grade

Ilyse Resnick, Nicole Hansen, Jessica Carrique, Vinaya Rajan, Nancy Jordan

University of Delaware, United States of America; iresnick@udel.edu

Development of fraction number line estimation in 472 students was assessed longitudinally over 5 time points between 4th and 6th grades. Although students showed positive linear growth overall, latent class growth analyses revealed three distinct growth trajectories: students who were highly accurate from the start ($n = 154$); students who started inaccurate but showed high growth ($n = 121$) that corresponded with fractions instruction; and students who started inaccurate and stayed inaccurate ($n = 197$). Younger and low-growth students typically estimated both proper and improper fractions as being less than one, failing to see the relation between the numerator and denominator. Class membership was highly predictive of performance on a statewide-standardized mathematics test at the end of sixth grade as well as general fraction knowledge. Age, multiplication skills, classroom attention, and whole number line estimation predicted class membership. The findings reveal that magnitude understanding is centrally important to mathematical development.

ID: 744 / PS-IV: 29

Poster

Topics: Number, Spatial Cognition, STEM Learning

Developmental Trajectory of Fraction Area Model Strategy Use in Second and Third Graders

Courtney R. Gray¹, Mahala R. Femovich², Noora Hamdan³, Alexander D'Esterre⁴, Elizabeth A. Gunderson³

¹St. Thomas Aquinas College, United States of America; ²Ursinus College, United States of America; ³Temple University, United States of America; ⁴University of Maryland, United States of America; cgray13@stac.edu

Students first encounter the area model (AM) fraction representation in 2nd-3rd grades, but many struggle to understand fractions through high school. We investigated the developmental trajectory of children's AM fraction segmentation strategies. Second- and third-graders ($N=78$) shaded circles to represent fractions with denominators 2-7. Despite preliminary exposure in school, no child used an adult-like, equal-division strategy on more than 70% of trials. Nevertheless, children's strategies showed a clear developmental progression. Children who segmented the circle in half or created a single non-half division had higher error rates than those who segmented the circle into multiple parts or used a mix of strategies (usually involving multiple parts) ($F(3, 70)=5.82$, $p=.001$). Multiple-segmenters were older than single-segmenters ($t(76)=2.29$, $p<.05$), and only multiple-segmenters benefitted from a brief, explicit AM segmentation training (condition x strategy interaction, $F(2, 67)=3.2$, $p<.05$). Multiple segmentation, even when inaccurate, reveals more advanced fraction understanding and readiness to learn from instruction.

ID: 696 / PS-IV: 30

Poster

Topics: Decision Making and Reasoning, Social Cognition

Keywords: Truth-lie detection

Did they really do that? Judging the veracity of children's stories after parental coaching

Cassy Caroline Gillingham¹, Kelly Warren²

¹Memorial University of Newfoundland, Canada; ²Grenfell Campus, MUN, Canada; ccompton@grenfell.mun.ca

In this study, 109 university students and members of the general public judged whether children were telling the truth about the experience of travelling by plane. One of seven videos, each depicting one child being interviewed (either of three females or four males from the ages of 7-11) was shown to participants. Four children were giving truthful accounts, two of whom had prepared their own stories and two of whom had been helped by a parent; and three children were telling a false story, one of whom had prepared his/her own story, and two of whom had been prepared by parents who had flown before. Participants were above chance when judging true accounts for both prepared (77%) and unprepared conditions (75%). However, 63% of the unprepared lies were judged correctly, in comparison to only 45% of the coached lies being judged correctly.

ID: 684 / PS-IV: 31

Poster

Topics: Executive Function, Infant Cognition

Do Behavioral and Parent-Report Measures of Self-Control Measure the Same Thing? Examining Concurrent and Longitudinal Relationships between Executive Function and Self-Control Temperament in the Toddler Years

Tonya Vandenbrink¹, Stephanie Miller¹, Stuart Marcovitch²

¹University of Mississippi, United States of America; ²University of North Carolina at Greensboro, United States of America; semille5@go.olemiss.edu

As cognitive research focuses on the origins of cognitively controlled behavior (i.e., executive function or EF), it is important to understand the relationships between emerging behavioral measures of EF and parent-reports of similar self-control temperament measures. Forty-three toddlers completed several measures of EF (i.e., A-not-B, 3-boxes, imitation sorting, and don't tasks, Miller & Marcovitch, 2015) and parents reported on self-control (i.e., attention shifting, attention focus, inhibitory control and impulsivity, Putnam et al., 2006) at 14 and 18 months. Results demonstrated more cohesion between parent-report measures than EF measures at both ages. There was little evidence that EF and parent-report of self-control was positively related concurrently or longitudinally. Finally, stronger growth was demonstrated in measures of EF compared to parent-report of self-control. Results suggest the method of data collection influences findings on self-control, and behaviors examined in controlled lab settings show different growth profiles compared to parent-reported self-control behavior at home.

ID: 767 / PS-IV: 32

Poster

Topics: Concepts/Categories, Social Cognition, Social Learning

Keywords: Understanding of teaching, Learning, Desire

Do I Want to Learn It? Young Children's Judgment of Learning Based on Desire

Jeein Jeong, Douglas Frye

University of Pennsylvania, United States of America; jeongjee@gse.upenn.edu

Do young children understand how individual desire might influence the intention to learn and actual learning? The current study examined children's judgment of learning based on desire.

Sixty Korean children (ages 3-5) were told stories in which teacher's intention (i.e., want to teach, neutral, or want to keep it secret) and child's desire (i.e., either have interest in the knowledge or not) were combined. After hearing each story, children were asked whether the child will try to learn, would be excited to learn, and how much he would learn.

The result showed that across age, children judged the learner's intention and related emotion based on his desire rather than teacher's intention. However, older children also considered the agent's desire to predict the learning outcome. Young children may understand learning is based on desire, but they become better able to recognize that the learning outcome also depends on desire.

ID: 706 / PS-IV: 33

Poster

Topics: STEM Learning

Do objects of different weight fall at the same time? Learning about gravity from picture books.

P. Vaunam Venkadasalam, Patricia A. Ganea

University of Toronto, Canada; vvenkada@gmail.com

Picture books are primary sources of knowledge for children. However, young children are rarely exposed to informational books and spend more time reading fictional books. We examined how children age 4 and 5 learn that objects with different weights fall at the same rate from informational books. A nonfiction narrative and an informational book with identical images were designed and matched in words and reading difficulty level. A pretest and posttest were administered to 51 children. Each test contained four pairs of objects identical in size, where two pairs of objects had the same weight and two pairs of objects had different weights. A 2 (condition) x 2 (age) ANOVA showed a significant main effect of age ($p = .008$). These findings suggest that 5-year olds learn more than 4-year olds from both types of books. However, pairwise *t*-tests revealed that overall, both age groups learned from the books.

ID: 564 / PS-IV: 34

Poster

Topics: Infant Cognition, Language, Word Learning

Do varied pragmatic cues affect visual attention and word learning in monolingual and bilingual toddlers?

Christina Schonberg (Diversity Fellow), Catherine Sandhofer, Scott Johnson

UCLA, United States of America; ccs185@g.ucla.edu

Older bilingual children have been shown to attend more to pragmatic cues than monolinguals (Yow & Markman, 2011). Because attention to pragmatic cues is important for language learning (Brooks & Meltzoff, 2005), this study investigates whether there are differences in young monolingual and bilingual children's attentional patterns in a word learning task involving pragmatic cues. Infants ($M_{age} = 22.0$ months) viewed videos in which a person labeled a novel object and provided various pragmatic cues including eye gaze and pointing. After each labeling video, infants saw a test trial in which the labeled object and a distractor object were presented side by side. Preliminary data analysis suggests an interaction between language background and looking behavior during test trials, $F(1, 7) = 5.313, p = .055$, such that bilinguals increase their looking to the target after it is labeled but monolinguals do not.

ID: 784 / PS-IV: 35

Poster

Topics: Attention, Executive Function

Keywords: attention, executive function, learning

Does Selective Sustained Attention Mediate the effect of Executive Function on Learning?

Karrie E. Godwin, Anna V. Fisher

Carnegie Mellon University, United States of America; kegodwin@andrew.cmu.edu

Although there has been considerable interest in the relationship between executive functions and learning, there has been comparatively little research on the mechanisms by which executive functions contribute to academic achievement. The present work explores the possibility that attention mediates the relationship between executive functions and learning. Children's ability to engage in endogenously driven selective sustained attention is hypothesized to be related to two core executive functions: (1) inhibitory control, as successful completion of tasks often requires inhibiting extraneous information or events, and (2) working memory which enables the active representation of task goals. In the present study, 83 children ($M_{age}=5.09$ years, $SD=0.57$ years) participated. Inattention was indexed by the proportion of time spent off-task during a paired associates learning task. The indirect effect of executive functions on learning was assessed. The findings suggest that one way in which inhibitory control and working memory affect learning is by reducing inattention.

ID: 746 / PS-IV: 36

Poster

Topics: Spatial Cognition, STEM Learning

Keywords: Parenting

Does Spatial Talk During Parent-Child Play Vary by Parent or Child Gender?

Giulia A. Borriello, Lynn S. Liben, Kristin A. Buss

The Pennsylvania State University, United States of America; gaborriello21@gmail.com

Spatial skills relate to success in science, technology, engineering, and mathematics (STEM; Wai, Lubinski, & Benbow, 2009). Researchers have reported links between parents' spatial guidance and children's concurrent (e.g., Szechter & Liben, 2004) and later spatial skills (e.g., Pruden, Levine, & Huttenlocher, 2011). However, research to date has largely ignored parent or child gender, potentially important variables given gender differences in spatial skills and STEM. We thus studied dyads in which either mothers or fathers interacted with their preschool son or daughter ($N=71$; $M_{years}=3.56$) during jigsaw-puzzle and block-construction activities. Parents used more spatial language with daughters than sons in puzzle but not block-construction play, $F(1, 68)=5.56$, $p=.02$; children's spatial language did not differ by parent or child gender. Results imply the need for additional research to determine conditions (e.g., activity types) under which parental spatial language differs by gender and whether such differences influence children's spatial development.

ID: 559 / PS-IV: 37

Poster

Topics: Memory

Keywords: Memory, context, recollection

Effect of serial position on long-term memory in early childhood

Leslie Rollins¹, Elizabeth Cloude¹, Tracy Riggins²

¹Christopher Newport University; ²University of Maryland; leslie.rollins@cnu.edu

Although serial position effects associated with working memory have been widely studied, fewer studies have examined the effect of serial position on long-term memory. The present study examined the effect of serial position on item and context memory (i.e., recollection) during early childhood. Five-year-old children ($N = 40$, $M = 5.59$) encoded 5 sets of 6 items in two different locations. Preliminary results suggest that performance was similar between the two locations ($ps > .29$). However, within location, set order had a linear effect on item recognition, $F(1, 198) = 4.94$, $p = .03$, and a curvilinear effect on context memory, $\Delta F(1, 197) = 5.29$, $p = .02$. These results suggest that event memory is influenced by the structure of the event and that item and context memory are influenced differently by this structure. We will discuss potential educational applications of this research.

ID: 561 / PS-IV: 38

Poster

Topics: Executive Function, Number, STEM Learning

Keywords: Working Memory, Approximate Number System, Number Line

Executive Function and Numerical Abilities

Amira F.A. Ibrahim¹, Ben Katz¹, Jennie Grammer², Pamela Davis-Kean¹, Frederick Morrison¹

¹University of Michigan, Ann Arbor; ²University of California, Los Angeles; ibrahiam@umich.edu

Executive functions, and in particular working memory, have been shown to play an important role in mathematics learning and performance. Recent research has focused on the roles of non-symbolic and early symbolic representation of numbers as precursors and predictors to later mathematical achievement and performance. However, extant research has not sufficiently accounted for the role of executive function in these early precursors of mathematics ability. In this study, 82 kindergarten students aged 5-6 years old were recruited from southeast Michigan. A variety of executive function measures were collected as well as mathematical performance through the Approximate Number System (ANS) task, Applied Problems, and the Number Line Test. ANS performance did not significantly predict performance on applied math problems when accounting for working memory performance. However, number line performance was a marginally significant predictor of applied problem scores when accounting for working memory task performance.

ID: 623 / PS-IV: 39

Poster

Topics: Spatial Cognition, STEM Learning
Keywords: Analogical reasoning

Explanation and analogy combine to support early learning

Christian Hoyos, Dedre Gentner

Northwestern University, United States of America; christianhoyos2016@u.northwestern.edu

We examine effects of analogical comparison and explanation on children's learning of a basic principle that is important in engineering (i.e., diagonal bracing confers stability in construction). Six-year-olds were placed in one of three training conditions. In the *High Alignability* condition, children saw two buildings that were highly similar—one with a brace and one without. In the *Low Alignability* condition, the two buildings were dissimilar and harder to align. In the *Single Model* condition, children saw one braced building. In all three conditions, children interacted with the buildings and were asked to explain why one building was strong(er). We found that children in the High Alignability condition were most likely to generate brace-based explanations and transfer the concept to subsequent tasks. Thus, we suggest that a successful alignment process provides fodder for good explanations and explaining the results of a comparison process enhances the effects of comparison alone.

ID: 502 / PS-IV: 40

Poster

Topics: Attention, Perception

Keywords: Sensory Dominance; Cross-Modal Processing; Attention

Exploring auditory dominance in children and adults: An eye tracking study

Wesley Barnhart, Samuel Rivera, Christopher Robinson

The Ohio State University, United States of America; barnhart.135@buckeyemail.osu.edu

Under some situations sensory modalities compete for attention, with one modality attenuating processing in a second modality. Using a simple discrimination task on an eye tracker, the present study seeks to examine modality dominance effects in 4- to 6-year-olds and adults. Particularly, we are interested in whether a potential mechanism of auditory dominance identified in previous research (i.e., auditory input attenuates/delays encoding of visual input) will be extended to the populations under examination with this present study. Research with adults suggests auditory, not visual, dominance, with nonsense words slowing down visual response times. Eye tracking variables such as latency of first fixation were correlated with behavioral responses, with a reported slow down occurring when images were paired with words but not when presented in silence. This finding is consistent with a potential mechanism underlying auditory dominance effects. Children and adult data will be presented in the poster.

ID: 348 / PS-IV: 41

Poster

Topics: Decision Making and Reasoning

Exploring preschoolers' use of representativeness in a classic base-rate problem

Samantha Gualtieri, Stephanie Denison

University of Waterloo, Canada; sgualtieri@uwaterloo.ca

The use of representative information in lieu of base-rates is a longstanding puzzle within the heuristics and biases literature (e.g., Kahneman & Tversky, 1973). Although the origins of base-rate neglect have gained subsequent interest, researchers are reluctant to draw conclusions due to problems with developmental designs (see Stanovich, West, & Toplak, 2011). Using novel methods, we investigated preschoolers' (*mean age* = 4 years, 4 months; *range* = 3 years, 0 months, to 5 years, 11 months) use of base-rate and individuating information. In Experiments 1 and 2, children used base-rate and individuating information at higher than chance levels when presented alone ($N = 32$ per experiment, $p = .002$ and $p = .003$, respectively). In Experiment 3, we pitted base-rate and individuating information against one another. Preliminary results ($N = 15$) show preschoolers neglect base-rates in favor of conflicting individuating information ($p = .014$), suggesting early emergence of representativeness.

ID: 588 / PS-IV: 42

Poster

Topics: Culture, Language, Reading

Exploring story grammar structure in the book reading interactions of African American mothers and their preschool children: a pilot investigation

Yvette Renee Harris¹, Susan Rothstein²

¹Miami University, United States of America; ²Miami University, United States of America; harrisyr@miamioh.edu

The aim of this investigation was to identify the book reading styles of African American mothers engaged in a shared book reading activity with their children. Mothers and their four year old preschool children were videotaped reading one of three books, *Julius, Grandfather and I*, or *Somewhere in Africa*. Maternal and child behaviors were coded for the frequency of occurrence of story grammar elements contained in their stories and maternal behaviors were also coded for their use of narrative eliciting strategies. Mothers were queried about the quality and quantity of book reading/story telling interactions in the home environment. The results suggest a great deal of individual variation in how mothers use the story grammar elements and narrative eliciting strategies to engage their children in a shared book reading activity. Findings for additional research and applications are offered on ways to optimally engage African American preschool children in book reading interactions.

ID: 694 / PS-IV: 43

Poster

Topics: Language, Reading, Social Learning

Exploring the impact of a family literacy program with the Eric Carle Museum of Picture Book Art

Alison Sparks

Amherst College, United States of America; asparks@amherst.edu

The Eric Carle Museum of Picture Book Art's Whole Book Approach to shared book reading, builds on two research-based education programs, Dialogic Reading and Visual Thinking Strategies. The Carle literacy program teaches parents to support their child's learning by asking open-ended questions and exploring the book as an art form. In prior book-sharing research, discussion that focused on pictures was associated with contextualized use of language (such as labeling or describing pictures). The Whole Book Approach challenges this finding, modeling ways to integrate visual observations with talk about real world knowledge and personal experience. Parent report measures, collected before and after a ten-week intervention with African American and Latino families from low-income backgrounds, supported links between visual literacy and children's learning (all $ps > .05$); ethnographic journals and standardized measures of children's language and literacy will be used to further examine the impact of the program on children's cognitive-linguistic skills.

ID: 437 / PS-IV: 44

Poster

Topics: Attention, Concepts/Categories

Flexibility of Categorization: Developmental Differences between Adults and Children

Sophia Deng, Vladimir Sloutsky

The Ohio State University; deng.69@osu.edu

How do people learn and represent categories? And how do these processes change in the course of development? The current study addressed these questions by examining the role of attention in the development of category representation and representational flexibility. Participants (adults and 4-year-olds) were first trained with two categories that included deterministic (D) and probabilistic (P) features and their attention was either directed to the D or P features. After training, participants learned two new categories and their categorization for novel exemplars were tested. Results indicated that both adults and 4-year-olds were able to be trained to use either a similarity-based or rule-based strategy. More importantly, 4-year-olds, in contrast to adults who went back to their default rule-based strategy, exhibited representational flexibility by generalizing the learned strategy in novel situations. These results have important implications for understanding the development of categorization and the role of attention in cognitive development.

ID: 597 / PS-IV: 45

Poster

Topics: Number, Spatial Cognition, STEM Learning

Keywords: approximate arithmetic, gender difference, spatial ability

Gender Difference in Approximate Arithmetic

Wei Wei^{1,2}, Jie He (International Fellow)¹, Xinlin Zhou²

¹ZheJiang University, China, People's Republic of China; ²Beijing Normal Univeristy, China, People's Republic of China; florawei820@126.com

It has been shown that females always outperform males in exact arithmetic, which has been proved as the result of involvement of language processing (Wei et al., 2012, Psychological Science). Approximate arithmetic is highly associated with visuospatial processing. However, the gender difference study in the approximate arithmetic is absent. Does the same model of gender difference in exact arithmetic could be found in approximate arithmetic? It is assumed that the male would perform better than female due to the involvement of visuospatial processing. Here a large-size children group showed the boys' advantage in the approximate arithmetic. The approximate arithmetic could be partially dependent on spatial ability. Additionally, the approximate arithmetic was significantly correlated with mathematical achievement after the processing all the cognitive tasks used in the investigation were controlled for. The results provide a new perspective to examine the source of gender difference in mathematical achievement and professional careers.

ID: 450 / PS-IV: 46

Poster

Topics: Executive Function

Keywords: School Readiness

Head Start Teachers' Perception of Teacher-Child Relationships and School Readiness for Students Exhibiting High, Moderate, and Low Self-Regulation

Leah Cohen Marks, Alycia M Hund

Illinois State University, United States of America; lccohen@ilstu.edu

The goal was to examine how self-regulation and teacher-child relationships relate to kindergarten readiness in an at-risk sample. Head Start teachers (n=23) read three hypothetical scenarios describing a Head Start student exhibiting high, moderate, and low levels of self-regulation. Teachers completed questionnaires regarding each student's readiness for kindergarten and predicted relationship with the teacher. Relationship conflict differed significantly for all three levels of self-regulation and was highest for children with low self-regulation. Closeness was significantly higher for children with high relative to low self-regulation. Teachers

reported feeling closer to girls than to boys overall. Perceived problems related to kindergarten readiness differed significantly for all three levels of self-regulation and were highest for children with low self-regulation. There were strong links between teacher-child relationship characteristics and school readiness across all three levels of self-regulation. These findings reveal striking differences in teacher-child relationships and school readiness as a function of self-regulation.

ID: 338 / PS-IV: 47

Poster

Topics: Concepts/Categories, Language, Word Learning

How do Japanese children generalize names with or without the personified suffix “san”?

Toshiki Murase, Mai Adachi

Shimane University, Japan; t-murase@soc.shimane-u.ac.jp

We investigated how Japanese children generalize names with or without the personified suffix “san” when referring to an object. Sixty-six Japanese 4- and 6-year-olds were divided equally into two conditions: labels with or without the suffix. After an exemplar was labeled by the experimenter with or without the suffix according to the condition, participants were asked whether the label was applicable to each of the six test objects that matched the exemplar in shape + texture + color; shape + texture; shape + color; or shape, texture, and color. Four-year-olds generalized the label to the objects that matched the exemplar in shape when the label was provided without the suffix and to the objects that matched the exemplar in shape and texture when the label was provided with the suffix. Six-year-olds generalized the label to the object that matched the exemplar in all properties under both conditions.

ID: 738 / PS-IV: 48

Poster

Topics: Concepts/Categories, Word Learning

How essentialist concepts might be acquired

Iris Oved¹, Pierna Cheung², Shaun Nichols³, David Barner¹

¹University of California, San Diego, United States of America; ²Wesleyan University, United States of America; ³University of Arizona, United States of America; irisoved@gmail.com

We present two studies that explore the *Baptism* theory for the acquisition of essentialist concepts. On this theory, observed co-occurrences in features lead humans to posit, and then mentally name, hidden properties (essences) as common causes of the co-occurring features. The first study shows that when describing co-occurring features in novel animals, adults and preschoolers produce more generic utterances (Fs are G) than utterances about particulars (The Fs are G), suggesting that humans may have an early tendency to posit hidden properties as common causes of observed co-occurrences. The second study, however, finds that when shown two groups of novel animals that have the same shape and differ only in color and kind-label, adults, but not preschoolers, judge the kinds to survive color swapping, suggesting that humans have a tendency to posit hidden properties as causes of co-occurrences, but that this tendency may have to be developed.

ID: 404 / PS-IV: 49

Poster

Topics: Social Cognition, Social Learning

Individual differences in preschoolers’ selective social learning

Patricia Brosseau-Liard

University of Ottawa, Canada; pbrossea@uottawa.ca

Preschoolers are not indiscriminately gullible: They prefer to learn from individuals who demonstrate credibility. Yet, though we know that preschoolers as a group can attend to some credibility cues, only recently have researchers begun to investigate individual differences in selective learning, and little is known about the stability of individual differences across the use of different credibility cues. In the present study, typically-developing 3- to 6-year-olds are presented with a series of tasks involving learning different types of novel information from individuals showing various credibility indicators: having a history of (in)accuracy, showing verbal and non-verbal indicators of (non)confidence, or having/lacking perceptual access to relevant information. Additionally, tasks measuring several aspects of children’s cognitive development (theory of mind, executive function) are administered. Preliminary results will demonstrate whether individual differences in selective learning hold across different credibility cues and explore how individual differences in selective learning relate to children’s cognitive performance.

ID: 397 / PS-IV: 50

Poster

Topics: Language, Spatial Cognition, Word Learning

Individual Differences in Preschooler’s Processing of Dimension Terms

Rosalie Odean (Diversity Fellow), Elsa Bravo, Shannon M. Pruden

Florida International University, United States of America; rodea001@fiu.edu

There has long been an interest in understanding the relation between our perceptions of the spatial world and the development of a vocabulary to describe it (e.g. Clark, 1973). One area of particular interest is in the understanding of dimensions and the language to describe dimensions. The current study examines whether children’s processing speed for dimensional terms predicts their comprehensive vocabulary for dimensional terms. Participants were 19 Spanish-English bilingual 31-40 month-olds ($M=36.27$). An intermodal preferential looking paradigm (IPLP) was used to assess children’s comprehension and processing of 4 dimension terms

(large, small, long, short). Eye gaze was used to determine comprehension and processing speed. Children's mean processing speed was a significant predictor of their vocabulary ($b=.431$, $p=.033$). An accurate measure of early comprehension of dimensional language may allow us to predict which children will develop stronger spatial language and reasoning skills at a younger age than previously possible.

ID: 579 / PS-IV: 51

Poster

Topics: Attention, Number, Perception

Keywords: subitizing, working memory

Individuation and enumeration of small-number sets do not depend on visual working memory

Chin-Yuan Chang, Wen-Chi Chiang

National Chung Cheng University, Taiwan, Republic of China; psywcc@ccu.edu.tw

Many studies have suggested that rapid enumeration of small numerosities in visual arrays, or subitizing, is supported by a parallel individuation system that has an early-emerging and developmentally stable set-size limit. However, whether subitizing shares resource with either visual working memory (VWM) or the approximate number system (ANS) for estimating large numbers is still under debate. Using a dual-task method, we previously found that adults' enumeration within the small-number range was unaffected by high levels of concurrent visual memory load, and evidenced a pattern critically distinct from that for enumerating large collections. In the current study, adults enumerated attention-demanding, subsequently masked displays that required individuation of targets among simultaneously presented distractors. The results are consistent with our previous findings: Individuation of small sets of visual targets for enumeration do not depend on attentional resources linked to the VWM or the ANS, both of which undergo an extended period of development.

The contribution has been withdrawn.

Infants' Visual Attention to Textural Cues of Substance Type

Rebecca Rosenberg, Rebecca Core, Hannah Fiore, Aleksa Kaups

Denison University, United States of America; rosenbergr@denison.edu

ID: 630 / PS-IV: 53

Poster

Topics: Infant Cognition, Moral Cognition, Social Cognition

Infants' performance on sociomoral evaluation tasks predicts parent report of preschool social functioning

Enda Tan, Amori Mikami, Kiley Hamlin

The University of British Columbia, Canada; enda.tan@psych.ubc.ca

The present study examined the relationships between infants' performance on sociomoral evaluation studies and parent report of their preschool social functioning. Infants' performance, emotional stability (fuss-out rate), and average habituation rate in moral evaluation tasks were collected. Preschool social functioning was measured through parent-report online scales. The results showed 1) that performance on infant moral evaluation studies was negatively associated with parent reported preschool attention problems, social responsiveness problems, and callousness-unemotional traits, and positively associated with parent reported adaptive social skills, 2) that fuss-out rate across infant moral evaluation studies was positively associated with parent report of preschool anxiety, depression, and withdrawal, 3) that the relationships between the performance on infant moral evaluation studies and parent-report preschool functioning were stronger for males than for females, and that 4) these relationships were domain-specific. Together these findings provide preliminary evidence for longitudinal continuity in social functioning from infancy to preschool.

ID: 379 / PS-IV: 54

Poster

Topics: Language, Word Learning

Instructional placement and memory skills predict preschoolers' learning during shared book reading

Sofia Jimenez, Megan Michelle Saylor

Vanderbilt University, United States of America; m.saylor@vanderbilt.edu

Providing vocabulary instruction during book reading is an effective way to support word learning. We test the optimal placement of such instruction to provide insight into the cognitive abilities that support word learning and story comprehension. 3-to-5-year-olds ($N = 83$) were read a storybook that included instruction on six new words. Instruction was provided either during (*inside*) or before/after (*outside*) the story. Memory skills (digit span, SOPT), identification of the named items, and story comprehension were measured separately. Word learning (M 's = 3.34 and 3.69 out of 6) and story comprehension (M 's = 3.66 and 3.31 out of 5) were above chance ($p < 0.001$) and equal in the two conditions. However, memory skills were stronger predictors of word learning and story comprehension in the *inside* condition. These results suggest that instructing children during the story may place more demands on cognitive resources and may not be equally appropriate for all children.

ID: 594 / PS-IV: 55

Poster

Topics: Communication, Social Cognition

It's not what you know, it's how you show it: Preschoolers' inferences about potential informants

Marissa Gurrola Fierro, Carolyn Maxwell Palmquist

Amherst College, United States of America; cpalmquist@amherst.edu

Children use both what others have said (Koenig & Harris, 2005) and done (Palmquist & Jaswal, in press) in the past to make inferences about the future reliability of those individuals. However, children do not infer ability universally across these domains – they only assume that accurate speakers will be accurate pointers, not vice versa. It is unclear whether this pattern is a result of children being unwilling to generalize the episodic knowledge shared by pointers (Stephens & Koenig, 2015) or whether they simply do not generalize pointing ability to verbal ability. The current study introduced children to pointers who demonstrated either semantic or episodic knowledge and then measured from whom they preferred to learn novel labels. Children did not prefer an accurate pointer over an inaccurate pointer in either condition (p 's > 0.3), suggesting that they are unwilling to generalize pointing to labeling, even when semantic knowledge is shared.

ID: 718 / PS-IV: 56

Poster

Topics: Concepts/Categories

Judging the Persistence of Individual Objects

Kristan A. Marchak, Kyle Dadgar, D. Geoffrey Hall

University of British Columbia, Canada; marchak@psych.ubc.ca

What guides people's attributions of individual persistence to objects? We examined the disputed issue of whether these attributions depend on the persistence of kind membership (see Liittschwager, 1994; Rips et al., 2006; Xu, 1997, 2007). We presented adults and 5- and 7-year-olds with familiar animals and artifacts that were described as undergoing naturally occurring (for animals) or human-caused (for artifacts) transformations that either preserved or altered the objects' shape/kind. Preliminary results show that adults ($n = 10$) judged a post-transformation entity to be the same individual both when the shape/kind was preserved and when it was altered. In contrast, children ($n = 11$) judged the entity to be the same individual only when the shape/kind was preserved. The results suggest that there is an age-related change in the criteria guiding judgments of individual persistence, from a dependence on the persistence of an object's shape/kind to an independence from this constraint.

ID: 380 / PS-IV: 57

Poster

Topics: Culture, Moral Cognition, Social Learning

Kinder to Bobo: Children Today Rarely Imitate Aggressive Actions from Film

Angeline S Lillard, Eve M Richey

University of Virginia, United States of America; lillard@virginia.edu

In classic research, Bandura and colleagues showed that after viewing aggressive behavior on television or from a live model, in the 1960s about 90% of preschoolers re-enacted the aggression. In two attempted replications, we found today's children rarely aggress on Bobo. One possible reason is that cultural injunctions against aggression are stronger today. Study 1 supported this: After seeing a film of a model carrying out nice actions on Bobo, 44% of children imitated, compared to 17% after aggressive film ($N = 36$). Study 2 examined an alternate media model ($N = 36$). When the nice behaviors were shown in a storybook, 65% of children imitated. This is consistent with our prior research comparing an aggressive storybook with aggressive film, suggesting that overall children imitate more from storybooks. Possible reasons for this (changing roles of television in the culture; deeper processing of stories; adult endorsement) are explored.

ID: 775 / PS-IV: 58

Poster

Topics: Social Cognition, Theory of Mind

Knowledge and Ignorance: Children's expectations about action under uncertainty

Julian Jara-Ettinger, Samantha Floyd, Josh Tenenbaum, Laura Schulz

MIT, United States of America; samfloyd@mit.edu

Research on theory of mind has long investigated children's ability to infer others' unobservable mental states, including their intentions, desires and beliefs (see Wellman, Cross, & Watson, 2001; Baillargeon, Scott, & He, 2010). Almost uniformly, such investigations have treated agents' mental states as stable and known to the agents themselves. However, people are not always sure what they want or believe; people update their preferences with experience and their beliefs with evidence. If an agent is ignorant about the expected reward or cost of an action, she may be more likely to change her mind about future actions. Given identical actions and contexts, children (mean age: 4.94; range 4.01-5.96) correctly predict the stability of agents' goal-directed actions and preferences depending 1) on whether agents are initially knowledgeable or naïve about the **rewards** of the action (Experiments 1-4), and 2) whether they are knowledgeable or naïve about the **costs** (Experiments 5-8).

ID: 790 / PS-IV: 59

Poster

Topics: Language

Keywords: Language Assessment

Language Testing Made Fun: A New Tool for Measuring Language Skills in Monolingual and Bilingual Preschoolers

Kristina Marie Strother-Garcia¹, Giovanna Morini¹, Natalie Brezack¹, Amy Pace³, Paula Yust³, Andrea Takahesu Tabori², Dani F. Levine³, Roberta M. Golinkoff¹, Jill de Villiers², Aquiles Iglesias¹, Kathy Hirsh-Pasek³, Mary S. Wilson⁴

¹University of Delaware; ²Smith College; ³Temple University; ⁴Laureate Learning Systems; kmsg@udel.edu

Despite the importance of language development in the preschool years, there is currently no existing quick and efficient language assessment that is reliable, valid, and culturally neutral and that can be given by any examiner. We have created a touchscreen assessment to measure 3- through 5-year-old's vocabulary and syntax skills, both in terms of *products* (i.e., acquired knowledge) and *processes* (i.e., strategies to learn new linguistic information). Both the monolingual and Spanish-English bilingual version of the assessment has high internal consistency, excellent test-retest reliability, and strong convergent validity, each with two other language measures. This new instrument shows great promise as a quick and accurate screener of children from diverse backgrounds making it possible to target intervention earlier and more precisely. It also explores a wide array of language skills that other tests lack, providing educators, clinicians, and researchers with an accurate evaluation of preschooler's language development.

ID: 382 / PS-IV: 60

Poster

Topics: Concepts/Categories, Media and Technology

Keywords: fiction

Learning in stories and learning from stories

Emily J Hopkins, Deena S Weisberg

University of Pennsylvania, United States of America; hopkinse@upenn.edu

This study investigates how children *extend* information within the context of fictional stories, how they *export* information from stories to reality, and whether these processes are affected by the story's degree of realism. Preschoolers ($N=120$) heard a Realistic or Fantastical story, in which events violated real-world laws. The story contained a target fact that was either familiar to children, unfamiliar, or impossible. There was no effect of story type on extension of facts within the story, but children were more likely to export the unfamiliar fact from the Fantastical story than from the Realistic story. Fantastical stories thus might encourage children to consider that unfamiliar facts could be true. A follow-up study is investigating whether this result is affected by the type of fantastical events or the type of facts that are taught. These results deepen our understanding of children's sensitivity to genre as they learn information from stories.

ID: 617 / PS-IV: 61

Poster

Topics: Executive Function, Memory, STEM Learning

Learning under cognitive load due to stereotype threat: Impacts on procedural vs conceptual knowledge and short vs long term retention

Emily Anne Lyons, Nina Simms

University of Chicago, United States of America; ealyons@uchicago.edu

This study tested how experiencing cognitive load due to stereotype threat while learning impacted procedural and conceptual learning and short and long term retention among predominately African American 5th graders ($n=36$). Students not experiencing threat while learning improved significantly between pretest and immediate posttest on procedural ($p=0.014$; mean difference=0.158), and conceptual questions ($p=0.006$; mean difference=0.303) and maintained these gains at delayed posttest. Students who experienced stereotype threat while learning improved less between pretest and immediate posttest on procedural ($p=0.156$, mean difference=0.191) and conceptual questions ($p=0.078$; mean difference=0.137), and maintained these gains at delayed posttest on procedural questions only. Students who learned under cognitive load performed significantly worse than those who did not on conceptual questions at delayed posttest ($p=0.041$; mean difference=0.193), suggesting that experiencing cognitive load while learning due to stereotype threat may have especially profound detrimental impacts on deep learning and retention.

ID: 438 / PS-IV: 62

Poster

Topics: Word Learning

Keywords: Gesture, Action, Word Learning

Learning Verbs Through Action vs. Gesture

Casey Hall¹, Elizabeth M. Wakefield¹, Karin H. James², Susan Goldin-Meadow¹

¹University of Chicago; ²Indiana University, Bloomington; chall8@uchicago.edu

We know that verb learning is difficult for children (Gentner, 1982). Part of this difficulty stems from children's bias to associate a novel verb not only with the action it represents, but also with the particular object with which it is learned (Kersten & Smith, 2002). Here, we investigate how asking children to perform or observe actions on objects versus gestures off objects while learning novel verbs differentially impacts learning (Study 1, $N=48$), as well as generalization of verbs to new contexts and retention of verbs across time (Study 2, preliminary $N=12$). Data suggest that children learn verbs better through doing versus seeing actions or gestures, and that learning verbs through gestures, but not actions, helps children generalize verbs to new contexts. Together, these studies explore how gesture's impact on learning stems from properties it shares with action as well as properties that make it distinctively different from action.

ID: 352 / PS-IV: 63

Poster

Topics: Infant Cognition, Social Cognition, Social Learning

Keywords: Intentional Understanding, Collaborative Goal Understanding, Visual Predictions

Let's get it together: Infants' understanding of higher-order collaborative goals

Sheila Krogh-Jespersen¹, Annette Henderson², Amanda Woodward¹

¹University of Chicago, United States of America; ²The University of Auckland, New Zealand; skroghe@depaul.edu

Infants anticipate the outcomes of simple individual actions early in development (Krogh-Jespersen & Woodward, 2014), yet many complex actions, such as collaborative interactions, have less concrete goal structures. This study provides evidence that 14-month-old infants (N=40) recruit their understanding of higher-order shared goals to anticipate future actions based on past collaborative behavior.

Infants watched on an eye-tracker as two women engaged in either a collaborative interaction, in which they worked together to get a toy, or noncollaborative interaction, in which one woman watched as the other got a toy. At test, infants' visual predictions regarding one of the women's future actions were measured, revealing that infants made predictions based on the collaborative goal structure following the collaborative event ($M = .81, SD = .36$), but not the noncollaborative event ($M = .50, SD = .48$).

On-going research is examining whether 10-month-olds ($n=27$) generate visual predictions based on collaborative goal structure and whether action-experience influences this ability.

ID: 672 / PS-IV: 64

Poster

Topics: Comparative Cognition, Decision Making and Reasoning, Media and Technology

Keywords: Adolescents, Online Social Networks, Digital Literacy

Like or Liar: Adolescents' Heuristic Strategies for Judging the Credibility of Facebook Posts

Sean A. Minns, Gabriel Lopez-Mobilia, Jacqueline D. Woolley

University of Texas at Austin, United States of America; s.a.minns@gmail.com

Adolescents may be especially vulnerable to being deceived by online hoaxes masquerading as news. This study examined the development of adolescents' abilities to assess the reality-status of "news" encountered on Facebook. Adolescents (ages 13-17) and adults were shown a series of 18 different Facebook posts featuring fake news, and had to judge whether those stories were true or false. Each story was randomly paired with a different set of site-features that could impact its credibility: the number of "Likes" the post received (No Likes, 32 Likes, or 20,347 Likes) and which website was listed/linked as the source (No source, Wikipedia, or CNN). Adolescents' judgments were influenced more by site-features than those of adults. Adolescents' likelihood of believing fake news that cited CNN or no source increased with the number of likes the post received. In contrast, citing Wikipedia decreased their likelihood of believing news regardless of the number of likes.

ID: 635 / PS-IV: 65

Poster

Topics: Social Learning

Maternal Vicarious Emotion Regulation of Toddlers: Temporal Associations Between Negative Affect and Behavioral Strategies

Sarah Rose Vitale, Victoria Rose Riley Sanders, Wolfgang Friedlmeier

Grand Valley State University; vitaless@mail.gvsu.edu

Development of emotion regulation skills is a primary developmental task in a wide array of cognitive and social research. Caregivers' vicarious regulation attempts represent one important factor. We aimed to investigate temporal relations between toddlers' negative affect and maternal putative behavioral strategies to regulate toddler's emotions in a mildly frustrating situation. N = 47 U.S. mother-toddler dyads participated in a delayed gratification task (4 minutes). Nineteen maternal putative strategies (six strategy groups) and child's intensity for anger, sadness and positive emotions were coded on a second-by-second basis. Preliminary results showed that "less distractive" strategies, those that soothe and maintain attention (Crockenberg & Leerkes, 2004), occurred most frequently among mothers. Duration of negative affect occurred $M = 53.90$ seconds, ($SD = 58.47$). Preliminary contingency analyses showed that only some maternal putative strategies had temporal effects on child's affect. We also found that weak rather than strong negative affect evoked supportive putative strategies.

ID: 377 / PS-IV: 66

Poster

Topics: Decision Making and Reasoning, Theory of Mind

Maternal-Mind-Mindedness and School-Age Children's Emotion Understanding

Challie Elizabeth Frostick, Amarachi Nnebedum (Diversity Fellow), Naomi J Aldrich

Grand Valley State University, United States of America; frosticc@mail.gvsu.edu

Research suggests that maternal-mind-mindedness (MMM; treating a child as an individual with a mind rather than a being with needs to be fulfilled) is beneficial for preschoolers' social cognition. Few studies, however, have examined MMM in relation to older children's abilities. Mothers of 5-to-11-year-olds ($N=79$) completed a MMM interview that was coded for 1) proportion of mental characteristics attributed to their child and 2) valence of the mental attributes; and children were given a test of emotion

comprehension. Contrary to expectations, children of mothers with a high degree of MMM exhibited less emotion understanding. However, this was due to mothers describing their children's mental attributes in a negative (e.g., *stubborn, easily stressed*), rather than positive (e.g., *smart, thoughtful*) manner. Thus, we suggest that future research should account for valence when examining the complex association between MMM and children's social cognition beyond the preschool years.

ID: 373 / PS-IV: 67

Poster

Topics: Communication, Language

Keywords: adolescent cognition

Modality and Discourse Mode Affordances of Higher-Order Thinking

Rebecca Rose Frausel, Catriona Silvey, Ozlem Ece Demir, Cassie Freeman, Lindsey Richland, Susan Levine, Susan Goldin-Meadow

University of Chicago, United States of America; frausel@uchicago.edu

Higher-order thinking (HOT) links ideas and concepts into complex mental frameworks, which is crucial for later school success (NRC, 2001). Much research examines students' written HOT use in expository prompts (White, 1993). However, narrative might also encourage HOT, because theoretically-defined "good" narratives require story elements to be linked in a cause-and-effect framework (Stein & Albro, 1997); in effect, to display HOT. In addition, HOT use in oral modalities has not been systematically examined. In this project, we examine HOT use in 50 5th graders in response to prompts in different modalities (written vs. oral) and discourse modes (narrative vs. expository) in a 2x2 within-subjects design. Preliminary findings suggest written expository prompts elicited the richest HOT use; students used less HOT in oral expository prompts, yet HOT use in narrative prompts did not differ by modality. These results suggest that modality and domain effects should be considered when evaluating HOT.

ID: 532 / PS-IV: 68

Poster

Topics: Infant Cognition, Neuroscience Approaches, Social Cognition

Keywords: motor development

Neural correlates of motor planning in infancy

Courtney Filippi (Diversity Fellow)¹, Lauren Ross¹, Erin Cannon², Samuel Thorpe², Nathan Fox², Amanda Woodward²

¹University of Chicago, United States of America; ²University of Maryland, United States of America; cfilippi@uchicago.edu

Motor skill develops rapidly in infancy and is linked to a broad range of cognitive abilities. Although much is known about the behavioral processes involved in motor development, little is known about the neural correlates of motor skill in infants. This study examined the neural correlates, using a measure of sensorimotor activity, associated with motor planning in infants. We collected EEG as 7-month-old infants reached for toys and we coded behavioral markers of motor planning (e.g., hand pre-shaping). We found that the magnitude of the sensorimotor response, as measured by alpha ERD over motor cortex, uniquely predicted infants' reaching skill. These findings provide the first evidence that the magnitude of the sensorimotor system response is associated with improved motor planning during infancy. Future analyses will include developmental comparisons at 9 and 12 months.

ID: 723 / PS-IV: 69

Poster

Topics: Attention, Infant Cognition

Keywords: motor

Newly sitting infants recruit compensatory postural strategies to facilitate inhibition

Sarah Berger¹, Julie Sonsini², Regina Harbourne³

¹College of Staten Island and the Graduate Center, City University of New York, United States of America; ²Graduate Center of the City University of New York; ³Rangos School of Health Sciences, Duquesne University; sarah.berger@csi.cuny.edu

To examine strategy choice and discovery in infancy, 7-month-old, pre-crawling sitters reached to retrieve objects from two locations in an upright reaching board. Effort required to keep balance depended on whether infants sat on a firm or foam surface while reaching. Spontaneous balance control strategies (e.g., propping, high guard, light touch) were documented trial-by-trial. Perseverative behaviors (e.g., reaches, looks, vacillations) were coded after a switch in the object's location. Preliminary data from 10 infants suggests that extent of perseverative errors did not depend on sitting surface because infants used compensatory strategies in the less stable foam condition. Infants learn ways to adapt their body configuration to achieve the goal of object manipulation. Subtle postural control movements provide the cognitive benefit of relieving attentional load to facilitate inhibition. Microgenetically coding infants' behavior revealed problem-solving unfolding in real time and indicated the co-emergence of movement strategies and cognitive change.

ID: 777 / PS-IV: 70

Poster

Topics: Culture, Social Cognition, Social Learning

Keywords: Prosocial Development, Culture, Social Learning

Parental Guidance and Children's Development of Collaborative Initiative: Cultural Contexts of Children's Prosocial Development

Andrew Dee Coppens¹, Barbara Rogoff²

¹University of New Hampshire; ²University of California, Santa Cruz; andrew.coppens@unh.edu

This study examined cultural guidance for 2-3- and 6-7-year-olds' prosocial helping in a US Mexican-heritage (USMH) and a middle-class European American (MCEA) community. Using in-depth interviews with 29 mothers in each community (20 with a 2-3-year-old, 9 with a 6-7-year-old), findings confirmed a 'developmental puzzle': At age 2-3, children in both communities were eager to take part in everyday work that benefits others and helped to an equal extent. Yet at age 6-7, cultural differences were striking: USMH children helped more extensively, more often with initiative, and more prosocially than MCEA children. Mothers' approaches helped to explain these patterns: More USMH mothers involved 2-3- and 6-7-year-olds collaboratively in shared work than MCEA mothers. By contrast, most MCEA mothers avoided or redirected their 2- to 3-year-olds' involvement in work that benefits others. Mothers' developmental theories were also examined. The findings contribute novel cultural and analytic perspectives to prosocial development research.

ID: 445 / PS-IV: 71

Poster

Topics: Infant Cognition

Keywords: sticky mittens, fine motor skills, infant, early motor intervention

Perceived benefits of sticky mittens training

Sarah Elizabeth Wiesen, Amy Needham

Vanderbilt University, United States of America; Sarah.E.Wiesen@vanderbilt.edu

What are parents' perceptions of the effects of sticky mittens training? Do these perceptions differ depending on the amount of training infants complete? We investigated these questions by randomly assigning thirty 2.5- to 3-month-old infants to either extensive (n = 15) or brief (n = 15) mittens training conditions. Extensive training consisted of twelve training sessions whereas brief training consisted of one training session. At two laboratory visits approximately two weeks apart, parents completed Early Motor Questionnaires (EMQs; Libertus & Landa, 2013). Our EMQ data indicate parents perceived bigger increases in infants' fine motor skills than in gross motor and visual reception domains. Surprisingly, perceived benefits did not differ between training conditions. Exposure to sticky mittens training appears to sensitize parents to increases in their infants' fine motor skills. Behavioral measures will help to better explain these findings.

ID: 734 / PS-IV: 72

Poster

Topics: Perception

Keywords: motor action

Perceiving and Acting on Joint Affordances: How Children Cross Roads Together

Kathryne Brown, Luke Franzen, Elizabeth O'Neal, Joseph Kearney, Jodie Plumert

University of Iowa, United States of America; jodie-plumert@uiowa.edu

Children and adolescents perform many physical activities in the company of others. They cross streets with friends, ride bikes with parents, and climb playground equipment with classmates. These situations often require that children perceive and act on joint affordances. Using an immersive, interactive pedestrian simulator, we examined how 12-year-old pedestrians cross a single lane of continuous traffic with a friend or alone. When crossing with a friend, 12-year-olds waited for less time before crossing and took significantly smaller gaps, but did not time their entry more tightly or cross the road more quickly to compensate for their gap choices. As a consequence, children crossing with a friend had less time to spare and more close calls with traffic. Overall, 12-year-olds were much more risky when crossing with a friend than when crossing alone. These results suggest that children judge possibilities for action differently when engaged in joint activities.

The contribution has been withdrawn.

Playing from Video: Viewing and Resources Affect Children's Play

James D. Morgante¹, Cara Jean DiYanni²

¹Rutgers University, United States of America; ²Rider University, United States of America; cdivanni@rider.edu

ID: 409 / PS-IV: 74

Poster

Topics: Moral Cognition, Social Cognition

Keywords: Social Exclusion

Preschoolers are sensitive to social exclusion

Hyesung Grace Hwang (Diversity Fellow)¹, Natasha Marrus^{1,2}, Kelsey Irvin¹, Lori Markson¹

¹Washington University in St. Louis, United States of America; ²Washington University School of Medicine; hwang.h@wustl.edu

Social exclusion – intentionally excluding others – has been observed in children as young as 3 years (Crick et al., 1997). Developmental research has focused on children's moral evaluation of social exclusion, rather than their ability to detect its occurrence (Killen, 2007). We investigated whether 2-to-3-year-old children can detect social exclusion using a live-action paradigm. Children saw two agents exclude a third agent who displayed sadness when excluded. Three-year-olds preferred the excluded agent (13/16, binomial test, $p=.02$), but 2-year-olds did not (6/16, $p=.45$). Preference for the excluded agent was not due to superficial characteristics, but rather was based on evaluation of the social dynamic, as children no longer preferred this agent

when s/he was included (7/16, $p=.80$). In fact, children showed a marginal preference for the excluded agent even when s/he exhibited no sadness (11/16, $p=.11$). The findings suggest sensitivity to social exclusion emerges in the preschool years.

ID: 526 / PS-IV: 75

Poster

Topics: Concepts/Categories

Keywords: inductive selectivity, induction, associative learning, conceptual learning, preschoolers

Preschoolers' inductive selectivity as a function of associative and conceptual learning

Alexey Kotov¹, Tatyana Kotova², Elizaveta Vlasova²

¹National Research University 'Higher School of Economics', Russian Federation; ²Russian Academy for National Economy and Public Administration, Russian Federation; akotov@hse.ru

Children rely on contextual information, while generalizing information about new objects. It is still uncertain, what underlies such inductive selectivity - associative learning, which depends on the amount of features, or conceptual learning, which depends on the features' content. In the first experiment we varied the contextual information and found that 4-5-year-olds rely more on object features of the context (shape and colour of the background), but not on spatial one (location). In the second experiment we varied the combination of context features and showed that, in the lack of object information (shape only), children rely on spatial feature of the context more than on object feature. Besides, they prefer not to rely on the contextual information at all if the object information was modified (same shape but different colour). Together these results indicate the dependence of the inductive selectivity on conceptual learning, but not only associative learning.

ID: 457 / PS-IV: 76

Poster

Topics: Memory, STEM Learning

Promoting STEM Learning in Informal Settings: Children's Narrative Reflections

Maria Marcus¹, Lauren Pagano¹, Melanie Velado¹, Catherine A. Haden¹, David H. Uttal²

¹Loyola University Chicago, United States of America; ²Northwestern University; mmarcus@luc.edu

We studied children's narratives about a STEM learning experience in a children's museum. The participants were 120 children (age 4 to 8) and their caregivers. The narratives were told after the children worked with their caregivers to either build a skyscraper or fix a wobbly skyscraper and then worked independently to fix another wobbly structure (skyscraper or bridge). Children were asked to reflect on their building experience (e.g., "What problems did you have while working on the skyscraper?") and learning (e.g., "What did you learn from working on this task?"). The presentation will describe the children's provision of STEM-related information in the narrative reflections (e.g., "It was hard to screw the nuts on." "I learned that if you cannot make diagonals it's [the structure is] still going to be wobbly."), and relations to between the narrative responses and measures of the family interactions and building outcomes.

ID: 781 / PS-IV: 77

Poster

Topics: Decision Making and Reasoning

Keywords: Exploration and self-directed learning

Puzzling Question of Curiosity: Information about the difficulty of one task influences preschoolers' exploratory play with a novel toy

Amanda Castro, Elizabeth Bonawitz

Rutgers University - Newark, United States of America; amanda.ashley.castro@gmail.com

Exploratory play is an important component of learning. Past accounts of children's exploration have focused on how information in the context of a particular event (e.g. a novel toy) affects children's inferences about the likely features of said event (e.g. how many functions the toy has). An important open question is the degree to which past exploration and learning experiences affect exploration in novel contexts. We present preschoolers with information about an initial task, explaining that it was hard or easy (or providing no information). Preschoolers are then invited to explore a novel toy where no information about the difficulty of the toy is given. We find that preschoolers explore more and discover more features following information that the initial task was difficult, than following easy or neutral descriptions. Additional control conditions suggest that children are extending expectations about previous events to novel ones.

ID: 431 / PS-IV: 78

Poster

Topics: Number, Spatial Cognition

Reasoning with Continuous and Discrete Proportions in 4 and 6 year old Children

Michelle Hurst, Sara Cordes

Boston College; hurstm@bc.edu

Research suggests that 6- to 10-year-old children have difficulty with discrete presentations of proportional information when misleading numerical information is available, despite being successful with continuous presentations (e.g., Boyer, Levine, & Huttenlocher, 2008). We extend this literature by investigating differences in discrete and continuous proportional reasoning in younger children (4- and 6-year-olds), exploring whether performance on proportional judgment tasks are responsive to a brief

training on part-part relations, and investigating the relationship between proportional and analogical reasoning. Results with both 4- and 6-year-olds suggest that children who are successful at continuous presentations show evidence of numerical interference in discrete proportional reasoning. However, only the 4-year-olds' performance is responsive to training; the 6-year-olds do not show any improvement from part-part relational training. Finally, performance on the continuous trials, but not the discrete trials, is predicted by performance on the analogy task.

ID: 478 / PS-IV: 79

Poster

Topics: Social Cognition

Keywords: stereotyping; illusory correlation; rational statistical learning; associative learning

Can Facilitating Accurate Processing of Statistical Information Reduce Illusory Correlation in Children?

Vera Bingchen Chai, Lili Ma

Ryerson University, Canada; lilima@psych.ryerson.ca

Stereotyping is a pervasive phenomenon and emerges early in development. One well-studied mechanism involved in stereotyping is the formation of illusory correlation, which refers to the erroneous inference about the relationship between two categories of events that are in fact uncorrelated or are correlated to a lesser degree than perceived. Previous studies demonstrate that adults' illusory correlation can be reduced through associative learning and the facilitation of rational statistical reasoning. In three experiments, we found that just like adults, 5- to 10-year-olds formed an illusory correlation between the minority group and the infrequently occurring, negative behaviors, which biased their subsequent social judgments and playmate choice. Importantly, such stereotyping in 5- to 8-year-olds was significantly reduced through the facilitation of rational statistical learning, but not through associative learning. These findings have the potential to make novel contributions to the literature and inform new interventions for reducing stereotyping in children.

ID: 453 / PS-IV: 80

Poster

Topics: Attention, Executive Function

Keywords: Inhibitory Control, Emotion

Sad, mad, and scared, oh my! The impact of emotional stimuli on inhibitory control in children and adults

Hannah Jean Kramer, Kristin Hansen Lagattuta

University of California, Davis, United States of America; hjkramer@ucdavis.edu

We examined the impact of emotional stimuli on inhibitory control, the ability to stop dominant responses. Four- to 12-year-olds and adults (anticipated $N=180$) played opposite games (e.g., *happy-sad*, say "happy" to a sad face and vice versa, Lagattuta et al., 2011) on an eyetracker. Of interest was the differential impact of emotion as focal (performance dependent on processing emotion: *happy-sad*, *happy-mad*, *happy-scared*) versus peripheral (performance not dependent on processing emotion: *up-down* arrow tasks with emotion faces in corners) versus absent from the task. Preliminary results ($N=14$ adults) revealed that focal emotions elicited higher error rates and response times than peripheral emotions, with the latter not differing from emotion-free variants. We anticipate significant gains in IC during childhood, with focal emotions being more disruptive than peripheral. Given children's difficulty controlling attention, we further expect peripheral emotions to be harder than non-emotion tasks. Eye-tracking analyses will assess participants' ability to avoid peripheral stimuli.

ID: 393 / PS-IV: 81

Poster

Topics: Spatial Cognition, STEM Learning

Sex Differences in Gains on Spatial Ability Throughout Pre-Kindergarten

Carla (Diversity Fellow), Rosalie Odean (Diversity Fellow), Shannon M. Pruden

Florida International University, United States of America; cabad003@fiu.edu

The current study explores early sex differences in a variety of spatial abilities within a Hispanic population to better understand the underrepresentation of women and Hispanics in the STEM fields. Ninety-three Hispanic Spanish/English bilingual children completed a spatial assessment battery at the beginning and end of pre-kindergarten. Results suggest significant gains were made on all spatial assessments throughout pre-kindergarten. Although child sex was not predictive of spatial assessment scores at the beginning or end of pre-kindergarten, children's sex was found to predict gains on two tasks requiring mental rotation: the *Children's Mental Transformation Task* ($b = -.422, p = .011$) and *WPPSI-III's Block Design test* ($b = -.306, p = .021$). These results shed light on the development of Hispanic children's early spatial skills and point to the importance of examining the role of early education on the development spatial abilities in young girls and minority children.

ID: 799 / PS-IV: 82

Poster

Topics: Social Cognition

Keywords: helping, prosocial behavior, social goals

Social considerations inform preschoolers' decisions to help others achieve their social goals.

Brandon F. Terrizzi, Amanda Mae Woodward, Emma G. Larson, Jonathan S. Beier

University of Maryland, College Park, United States of America; terrizzi@umd.edu

Young children help other people achieve their social goals. For instance, when 3-year-old children witness one person's failed attempts to get another's attention, they will spontaneously approach the target individual and helpfully redirect her attention (Beier et al., 2014). However, *appropriate* social helping requires weighing the preferences of everyone involved. The present study assessed whether children's decisions to provide social help are based solely on recognizing one person's unmet goal, or whether social helping follows from also considering the wishes of the target. Thirty-two 3-year-olds experienced two (within-subject) variations on Beier et al.'s (2014) "getting attention" scenario. An actor called unsuccessfully toward a person who previously either had or had not expressed disinterest in responding. Children in the Disinterest condition were more hesitant to redirect the target individual's attention, $t(31) = 2.9$, $p = .006$, demonstrating sensitivity to the interpersonal consequences of social helping.

ID: 500 / PS-IV: 83

Poster

Topics: Executive Function, Social Learning, STEM Learning

Social Emotional Competency as a Mediator between Inhibitory Control and Hypothesis Revision

Ellen Christine Litkowski, Maggie Renken

Georgia State University, United States of America; elitkowski@student.gsu.edu

Little empirical work has assessed the contribution of executive function (EF) to children's early scientific reasoning, despite theory-driven suggestion that inhibitory control is necessary for considering evidence and revising hypotheses (Gropen et al., 2011). Similar to the way children's social and emotional competency influences their acceptance of testimonial evidence, we expected children's social and emotional understanding to affect their evaluation of experimental evidence as well. We investigated whether the relationship between pre-K students' ($n = 62$, ages 4 and 5) inhibitory control and hypothesis-revision ability was mediated by social-emotional competency. The results of a mediational model confirm the role of social-emotional competency as a mediator. These findings demonstrate the necessity of accounting for social factors when investigating children's evaluation of experimental evidence. Results indicate that social-emotional competency should be considered both in the development of empirical measures of scientific reasoning and early childhood education interventions.

ID: 365 / PS-IV: 84

Poster

Topics: Culture, Executive Function

Keywords: Parent-child interaction

Stability and Changes in Maternal Autonomy Support From Kindergarten to First Grade: Predicting Executive Function Skills in a Low-Income and Ethnically Diverse Sample

Lauren Malachowski, Diana Leyva

Davidson College, United States of America; [dileyya@davidson.edu](mailto:dileyya@ davidson.edu)

This study examined: (1) the extent to which maternal autonomy support changed over time in a sample of low-income African American and Latino mothers, and (2) whether change in maternal autonomy support was related to children's executive functioning skills (EF). The full sample includes 244 mother-child dyads. To date, we have transcribed and coded 42 videos of mother-child dyads completing a challenging task when children were 5-year-olds (T1) and again when they were in first grade (T2). Autonomy support was coded at the utterance level using a coding scheme adapted from Bernier et al. 2010. Children's EF was assessed using the DCCS task (Zelazo, 2006). Mixed ANOVAs yielded a significant interaction between time and ethnicity for certain maternal autonomy support strategies. Overall, changes in maternal autonomy support predicted EF at T2. Findings are discussed in light of the role that socioeconomic and cultural factors play in EF development.

ID: 726 / PS-IV: 85

Poster

Topics: Moral Cognition, Social Cognition

Sticky Marshmallows: Experience with temptation reduces preschoolers' condemnation of tempted others

Christina Starmans, Paul Bloom

Yale University, United States of America; christina.starmans@yale.edu

People often know the right thing to do, but feel tempted to do the wrong thing—to cheat on taxes or spouses, lie to avoid trouble, or skip out on a promise. How do these struggles with temptation affect moral judgments? In previous research we found that adults judge people who overcome temptation and do the right thing to be morally superior to those who do the right thing without experiencing temptation. Preschoolers, conversely, see those who were never tempted as morally superior. In the current studies, we replicate this finding using a new video method, and show that giving preschoolers experience with temptation (using a marshmallow task) significantly reduces their condemnation of a third party who is tempted but ultimately does the right thing. These findings suggest that part of developing an adult-like stance toward temptation and willpower is a growing appreciation of one's own temptation to do wrong.

ID: 693 / PS-IV: 86

Poster

Topics: Concepts/Categories, Infant Cognition

Surprise-induced exploratory play in infants: When does surprise generalize across exemplars?

Lisa Feigenson¹, Aimee Elyse Stahl²

¹Johns Hopkins University; ²The College of New Jersey; aimeestahl@gmail.com

Previous work shows that infants preferentially explore objects that behave surprisingly. Eleven-month-olds saw an expected event (e.g., ball stopped by wall) or surprising event (e.g., ball passes through wall), then had 60s to explore that object (ball) and a new object (car). Infants who saw the expected event preferred the new object; infants who saw the surprising event preferred the familiar, surprising object. Here we asked whether infants' surprise-induced exploratory behaviors are linked to object tokens or object kinds. We showed infants either an expected or surprising event, but then gave them a perceptually *different* ball and a new car to explore. Infants who saw the expected event again preferred the novel object kind (car), whereas infants who saw the surprising event showed no such preference. Thus, infants use surprise to guide exploration—not just of the very objects that surprised them, but also of objects of the same kind.

ID: 659 / PS-IV: 87

Poster

Topics: Infant Cognition, Language, Word Learning

Keywords: goal understanding, mutual exclusivity, Violation-of-Expectation paradigm

Ten-month-olds' ability to use verbal information when reasoning about others' goals.

Min Ju Kim, Hyun-joo Song

Yonsei University, Korea, Republic of (South Korea); rubymjinju@gmail.com

We examined whether the 10-month-olds interpret an agent's changed word to infer a possible change in her upcoming actions. Infants were familiarized with an agent producing a novel word twice and grasping one of the two toys. After replacing the toys, the agent produced a different novel word twice and grasped either the new toy (new-goal event) or the old toy (old-goal event). Infants looked at the new-goal event significantly longer than the old-goal event (Exp.1). With two more familiarizations (Exp. 2) infants looked equally at the two events, indicating that they could detect the word change but could not infer more. With eye gaze and emotional cues (Exp. 3), infants looked reliably longer at the old-goal event than the other, showing that the 10-month-olds could correctly form such specific expectations. These findings contribute to the developmental trajectory of infants' ability to use verbal information in reasoning about others' goals.

ID: 580 / PS-IV: 88

Poster

Topics: Language, STEM Learning

The Developmental Effects of Mathematics Terminology on Algebra Learning

Kelly Marie McGinn, Julie L. Booth

Temple University, United States of America; kelly.mcginn@temple.edu

Today, it is expected that students learn to precisely communicate their mathematical thinking. Self-explanation prompts are a common tool used to foster this skill. Unfortunately, the developmental effects of mathematics language used when responding to these prompts has not yet been explored. The question becomes at what point should we expect students to use formal mathematical language, rather than informal, everyday language, when explaining a mathematical concept.

Data from sixty-six students from five districts across the country were analyzed. Latent class growth analysis was used to define the various mathematical terminology growth trajectories in order to determine the most effective path in regards to student learning. Results indicate that attempting to use both types of language consistently throughout the school year is associated with higher self-explanation scores, and conceptual and procedural knowledge, suggesting that teachers should promote the regular attempt to explain concepts, regardless of the type of language used.

ID: 521 / PS-IV: 89

Poster

Topics: Decision Making and Reasoning, Memory

Keywords: Episodic Foresight

The Developmental Path to Envisioning an Uncertain Future

Janani Prabhakar², Simona Ghetti^{1,2}

¹Department of Psychology, University of California, Davis, United States of America; ²Center for Mind and Brain, University of California, Davis, United States of America; jprabhakar@ucdavis.edu

Young children show marked difficulty with episodic forethought. We asked whether the inherent uncertainty about future states contributes to this difficulty. Three- and four-year-olds (N = 21, Projected N = 60) were successfully taught to play a video by moving characters on a tablet to distinct locations in one temporal order. After a 10-minute delay, children were asked to indicate how they would play the video in a future visit. We manipulated future uncertainty by showing a video of a confederate who after inputting the sequence out of the child's sight was or was not able to see the video (low and high uncertainty, respectively). Preliminary results indicate children produced sequences for the future more accurately in the low ($M=0.67$; $SD=0.48$) versus high ($M=0.34$, $SD=0.48$) uncertainty condition, $p<.05$. The contribution of additional factors (e.g., age, general memory ability and executive function) is also explored.

ID: 687 / PS-IV: 90

Poster

Topics: Social Cognition, Social Learning

The effect of multiple gossip statements on young children's selective learning from others

Nella Cautillo, Lili Ma, Kathryn Harper

Ryerson University, Canada; lilima@psych.ryerson.ca

Gossip can serve as an alternative for direct observation and suggest whether a person is a reliable source of information. Here we examined young children's ability to pick up on the relative valence of multiple gossip statements and use it to guide their learning from others. Four- to 6-year-olds watched four people gossiping about an informant's prior accuracy in labeling familiar objects, and decided from whom, the gossip target or an alternative informant, they would like to seek information about novel labels and facts. The gossip statements were of opposing valence, with the relative valence being positive, negative, or neutral. The results indicated that children did not show a preference for either informant when the relative valence of the gossip was positive or neutral. However, they avoided learning from the target of relatively negative gossip. These findings were discussed in relation to a general negativity bias and the practical implications.

ID: 463 / PS-IV: 91

Poster

Topics: Culture, Social Cognition, Social Learning

Keywords: Imitation, Ritual

The effect of ritual on instrumental tool use

Nicole J. Wen (Diversity Fellow)¹, Cristine H. Legare¹, Rachel E. Watson-Jones¹, Sarrah M. Ratcliff¹, Susan A. Gelman²

¹The University of Texas at Austin, United States of America; ²University of Michigan, United States of America;

nicole.wen@utexas.edu

The use of artifacts in rituals is pervasive in human cultures, yet little is known about how children perceive the instrumental function of these ritualized tools. This study examines the effect of ritualistic tool use on 3-6-year-old's perceived instrumental function of the tool. To manipulate ritualization, we use cues to consensus (witnessing a single, successive, or synchronous actors) and experience with the tool (observation only, observation + physical interaction). We measure the likelihood of using the ritualized tool to solve an instrumentally oriented puzzle box task. We predict that (1) cues to ritualization decrease the likelihood of using the tool to solve the instrumentally oriented task and (2) imitating the ritual sequence further decreases the likelihood of using the tool to solve the puzzle box task compared to observation alone. The results will provide insight into whether children's experience using a tool ritualistically imbues it with a ritual "essence".

ID: 576 / PS-IV: 92

Poster

Topics: Concepts/Categories, Decision Making and Reasoning, STEM Learning

Keywords: Explanation

The influence of an inference heuristic on scientific explanation

Zachary Steven Horne, Andrei Cimpian

University of Illinois at Urbana-Champaign, United States of America; horne2@illinois.edu

What mental processes underlie scientific explanation? Although scientific reasoning is typically careful and methodical, we hypothesize that it is also influenced by a more intuitive explanatory process: namely, an inference heuristic (Cimpian & Salomon, 2014). The central claim of the inference heuristic proposal is that, when people construct everyday explanations, they oversample easily-accessible inherent facts about the entities involved. Here, we investigated the influence of this heuristic process on explanations for novel scientific phenomena in physics, biology, and chemistry. Across 12 studies, children (ages 6 to 9) and adults ($N = 1208$) were asked to explain outcomes of unfamiliar experiments. As predicted, explanations were predominantly couched in terms of inherent features even though (1) such features were not mentioned in the vignettes but (2) extrinsic factors were (e.g., the experiment was conducted on the moon). These findings suggest that scientific explanation may be influenced by an inference heuristic.

ID: 741 / PS-IV: 93

Poster

Topics: Communication, Language, Memory

The kiwis at the sanctuary were nocturnal: Exploring the lexical and syntactic features of parent-child reminiscing.

Shika Anjanita Das¹, Jane Carroll^{1,2}, Elaine Reese¹, Elizabeth Schaughency¹

¹University of Otago, New Zealand; ²School of Teacher Education, University of Canterbury, New Zealand;

shika_108@hotmail.com

Parent-child reminiscing conversations provide a context for fostering children's language and socio-emotional competencies. Previous studies have explored the style of reminiscing, but not at the lexical or syntactic level. We collected parent-preschooler reminiscing about a negative and positive event from 67 dyads in New Zealand (NZ). Using Systematic Analyses of Language Transcripts-NZ software, we conducted lexical and syntactic analyses. Preliminary results suggest conversational differences across events. Parents and children used more utterances in positive events (parent: $M=34.64$; child $M=19.28$) than in negative events. (parent: $m=27.64$, child: $m=13.75$). Interestingly, parents took longer conversational turns (monologuing) and children used more morphemes in the negative event conversation, whereas parents asked more questions, and dyads had greater lexical variation during the positive event conversation. Further analyses with this sample will examine relations between these lexical and syntactic features of reminiscing and children's vocabulary development.

ID: 625 / PS-IV: 94

Poster

Topics: Memory, Neuroscience Approaches

The neural underpinnings of metacognitive monitoring and control: Individual differences and contribution to memory development

Yana Fandakova, Elliott Johnson, Simona Ghetti

University of California, Davis, United States of America; fandakova@ucdavis.edu

Children's ability to introspect on uncertainty and strategically withhold responses continues to develop during middle childhood. We examined the neural underpinnings of uncertainty monitoring in 8-12-year-olds (N=89) and adults (N=30). At retrieval participants could select a 'not sure' answer if uncertain about the context studied with a target object. Prefrontal regions were engaged for 'not sure' decisions, whereas the anterior insula (AI) was engaged for both 'not sure' and incorrect decisions. AI activity predicted memory improvement and prefrontal engagement 16 months later. To examine how uncertainty monitoring guides memory control, participants (N=23 adults; projected N=20 children) decided if they wanted to volunteer or discard each answer in a memory task. Discarding answers engaged the AI and fronto-parietal regions, whereas volunteering answers engaged occipital and hippocampal regions. Together, these results identify the AI as critically engaged in monitoring and regulation of memory states and highlight its role in memory development.

ID: 626 / PS-IV: 95

Poster

Topics: Theory of Mind

Keywords: Theory of Mind, Introspection

The Role of Introspection in Children's Theory of Mind Development

Christopher Ryan Gonzales, William Fabricius, Annelise Pesch, Jacquelyn Swift-Honer, Benjamin Woolley

Arizona State University, United States of America; gonz489@gmail.com

A well-established finding is that children show no evidence for any introspective ability in their understanding of false beliefs; preschool children who fail standard verbal false belief tasks are also unable to correctly report their own false beliefs (Gopnik & Astington, 1988). However, there is evidence that young children are capable of introspection in other areas such as their understanding of uncertainty (Hembacher & Ghetti, 2014) and in reporting their feeling of knowing (Wellman, 1977). The current study examined the role of introspection in earlier developing mental state understanding important to theory of mind development. Three- and 4-year-olds were better at reporting their own knowledge than reporting another person's knowledge, and 2- and young 3-year-olds were better at reporting their own Level-1 perception than another person's Level-1 perception. Together, these findings suggest that introspection plays a key role in a child's developing theory of mind.

ID: 368 / PS-IV: 96

Poster

Topics: Theory of Mind

Theory of Mind and Leadership in Adolescents

Melissa S Atkins, A Taylor Rowe

Marshall University, United States of America; stinson8@marshall.edu

The purpose of the present study was to examine the relationship between theory of mind and leadership in adolescents. While there has been significant research on theory of mind and its social correlates in early childhood, the relationship in adolescence and beyond has received little research attention. In this study, 74 adolescents completed a measure of theory of mind (Reading the Mind in the Eyes Test) and a self-report measure of leadership (Roets Rating Scale for Leadership). Their teacher provided ratings of each student on two dimensions of leadership. Results showed a significant correlation between theory of mind and self-reported leadership, but not between theory of mind and teacher-reported leadership. This suggests that theory of mind skill might be one characteristic of strong leaders, although more research is necessary to further examine the nature of this relationship and learn more about the role theory of mind plays in leadership behavior.

ID: 747 / PS-IV: 97

Poster

Topics: Social Cognition, Theory of Mind

Keywords: Theory of Mind, aggression, preschool

Theory of Mind Development and Concurrent Aggressive Expression in the Preschool Years

Erin Ruth Baker¹, Marie S Tisak¹, Kaitlin Flannery²

¹Bowling Green State University; ²University of Connecticut; ebaker@bgsu.edu

The purpose of the study was to examine preschoolers' aggressive expression and concurrent Theory of Mind (ToM) development. Children (N=119, $M_{age} = 51$ months) completed two standard ToM tasks, and teachers rated each child on four types of aggression: Reactive-Physical, Reactive-Relational, Proactive-Physical, and Proactive-Relational. As expected, age predicted performance on both ToM tasks. Gender differences were found for only one type of aggression - Reactive-Physical - such that males were more likely to aggress in this manner. Additionally, socioeconomic differences were revealed for three types of aggression, such that those in an economically disadvantaged home tended to show more aggression. As predicted, analyses revealed that Proactive-

Relational aggression was related to ToM performance, such that those who were proficient in ToM were more aggressive. These findings suggest that certain types of aggression may be related to ToM development. Future directions and study limitations will be discussed.

ID: 396 / PS-IV: 98

Poster

Topics: Executive Function, Social Cognition

Keywords: pretense

Toddlers' Representation and Comprehension of Pretend Actions

Jennifer Van Reet

Providence College, United States of America; jvanreet@providence.edu

Children reliably claim pretending is merely an action until age 6 (Lillard, 1993), yet their behavior suggests they do appreciate the role of mental states in pretense. This research tests whether toddlers have an implicit awareness that pretending requires knowledge using looking time and whether their understanding of pretense is related to executive function. Forty 18-28 month olds (M = 23 months) were introduced to a novel object and its function. A second experimenter then pretended correctly with the novel object after claiming to know or not know about it. Toddlers looked longer when the actor did not know about the object. This is the first evidence to suggest young children have an implicit understanding that mental states are required in pretending. Children's understanding of pretending was also positively correlated with an executive function battery; this relationship has been well-established in preschoolers, but has never before been found in toddlers.

ID: 334 / PS-IV: 99

Poster

Topics: Infant Cognition, Moral Cognition, Social Cognition

Toddlers' selective responses to prosocial and antisocial others

Julia Van de Vondervoort¹, Lara Akinin², Tamar Kushnir³, J. Kiley Hamlin¹

¹University of British Columbia, Canada; ²Simon Fraser University, Canada; ³Cornell University, United States;

julia.vandevondervoort@psych.ubc.ca

Toddlers have been described as both "indiscriminate altruists" (Warneken & Tomasello, 2009) and selectively prosocial (Kuhlmeier, Dunfield, & Neill, 2014). This study explored whether toddlers' prosocial acts and emotional responses are sensitive to recipient deservingness. Sixty-nine 20-month-olds' responded to a prosocial or antisocial individual's request for a toy. Toddlers could give the requester her preferred toy, her non-preferred toy, or nothing, and emotional reactions after giving to or withholding from the requester were rated. Toddlers were more likely to give toys to prosocial requesters than antisocial ones, and more likely to give preferred versus non-preferred toys to prosocial requesters. Toddlers who gave a toy were happier after giving than before giving, regardless of whether the recipient was prosocial or antisocial. These results suggest that toddlers are selective in their prosocial behaviours, rather than indiscriminately altruistic. However, toddlers' behavioural responses are more selective than their emotional reactions.

ID: 717 / PS-IV: 100

Poster

Topics: Executive Function, Memory, Theory of Mind

Tracking multiple minds: Working memory (WM) and executive function (EF) in preschool theory of mind.

Michelle Cheng, Alan M. Leslie

Rutgers University, United States of America; michelle.cheng@ruccs.rutgers.edu

Theory of Mind development occurs in small groups (e.g., family) where a number of agents may have differing mental states. False belief (FB) studies, however, have required a child to track only a single agent's FB. We document the limit on preschoolers' WM for multiple agents' FB's at two levels of executive demand. In low-demand tasks, three-year-olds perform well tracking single-, double-, and even triple-agents but performance drops off with four agents-beliefs; four-year-olds continue to do well even with four agents. With high-demand, three-year-olds fail even a single-agent-belief, but performance does not suffer further with increasing agents, which produces a rise only in FB binding errors; four-year-olds pass single-, double-, and triple-agents, but performance suffers with four agents. Preschoolers have ample WM to track small groups of individuals: about three at age three and four at age four; executive demands are far more limiting.

ID: 729 / PS-IV: 101

Poster

Topics: Culture, Language, Social Learning

Keywords: Narrative, Indigenous Cultural Traditions

Understanding coherence in children's oral narrative constructions: Some insights on the role of cultural patterning from exploring Indigenous oral traditions.

James William Allen

Algoma University, Canada; james.allen@algomau.ca

This poster will present preliminary research comparing the Narrative Coherence Coding Scheme (NaCCS) and new approach to exploring children's narratives based on techniques employed in verse analysis. Verse analysis was developed through the

analysis of oral narratives of Indigenous peoples of the Americas, and a variation on this technique has recently been applied to the analysis of retellings of traditional oral narratives by children. This poster extends previous work to include data gathered from 48 children in 4 elementary school classrooms (grades 1,2 & 4). First, complexity of verse patterning in children's narratives is compared across the classrooms and second, these data are analyzed using the three dimensions of the NaCCS. Taken together, these results reveal age-related differences in children's oral narrative skills, and I argue they have the potential to further our understanding of the different, culturally influenced, dimensions that go into the construction of oral narratives by children.

ID: 609 / PS-IV: 102

Poster

Topics: Language, Word Learning

Using Comprehension to Predict Production: Variability in Individual Trajectories

Erin Smolak^{1,2}, Diane Poulin-Dubois³, Pascal Zesiger⁴, Margaret Friend¹

¹San Diego State University; ²University of California, San Diego; ³Concordia University; ⁴Université de Genève; erin.smolak@gmail.com

Children delayed in both comprehension and production are at the greatest risk for experiencing persistent language delay. It is therefore imperative that research into early indications for delay investigates comprehension, given its link to productive outcomes. The current research collected data from 59 English-monolingual children who are part of a longitudinal project. We report on a direct measure of comprehension taken at 16 and 23 months and its prediction to language complexity at 30 months. Prediction was found from 23, but not 16, months, due in part to variability in individual trajectories. Approximately one-third of children with "flat trajectories" increase slowly in comprehension scores, whereas other children increase dramatically and spread to different outcomes. Evidence suggests that children with flat trajectories, who have lower comprehension scores at 16 months, have less language complexity at 30 months. Further, parents report higher rates of concern in the language development of these children.

ID: 619 / PS-IV: 103

Poster

Topics: Media and Technology

What can the Internet tell you about Pangolins?: Children's Questions for Internet and Human Sources

Jacob Messmer¹, Nick Noles¹, Judith Danovitch¹, Patrick Shafto²

¹University of Louisville, United States of America; ²University of Rutgers - Newark, United States of America; nicholaus.noles@gmail.com

Technological information sources, such as Internet search engines, are becoming more prevalent in learning environments, but there is little research exploring whether experience with technological sources influences the quantity and quality of questions that children ask. In order to address this question, children ages 4, 5 and 6 (N=45) were familiarized with two informants, a human (accessible via a chat window) and an Internet search engine. Children were then given the opportunity to ask questions about each of four unfamiliar animals that were directed to one of the informants. Children did not differ in the number of questions directed towards the human or the technological informant, and the proportion of causal "how" or "why" questions that they asked of each source was also similar. This suggests that young children may attribute similar types of knowledge to human and Internet-based informants.

ID: 356 / PS-IV: 104

Poster

Topics: Concepts/Categories, Social Cognition

Who is in charge? Children's inferences of social power in social category relationships

Selin Gülgöz¹, Susan A. Gelman²

¹Kalamazoo College; ²University of Michigan; selingulgoz@gmail.com

A growing body of research shows that children become sensitive to social power differences between individuals from a young age (Brey & Shutts, 2015; Gülgöz & Gelman, unpublished dissertation). Studies also show children's implicit preferences for members of social groups that are of greater status (e.g., Horwitz, Shutts, & Olson, 2014). An important, unexplored question is how children make judgments about social power as a function of social category membership.

Two studies included vignettes depicting two characters varying in social power, and examined 3- to 9-year-olds' and adults' inferences about relative age and gender based on five previously studied dimensions of power: resource control, goal achievement, denying permission, giving orders, setting norms. Findings indicated that, based on power differentials, children and adults are more likely to infer relative age than gender. Moreover, children and adults did not readily infer the same social power relations across different social groupings.

ID: 725 / PS-IV: 105

Poster

Topics: Language

Keywords: word learning, referential links

Words are not enough: Referential links are key to enhancing infants' word learning at 14 months

Angeline Sin Mei Tsui¹, Laurel Fais², Christopher Fennell¹

¹University of Ottawa, Canada; ²The University of British Columbia, Canada; atsui029@uottawa.ca

At 14 months, infants learn novel words in rich phonological detail after brief training on known word-object associations (see cat, hear “kitty”), but fail with no training or when familiar objects are paired with non-referential exclamations (see cat, hear “wow”) (Fennell & Waxman, 2010). Interestingly, training involving referential mismatches (see shoe, hear “kitty”) also leads to enhanced word learning (Tsui et al., 2015). Here, violated referential expectations motivated infants to seek out stable patterns in subsequent word-learning, increasing attention to phonological detail (Proulx & Heine, 2009). In this study, we explored whether infants’ previous successes are due to simple pre-exposure to nouns, rather than any referential expectations. We paired familiar nouns with a non-object (unbounded checkerboard pattern) in training, removing any referential links. Infants subsequently failed to learn novel words in detail [$t(15)=-0.398$, $p=0.697$], confirming that infants’ understanding of noun-object links is key to enhancing subsequent word learning.

ID: 665 / PS-IV: 106

Poster

Topics: Attention, Concepts/Categories, Perception

Young children automatically access the real-world size of objects

Bria Long¹, Talia Konkle¹, Mariko Moher², George A. Alvarez¹, Susan Carey¹

¹Department of Psychology, Harvard University; ²Department of Psychology, Williams College; brialorelle@gmail.com

Knowledge about the real-world size of objects is automatically accessed when adults view pictures of objects. Here we probed preschoolers’ automatic access to the real world size of pictured objects using a Stroop task. Children (N=80) saw two pictures presented on an iPad and were asked to touch the picture that was smaller on the screen. Critically, the visual sizes of the pictures were either congruent with their real-world sizes (e.g., a big truck and a small apple) or incongruent with their real-world sizes (e.g., a big apple and a small truck). Children who performed the task in a speeded manner were faster and more accurate on congruent trials. As faster responders tended to be four-year-olds, we replicated these effects in an independent set of four-year-olds (N=29). Mature visual cognitive representations of real-world size appear to be in place by at least 4 years of age.

ID: 330 / PS-IV: 107

Poster

Topics: Social Learning

Keywords: Imitation, Individual Differences

Young children’s imitative behavior: Individual differences and developmental change

Yue Yu¹, Tamar Kushnir²

¹Psychology Department, Rutgers University; ²Cornell University; tk397@cornell.edu

In this study we employed a sequential design to explore how goal-directed and faithful imitation vary among individual children and change across the toddler years. Forty-eight 24- and 30-month-old children visited the lab three times, 6 months apart. During each visit children completed a series of imitation tasks and other social/cognitive measures. Parents reported on children’s developmental level (CDI), language skills (Macarthur CDI), and temperament (ECBQ/CBQ). We found consistent individual differences in goal-directed and faithful imitation across different types of imitation tasks. We also found significant increase in faithful imitation with age. In children’s first visit goal-directed imitation was correlated with developmental level, ToM, and sharing behavior. In children’s second visit faithful imitation was correlated with developmental level. These results suggest that imitation undergoes marked changes over the third year of life. They also point to specific developmental correlates that perhaps contribute to the capacity for social learning through imitation.

ID: 505 / PS-IV: 108

Poster

Topics: Culture, Language, Word Learning

Keywords: limited exposure, foreign word learning, comprehension, production

¿Se habla Español? Does once a week exposure suffice for foreign language learning in school-aged children?

Jasmin Perez¹, Marianella Casasola²

¹Barnard College, United States of America; ²Cornell University, United States of America; japerez@barnard.edu

We examined the foreign word learning of school-aged children ($N = 56$), kindergarten to fifth grade, with no regular, previous exposure to Spanish. Children participated in twelve, one-hour Spanish language lessons across the academic year. We tested children’s receptive and expressive Spanish vocabulary, both prior to the start of Spanish lessons and after the final Spanish lesson. Despite such limited exposure, children improved significantly in both their comprehension and production of Spanish when tested two weeks after the final Spanish lesson. Not surprisingly, children demonstrated stronger comprehension than production of Spanish and younger children (k-2nd grade) tended to show stronger gains in both comprehension and production than older children (3rd-5th grade). These results document that school-aged children can begin to build a receptive and productive vocabulary in a new language, even when exposure is limited to less than one hour, once a week.

ID: 322 / PS-IV: 109

Poster

Topics: Concepts/Categories, Moral Cognition, Social Cognition

Keywords: prosocial behavior

"But he didn't mean to do it": Preschoolers' defiance of unjustified punishments

Nadia Chernyak^{1,2}, David M. Sobel¹

¹Cognitive, Linguistic, & Psychological Sciences, Brown University; ²Harvard Graduate School of Education; chernyak@bu.edu

Preschoolers have a sophisticated understanding of reward and punishment. Here we investigated whether children spontaneously defy and correct unfair punishments. Across two experiments, 3- and 4-year-olds engaged in a block-tower building task with a puppet in order to receive a reward (four stickers to be shared between the puppet and the child). The puppet then either accidentally or intentionally knocked over the tower. In both cases, an adult, who did not observe the intentionality of the outcome, punished the puppet by giving all the stickers to the child. After hearing the puppet protest, children were more likely to correct the adult's punishment (i.e., share stickers with the puppet) when puppet's actions were accidental rather than intentional. Our results suggest that rather than passively accepting rewards and punishments imposed by authority figures, young children spontaneously correct situations they potentially believe are unfair.

ID: 640 / PS-IV: 110

Poster

Topics: Communication, Language, Memory

The Completeness and Accuracy of Children's Free Recall Memory Reports for Observed and Dyadic Conversations after a 1-Week or 3-Week Delay

Monica Lawson, Kamala London, Jessica Miller, Miranda Slates

University of Toledo; monica.rohrabaugh@rockets.utoledo.edu

In the present study, 90 8-year-old children listed to (observed) and engaged (dyadic) in two conversations of which their memory was assessed after a 1-week or 3-week delay. During memory testing, children were asked to recall the conversations exactly as they occurred. Two separate 2 (delay condition: 1-week, 3-weeks) by 2 (conversation type: observed, dyadic) mixed ANOVAs with repeated measures on the second factor were conducted to assess the completeness and accuracy of children's free recall reports. Regarding the completeness of reports, post hoc analysis following a significant interaction revealed that delay condition did not impact the completeness of reports after 1-week, but after 3-weeks, children reported significantly more from the dyadic conversation than the observed conversation. Regardless of delay condition, children were more accurate in their reports for the observed versus dyadic conversation. These findings suggest that delay and conversational context influences the completeness and accuracy of children's reports.

ID: 641 / PS-IV: 111

Poster

Topics: Communication, Language, Memory

Children's Recognition Memory for Utterances and Question-Answer Pairs from a Dyadic Conversation after a 1-Week or 3-Week Delay

Monica Lawson, Kamala London, Samantha Kuehn

University of Toledo; monica.rohrabaugh@rockets.utoledo.edu

Little is known about how children remember dyadic conversations. The present study examined 90 8-year-olds recognition memory for a dyadic conversation that occurred 1-week or 3-weeks prior. Children's recognition memory for child-utterances, adult-utterances, and question-answer pairs from the conversation was assessed with a 30 item (15 false) recognition test after a 1-week or 3-week delay. Overall, children in the 1-week delay condition significantly outperformed children in the 3-week delay condition ($M = 74.28\%$; $M = 68.08\%$ correct, respectively). A 2 (delay condition: 1-week, 3-weeks) by 3 (question type: child-utterances, adult-utterances, question-answer pairs) mixed-factorial ANOVA with repeated measures on the last factor revealed a significant interaction. Post hoc analyses showed that after 1-week, children performed significantly better on the child-utterance and adult-utterance items than children in the 3-week delay condition. However, regardless of delay condition, children performed at chance level on question-answer pairs items.

ID: 813 / PS-IV: 112

Poster

Topics: Attention

Attention Development in Toddlers: The Interactive Role of Parenting and Child Temperament

Loretta Cambron¹, John Bates²

¹Northwestern University, United States of America; ²Indiana University; lcambro@northwestern.edu

Recent studies suggest that an optimal level of parental responsiveness can lead to positive outcomes in children, such as increased attention ability. The goals of this study were to investigate the relationship between parenting behaviors and the development of attention, and test child temperament as a moderating factor because attention is thought to fall under the larger construct of temperament. We observed 112 children (54% males) at 30, 36, and 42 months of age. We gathered data from home observations, lab visits, and maternal self-reported questionnaires. Nurturing and guiding parenting behaviors influenced child attention, even after controlling for prior levels of attention. Five out of six child temperaments tested interacted with parenting behaviors to influence attention. These findings could be useful for parents and clinicians as they tailor behavioral strategies to a child's temperament to promote attention ability.

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Poster

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"I don't like snakes": Exploring parent-child conversations about threat-relevant animals in a zoo

Megan Geerdt¹, Vanessa LoBue²

¹University of North Carolina at Greensboro; ²Rutgers University - Newark; msgeerdt@uncg.edu

Extensive research has examined attentional biases for threat-relevant stimuli like snakes and spiders and theorized about how such biases might lead to the development fear/anxiety (LoBue, 2013). However, only one study has examined children's behavior towards real snakes and spiders, showing that children aged 18 to 36 months show little evidence of behavioral avoidance (LoBue et al., 2013). Further, no research has documented the daily experiences that might shape children's behavior towards threatening animals. In the current study, we explored parent-child conversations at a zoo about threatening (e.g. snakes) and non-threatening animals (e.g. frogs) in a reptile house. Both parents and 3 to 8-year-old children made more negative statements about threatening animals than non-threatening animals, and children made more negative than positive statements about threatening animals. Parents and children were just as likely to be initiators of negative conversations, while parents were more likely than children to initiate positive conversations.