COGNITIVE DEVELOPMENT SOCIETY
VIII BIENNIAL MEETING

October 18-19, 2013
Memphis, Tennessee

COGNITIVE DEVELOPMENT SOCIETY
VIII BIENNIAL MEETING
MEETING PROGRAM

Table of Contents

ACKNOWLEDGEMENTS 2

AWARDS 3

WORKSHOPS 3

MAPS 4

CONFERENCE SCHEDULE 6

POSTER SCHEDULE 9

PLENARY PROGRAM, SYMPOSIA AND ORAL PAPER SCHEDULE 21

PLENARY PROGRAM, SYMPOSIA, AND ORAL PAPER ABSTRACTS 27

POSTER ABSTRACTS 56

ACKNOWLEDGEMENTS

The EIGHTH BIENNIAL MEETING OF THE COGNITIVE DEVELOPMENT SOCIETY
would not have been possible without the support of:

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National Institutes of Health
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University of Virginia
Journal of Cognition and Development (Routledge, Taylor & Francis Group)
Oxford University Press

COGNITIVE DEVELOPMENT SOCIETY AWARDS

Book Awards

Trusting What You're Told: How Children Learn from Others, Paul Harris
Harvard University Press, 2012

Cultural Development of Mathematical Ideas: Papua New Guinea Studies, Geoffrey Saxe
Cambridge University Press, 2012

Journal of Cognition and Development "Editor's Choice" *Awards*

Parts and Relations in Young Children's Shape-Based Object Recognition
Elaine Augustine, Linda Smith, and Susan Jones
Journal of Cognition and Development, Volume 12, 2011

Why do Young Children Hide by Closing Their Eyes? Self-Visibility and the Developing Concept of Self
James Russell, Brioney Gee, and Christina Bullard
Journal of Cognition and Development, Volume 13, 2012

2013 CONFERENCE WORKSHOPS

Government Funding Opportunities

Friday, October 18, 11:45am-12:45pm

Led by experts in the field – Erin Higgins (Department of Education), Kathy Mann Koepke (NICHD and NIH), and Laura Namy (NSF) – this lunch workshop will highlight current federal training, career development, and research funding opportunities available to CDS investigators.

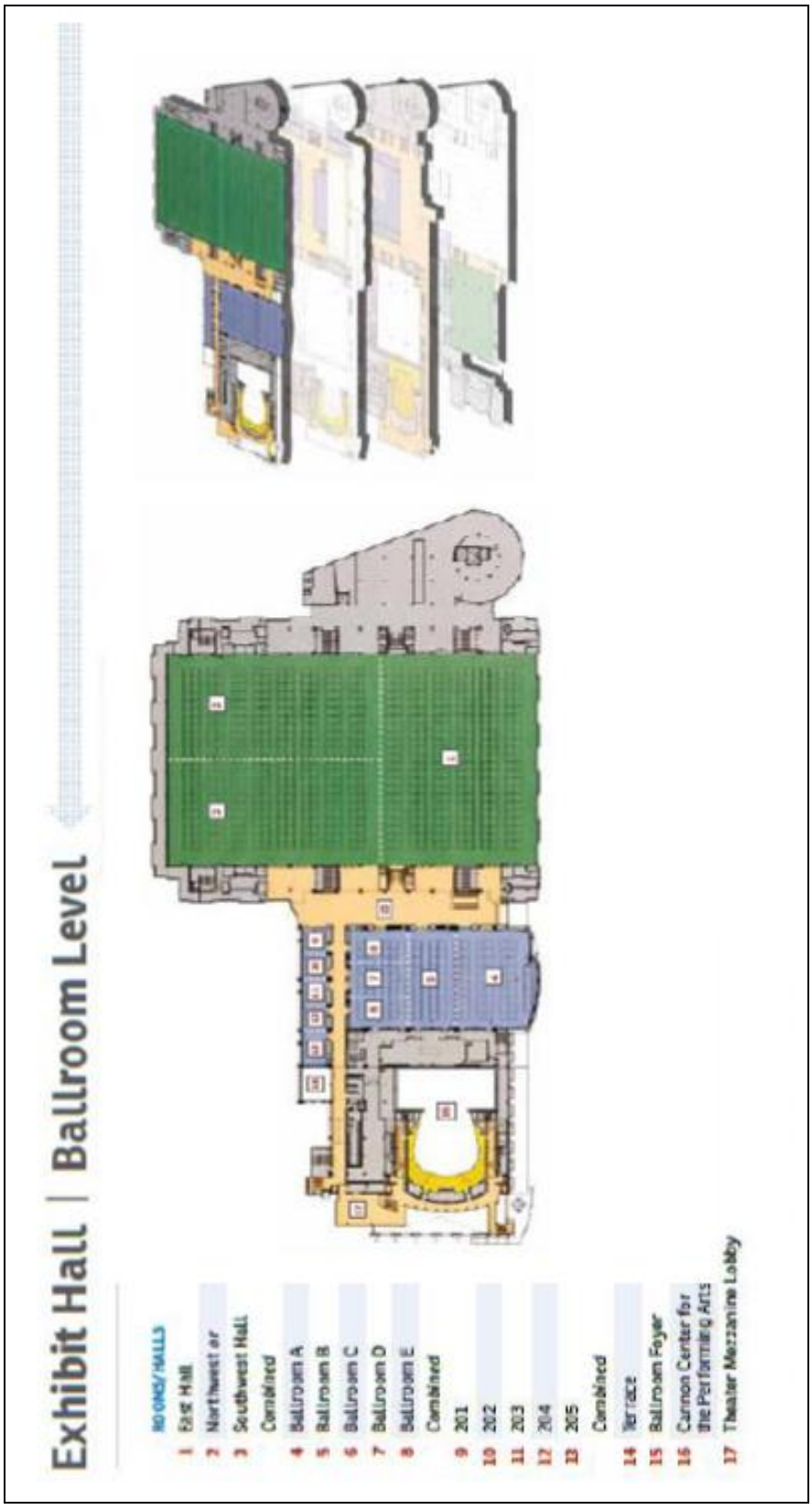
Burning Questions for the Professoriate

Saturday, October 19, 11:45am-12:45pm

This lunch workshop, sponsored by the American Psychological Association in conjunction with CDS, will provide an opportunity for students and postdoctoral fellows to network with new and established scientists, to ask their burning questions about the field, the job market, publishing, obtaining funding, and related topics.

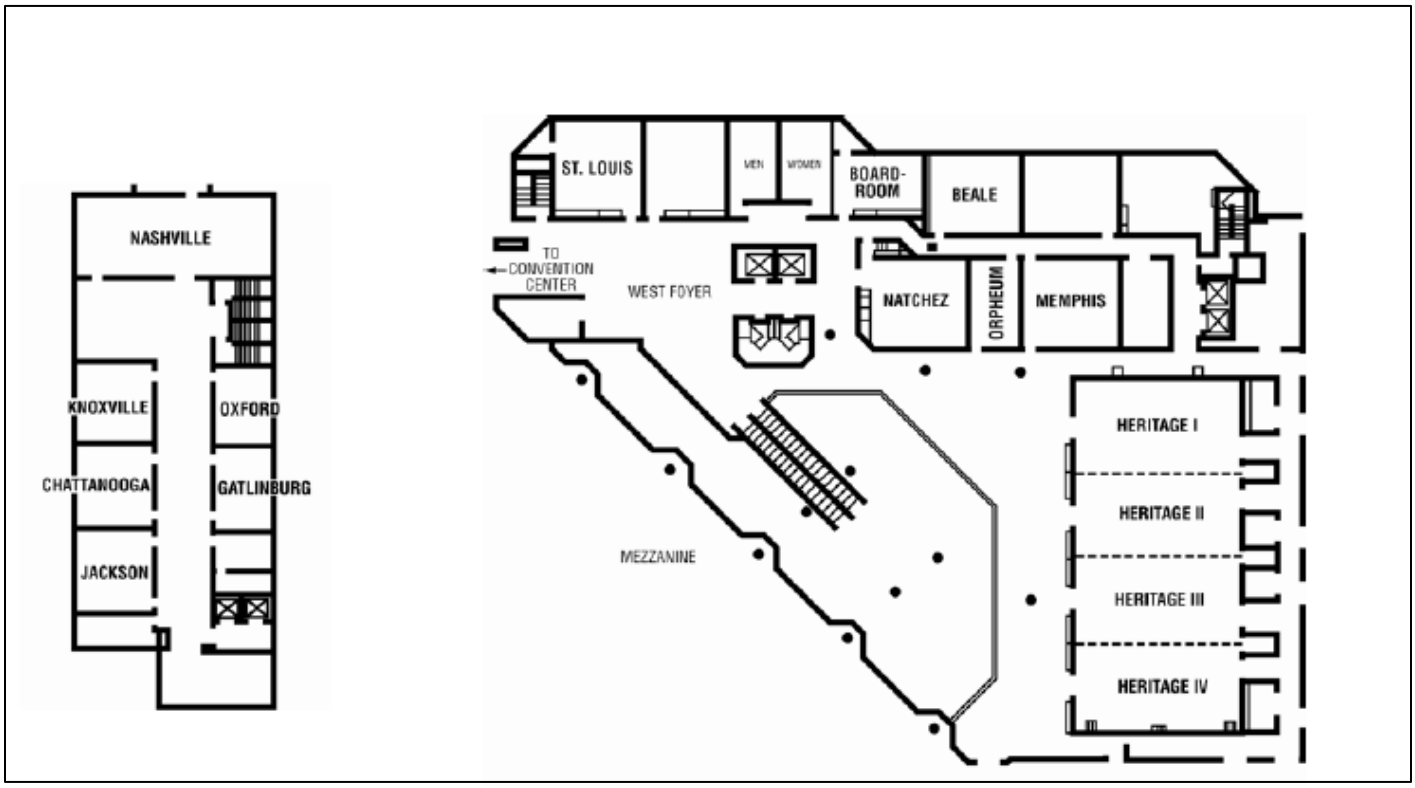
MAPS

MEMPHIS COOK CONVENTION CENTER



MEMPHIS COOK CONVENTION CENTER (CONT'D)

SHERATON MEMPHIS DOWNTOWN HOTEL



CONFERENCE SCHEDULE

All sessions to be held at Memphis Cook Convention Center (MCCC), Memphis, TN

THURSDAY, OCTOBER 17

8:30am– 6:00pm	Room 204/205 **PRECONFERENCE**: Computational Models of Cognitive Development
9:00am- 5:30pm	Room 202/203 **PRECONFERENCE**: Rethinking Cognitive Development & Autism
7:00 – 9:00pm	Sheraton Memphis Downtown Hotel, Heritage III & IV Welcome Reception/Registration

FRIDAY, OCTOBER 18

7:30	Registration and Continental Breakfast, Ballroom Foyer
8:00 - 8:30	Ballroom CDE Welcome: Judy DeLoache and Amanda Woodward Presentation of CDS Book and Journal Awards: Nora Newcombe and Laura Namy Introduction of plenary speaker: Vikram Jaswal
8:30 - 9:30	Ballroom CDE **PLENARY TALK** - *What's social about social cognition: The case of imitation and autism* Morton Gernsbacher (University of Wisconsin)
	Coffee break, Ballroom Foyer
10:00 – 11:45	Ballroom CDE **PLENARY SYMPOSIUM –** *Science at an exhibition: What we learn from studying children in museums* (Organizer: Amanda Woodward) Maureen Callanan, Michael Frank, Marjorie Rhodes, and Laura Schulz
11:45 – 12:45	Room 204/205 **WORKSHOP** - *Government Funding Opportunities* (registration required) or lunch on your own
12:45– 2:00	Steamboat **POSTER SESSION I**
2:00 – 3:45	**CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS** Room 204/205: *Concrete symbols and instructions: Do they facilitate or hinder learning?* Jennifer A. Kaminski, Katherine H. Herold (organizer), Lori A. Petersen, and David Uttal Ballroom C: *Development of visual attention: Implications across contexts and populations* C. Shawn Green, Heather Kirkorian, Anna Remington, Shannon Ross-Sheehy, and Vanessa Simmering (organizer) Ballroom D: *New approaches to studying executive functions* Dima Amso, Christopher Erb (organizer), Anna Fisher, and Yuko Munakata Ballroom E: *Oral Paper Session - Language Development* (Chair: Sandra Waxman) Angela F. Lukowski, Danielle Perszyk, Valerie San Juan, Catarina Vales, and Katie Wagner
4:00- 5:45	**CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS** Room 204/205: *Going beyond words: Children's use of pragmatic cues in evaluating communication* Caitlin Cole, Patricia Ganea, Susan Graham, and Alia Martin (organizer) Ballroom C: *Early non-verbal numerical intuitions and mathematics development: Establishing causality through experimental training studies* Justin Halberda, Daniel C. Hyde (organizer), Joonkoo Park, and Jessica M. Tsang Ballroom D: *New perspectives on social event memory in young children* Dare Baldwin, Lauren Howard (organizer), Vikram Jaswal, and Jeff Loucks Ballroom E: *Oral Paper Session - Infant Learning and Development* (Chair: Cathy Sandhofer) Ty W. Boyer, Krisztina V. Jakobsen, Swapnaa Jayaraman, Lauren Krogh, and Michaela Upshaw
	Coffee break, Ballroom Foyer
5:45- 7:00	Steamboat **POSTER SESSION II**

SATURDAY, OCTOBER 19

7:30	Registration and Continental Breakfast, Ballroom Foyer
8:15 - 8:30	Ballroom CDE Introduction of plenary speaker: Judy DeLoache
8:30 - 9:30	Ballroom CDE **PLENARY TALK** – *Early sociomoral reasoning* Renee Baillargeon (University of Illinois, Champaign-Urbana)
	Coffee break, Ballroom Foyer
10:00– 11:45	Ballroom CDE **PLENARY SYMPOSIUM** – *Thinking, talking, and doing-or NOT: Relations among thought, language, and action* (Organizer: Judy DeLoache) Karen Adolph, Nathan Fox, and Yuko Munakata
11:45– 12:45	Room 202/203 **WORKSHOP:** *Burning Questions of the Professoriate* (registration required) or lunch on your own
12:45– 2:00	Steamboat **POSTER SESSION III**
2:00 – 3:45	**CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS** Room 204/205: *Developmental origins of the moral sense* J. Kiley Hamlin, Joshua Rottman (organizer), Luca Surian, and Jennifer Cole Wright Ballroom C: *How words become labels: statistical, perceptual, and social contexts for language learning and use* Lucy C. Erickson (organizer), Christopher T. Fennell, Sumarga H. Suanda, and Daniel Yurovsky Ballroom D: *The role of pedagogy in learning from exploration* Audrey K. Kittredge (organizer), David H. Uttal, Tessa J. P. van Schijndel, and Andrew Young Ballroom E: *Oral Paper Session - Conceptual Development* (Chair: Douglas Frye) Sabine Doebel, Jeein Jeong, John E. Opfer, Romina A. Vivaldi, and Lu Wang
	Coffee break, Ballroom Foyer
4:00- 5:45	**CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS** Room 204/205: *Development of abstract reasoning about relational concepts* Yin-Juei Chang, Jean-Rémy Hochmann, Tomer Ullman, and Caren M. Walker (organizer) Ballroom C: *Young defenders of the status quo: Children's tendency to see their social systems as natural and legitimate* Rebecca S. Bigler, Andrei Cimpian (Organizer), Yarrow Dunham, Larisa Hussak, and Marco F. H. Schmidt Ballroom D: *Children's belief in the unseen and counterintuitive: Highlighting the roles of mental representation and cultural input* Jonathan D. Lane (organizer), Paul L. Harris, Andrew Shtulman, and Jacqueline D. Woolley Ballroom E: *Oral Paper Session - Basic processes: Learning, memory, and executive function* (Chair: Vladimir Sloutsky) Aaron Buss, Kevin Darby, Karin James, Marina Larkina, and Mary Stone
5:45- 7:00	Steamboat **POSTER SESSION IV**

POSTER SCHEDULE

POSTER SESSION I: FRIDAY, OCTOBER 18, 12:45 – 2:00 PM

1. A young child's referential associations between quantities and number words and numerals. *Ursula S Anderson & Sara Cordes*
2. Selective attention in young infants: Gaze shifts and stimulus attention-getting features. *Donna Fisher-Thompson, Ashlyn Boniszewski, Sarah Tassini, Frances Novak, & Bethany Legget*
3. Do children rely on a non-epistemic mechanism to enrich their epistemic status? *Igor Bascandziev & Paul Harris*
4. Recoding and decoding in toddler working memory. *Melissa M. Kibbe & Lisa Feigenson*
5. Judgments of persistence through change for artifacts: Does mode of reference matter? *Kristan A. Marchak & D. Geoffrey Hall*
6. Moral identity is related to self-perceived and teacher-rated behavioral conduct in 3rd-7th grade children. *Elizabeth A. Boerger, April Burns, Karisa Mauthe, & Sarah Falkowit*
7. Acute effects of physically active versus inactive video game play on children's executive functioning. *Rachel M. Flynn,*
   Rebekah A. Richert, Amanda E. Staian, Ellen Wartella, and Sandra L. Calvert
8. Effects of choice and strategy use on task switching in children and adults. *Allison O'Leary & Vladimir Sloutsky*
9. Children's perceptions of prosocial teasing. *Melissa Krushel & Melanie Glenwright*
10. Parent-toddler interactions during motor play: Implications for developing verb comprehension. *Ruth Tincoff, Amanda Slaboden, & Samantha Schindelheim*
11. Children's understanding of villains and evil. *Craig E. Smith, Felix Warneken, Susan Gelman, & Henry Wellman*
12. Two-year-olds' understanding of self-symbols. *Kate Herold & Nameera Akhtar*
13. The impact of wealth on sharing preferences in children. *J. Miller, B. Schilder, L. Peizer, & F. Subiaul*
14. Uncovering the extent of young adults' social essentialism. *R. Cole Eidson & John D. Coley*
15. Individual differences in children's ability to successfully gather information from others to solve problems. *Candice Mills, Asheley Landrum, Rachel Williams, & Amelia Pflaum*
16. Young children's transfer of fantastical and realistic problem solutions from television characters. *Molly Schlesinger*
17. Gestures provide more than a helping hand: Gestures' impact on learning. *Theodora Koumoutsakis, Adam Kaltenhauser, Alejandro Silva, Amanda Brown, R. B. Church, & S. Ayman-Nolley*
18. The development of domain-specific beliefs about the homogeneity of animal, artifact, and social categories. *Amanda C. Brandone & Laura E. Spearot*
19. Learning begets learning: Infants use native language statistics to segment and learn words. *Katharine Graf Estes*
20. Children's memory for culturally relevant similarity across individuals. *Kathleen R. Sullivan & Katherine D. Kinzler*
21. Double dissociation: Integrating color/shape aids conditional discrimination but separating them aids card sorting in 3½-yr-olds. *Daphne Ling, Cole Wong, & Adele Diamond*
22. Maternal interaction strategies for preschool categorization performance. *Valarie M. Schroeder & Yvette R. Harris*
23. Specifying the effects of causal information on early word learning. *Amy E. Booth & Aubry Alvarez*
24. 3-month-old infants exhibit sensitivity to action efficiency following active experience. *Amy Skerry, Susan Carey, & Elizabeth Spelke*
25. Complement syntax, mental verbs, and theory of mind in children who are deaf. *Holly B. Keddington & Steve Ball*
26. The development of a collective bias in sentence interpretation in preschoolers. *Julie M. Hupp & Nikole D. Patson*
27. Longitudinal predictors of success in mathematics: Understanding the role of spatial memory, sustained attention, and inhibitory control. *Alycia M. Hund & Rachelle Cantin*
28. Sticking to the evidence? A behavioral and computational case study of micro-theory change in the domain of magnetism. *Elizabeth Bonawitz, Tomer Ullman, Sophie Bridgers, Alison Gopnik, & Josh Tenenbaum*
29. Toddlers' interactive behavior during video-chat predicts learning. *Renee E. Gallo & Lauren J. Myers*
30. Preschool children's reports of frequency and temporal information for experienced events. *Laura Melnyk & Becky Earhart*
31. Practice with quantities promotes transfer in arithmetic problems. *Rebecca Boncoddo, Jordan T. Thevenow-Harrison, Martha W. Alibali, Timothy T. Rogers, & Charles W. Kalish*
32. Searching for a bilingual advantage in executive function: A latent variable approach. *Seamus Donnelly, Katie Pace-Miles, Rosario Maita, & Bruce Hom*

33. Preschoolers' use of past accuracy when learning objective and subjective information. *Patricia E. Brosseau-Liard, Grace Qiao, & Susan A. J. Birch*
34. A longitudinal fMRI study examining theory of mind development. *Hilary Richardson, Hyowon Gweon, & Rebecca Saxe*
35. Effects of developments in abstract thinking, world knowledge, language & metamemory on category development in 3 - 8 year olds. *Nora Isacoff & Karin Stromswold*
36. From smiles to noncompliance: Exploring children's behavior in helping situations. *Priscilla Sung*
37. Ho! Ho! Who? Children's understanding of "real live" Santa Clauses. *Thalia R. Goldstein & Jacqueline Woolley*
38. Culture of honor in media and development. *Jennifer L. Barnes & Ryan Brown*
40. Enumeration of small versus large numbers of items under high working-memory load. *Chin-Yuan Chang & Wen-Chi Chiang*
41. Multimodal input in joint book-reading activities facilitates early word learning. *Kelsey R. Lucca, Vrinda Kalia, & Makeba Parramore Wilbourn*
42. The effects of mindfulness training during adolescence. *Kristen Lyons, Jillian L. Sterns, & Iroise Dumontheil*
43. Eight-month-old infants can integrate physical constraints in probabilistic inference. *Stephanie Denison & Fei Xu*
44. The effect of labels on haptic memory in children. *Shealan McAlister, Amy Felix, Keeth Needham, Bob Frank, & Heidi Kloos*
45. Motor-spatial development in preschoolers: Learning goal directed actions and gestures from video. *Laura Zimmermann, Natalie Brito, Chagai Mendelson, Rachel Barr, Elizabeth Renner, Brian Schilder, & Francys Subiaul*
46. Investigating relationships between executive functions and conceptual change processes. *Dimitris Pnevmatikos, Giorgos Kyrianakis, Stella Vosniadou, Kalliopi Eikospentaki, & Nikos Makris*
47. Strategic memory monitoring: The role of confidence in help seeking. *Shaina F. Rowell & Vikram K. Jaswal*
48. Beyond instruction: Sources of conceptual knowledge and new strategies in mathematics. *Pooja G. Sidney, Sarah A. Brown, Noelle M. Crooks, & Martha W. Alibali*
49. The role of outcome in reasoning about food allergy. *Steve Croker, Kailyn Russell, & Rebecca Knibb*
50. Paternalism in children: Overriding desires to better help others? *Kelsey Lin, Alia Martin, & Kristina R. Olson*
51. Experimentally induced involuntary memories in young children. *Osman Skjold Kingo, Jonna Jelbak Dahl, Dorthe Berntsen, & Peter Krøjgaard*
52. Competing cues and the development of landmark use. *Amy E. Learmonth, Nicole Caltabellotta, Alejandra Jimenez, & Derek Voyticki*
53. A coat of needles would be fine, if I could be a...porcupine: Pausing and rhyme in word learning and retention. *Megan Macauley and Kirsten Read*
54. Preference for positive evaluations about competence: Children disregard expertise and consensus information. *Chelsea Hughes*
55. Constructing explanations leads children to privilege inductively rich properties. *Caren M. Walker, Tania Lombrozo, Cristine Legare, & Alison Gopnik*
56. Examining consistency of young children's exploratory behavior. *Jamie Jirout*
57. Source constrained retrieval in children and young adults. *Vanessa Carlos, Ezekiel Rodriguez, Thomas C. Lorsbach, & Jason F. Reimer*
58. When less is more and more is even worse: Magnitude influences preschoolers' performance on a reverse reward task. *Emily J. Ostergaard*
59. Inconsistent and ambiguous evidence inform hypothesis-testing behavior in young children. *Justin T.A. Busch & Cristine H. Legare*
60. Repetition effects on passive priming in English language learners. *Sahar Lewis, Perla Gamez, & Priya Shimpi*
61. Selective social learning of plant edibility in human infants. *Annie E. Wertz & Karen Wynn*
62. Examining recall memory in young adults: The importance of habitual sleep quality. *Helen M. Milojevich & Angela F. Lukowski*
63. 5- to 9-year old children take longer to correctly attribute belief based emotions than emotions not based on a false belief. *Samuel Ronfard & Paul Harris*
64. Ignoring the point: Preschoolers prefer to learn from speakers over pointers. *Carolyn M. Palmquist*
65. Thee, uhh, role of discourse status and object novelty in three-year-olds' understanding of disfluent utterances. *Sarah J. Owens & Susan A. Graham*
66. Blick-what? Searching for a label broadens children's inductive inferences. *Florencia K. Anggoro, Lauren M. Bellerose, Melanie R. Forte, & Kerry L. Simo*

67. The effects of small and large number talk on children's number knowledge. *Dominic Gibson, Elizabeth Gunderson, & Susan Levine*
68. Preschoolers consider ownership when predicting emotions. *Madison Pesowski & Ori Friedman*
69. I see what you're thinking': Examining how picture books can promote false-belief understanding in preschool children. *Valerie San Juan & Yasmine Ghobrial*
70. IDAQ-child form: Validation of a new measure of individual differences in anthropomorphism in children. *Rachel L. Severson & Kristi M. Lemm*
71. Is a tippu a teppu? Generalizing talker-specific accents during word learning. *Drew Weatherhead & Katherine White*
72. Children's reasoning about the capacities of plants, animals, humanoids, and spirits: A cross-cultural investigation. *Natalie A. Emmons, Yvan I. Russell, David F. Bjorklund, Florian Kiessling, Harvey Whitehouse, & Fernand Gobet*
73. The effects of perspective and math level on developmental math students' conceptual understanding of mathematics. *Eric Amsel*
74. The impact of emotional information on executive function in children and adults. *Hannah J. Kramer, K.H. Lagattuta, & L. Sayfan*
75. Temporal motor dynamics in inductive reasoning in typically developing children and children with Autism Spectrum Disorder. *Corinne Zimmerman, Steve Croker, Daisy Bueno, & Olivia Kirk*
76. Infants chunk objects using ownership cues. *Aimee Stahl & Lisa Feigenson*
77. Infant-directed speech as statistically optimal input. *Baxter S. Eaves Jr, Naomi H. Feldman, Thomas L. Griffiths, & Patrick Shafto*
78. Creature feature: Learning about novel animals based on verbal descriptions.*Maria Osina, Tiffany Tassin, Megan Saylor, & Patricia Ganea*
79. Using action and gesture to improve mental rotation. *Miriam Novack, Neon Brooks, Deanne Kennedy, Susan Levine, & Susan Goldin-Meadow*
80. The relation between theory of mind and empathy in preschool: The case of fantasy orientation. *Melissa McInnis, Jillian Pierucci, & Ansley Tullos Gilpin*
81. The relationship between parents' concepts of lying and children's theory of mind. *Carolyn A. Schult*
82. Location is the key: The relationship between location and narrative coherence in early memories. *Maria S. Jones, Marina Larkina, & Patricia J. Bauer*
83. Small children's verbal and nonverbal long-term memory for short movies. *Osman S. Kingo & Peter Krøjgaard*
84. Effects of training on category learning: Developmental differences between adults and children. *Wei Deng*
85. Culture and the development of social essentialism: How children reason about religious categories. *Lisa Chalik, Marjorie Rhodes, & Sarah-Jane Leslie*
86. Preschoolers' trait attributions: The roles of theory of mind and behavioral and affective cues. *Nicole R. Guajardo, Alexis Pham, Lauren Royster, Kylie Woodrum, & Renee Roccato*
87. Pre-kindergarteners' numeracy and spatial development: The influence of educators' language. *Rosalie Odean, Carla Abad, Amanda Costales, Natalie Herradon, Sandra Ferret, & Shannon M. Pruden*
88. Eye-tracking your attention: The development of emotional memory and encoding processes. *Anne Hermes, Aoxiang Xu, & Patricia Bauer*
89. A longitudinal study of life story development from age 9 to age 12. *Annette Bohn & Dorthe Berntsen*
90. The good intention prior and its role in the doctrine of double effect. *Sydney Levine & Alan Leslie*

POSTER SESSION II: FRIDAY, OCTOBER 18, 5:45 – 7:00 PM

1. Gesture is in the mind, not in the hands: How gesture influences children's mental abacus performance. *Neon Brooks, David Barner, Michael Frank, & Susan Goldin-Meadow*
2. Developing expectations of the boundaries of expertise. *Asheley R. Landruz & Candice M. Mills*
3. The development of the distinction between regret, disappointment, and sadness. *Eric Amsel*
4. The effects of parent speech on children's language development. *Amanda Gunn & Helen Neville*
5. Preschoolers infer their own prosociality through statistical reasoning. *Nadia Chernyak, Bertilia Trieu, & Tamar Kushnir*
6. Comparing early measures of child gesture and joint attention in relation to later language development. *Virginia C. Salo, Meredith L. Rowe, & Bethany C. Reeb-Sutherland*
7. A lifetime of separate selves: Children's intuitions about personal identity. *Christina Starmans & Paul Bloom*

8. Importance of executive function for learning about patterns. *Michael R. Miller, Bethany Rittle-Johnson, Abbey M. Loehr, & Emily R. Fyfe*
9. A place for location in children's memory for personally experienced events. *Rebekah Stewart, Elizabeth White, & Patricia Bauer*
10. Imitation of weight categorization by 36-month-olds. *Zhidan Wang, Andrew N. Meltzoff, & Rebecca A. Williamson*
11. Children's knowledge and avoidance of contagious illness. *Katy-Ann Blacker, Kaleigh Matthews, & Vanessa LoBue*
12. Stay with the group: Ostracism increases imitative fidelity of in-group members. *Rachel E. Watson-Jones, Cristine H. Legare, & Harvey Whitehouse*
13. Differences in young children's ability to categorize relational, social, and non-social categories. *Kathleen Saigh & Caroline Raffa*
14. Children's beliefs about the value of idea content. *Helana Girgis and Doug Behrend*
15. Children's use of cross-situational information to learn new verbs in English, Korean and Chinese. *Jane B. Childers, Jae H. Paik, Alexandra Nancarrow, & Julia Chavez*
16. The role of explanation in children's theory change: Do 6- to 8-year-olds update beliefs about balance? *Brian J. Edwards, Caren M. Walker, Elizabeth Bonawitz, Tania Lombrozo, & Alison Gopnik*
17. Preschoolers' use of truth-value and benevolence in evaluating statements and speakers. *Caitlin A. Cole & Mellisa A. Koenig*
18. Individual differences in verbal updating among 2-year-old children. *Begum Ozdemir, Heather Gallant, & Patricia Ganea*
19. Twelve-month-old infants infer intentional agents from the perception of auditory regularity. *Lili Ma, Vincent Berthiaume, Justine Hoch, & Fei Xu*
20. Mother-child conversations about safety: Implications for children's causal understanding. *Elizabeth E. O'Neal, Megan Mathews, Calvin Bryant, & Jodie M. Plumert*
21. Charity begins and ends at home: Developmental changes in ingroup favoritism in infancy. *Stephanie M. Sloane & Renée Baillargeon*
22. The cognitive underpinnings of the is-ought problem. *Christina Tworek & Andrei Cimpian*
23. Culture's influence on parental health beliefs: An exploration of behavioral endorsements. *Iseli G. Hernandez, Matthew J. Jiang, Xinya Chuong, Jason A. French, Isabel T. Gutierrez, & Karl S. Rosengren*
24. Effects of self-interest cues on children's trust and trustworthiness. *Bolivar Reyes-Jaquez & Catharine H. Echols*
25. Stuff counts: Preschoolers' use of containers in quantification. *Jingjing Wang, Sunny Zuona, Peggy Li, & Susan Carey*
26. Preschooler's ability to construct future episodes. *Janani Prabhakar & Judith A. Hudson*
27. Young children's ability to determine potential tool function through haptic exploration. *Hilary Kalagher*
28. Statistical learning of action sequences in adults and infants. *Claire Monroy, Sarah Gerson, Harold Bekkering, & Sabine Hunnius*
29. Infants' quantification of collections in an ordinal choice task: Does containment matter? *Rebecca D. Rosenberg*
30. Information sampling in children's relational thinking: Effects of comparison and labeling. *Paulo Carvalho, Catarina Vales, Caitlin M. Fausey, & Linda B. Smith*
31. An integrated rational number system and its relationship to Algebra ability. *Michelle Hurst & Sara Cordes*
32. Shared and separable representations of magnitude in 5-year-old children. *Ariel Starr & Elizabeth M. Brannon*
33. The effect of race familiarity on infants' visual attention: A visual search task. *Mee-Kyoung Kwon, Mielle Setoodehnia, & Lisa Oakes*
34. Understanding SES differences in preschool children's syntactic development: The role of vocabulary and processing efficiency. *Kathryn A Leech, Meredith L Rowe, & Yi Ting Huang*
35. Patterning in preschool: Cognitive predictors of patterning knowledge and intervention efficacy. *Melissa Collins & Elida Laski*
36. Infants selectively attend to singers of familiar lullabies. *Samuel A. Mehr & Elizabeth S. Spelke*
38. Effects of asymmetry, boundary, and depth cues on children's reorientation. *Anna Shusterman*
39. Pick on someone your own size: The detection of threatening facial expressions posed by both child and adult models. *Kaleigh Matthews, Katy-Ann Blacker, & Vanessa LoBue*
40. Inhibitory control during visual relational processing in young women. *Elise P. Gagnon, Valerie Flores, Sarah Zaza, Callie Short, Laura Stockdale, & Robert G. Morrison*
41. Executive function and sustained attention as joint or differential predictors of academic achievement in 1st and 3rd graders? *Sarah Loher & Claudia M. Roebers*
42. Toddlers expect individuals from novel social groups to prefer and align with ingroup members. *Lin Bian & Renee Baillargeon*

44. The effects of language, executive functions and bilingualism on young children's symbolic understanding. *Bruce D. Homer, Yolanta Kornak, Seamus Donnelly, Katherine Pace, & Elizabeth O. Hayward*
45. Inhaled oxytocin increases affiliative interactions in newborn macaques reared under early social adversity. *Elizabeth A. Simpson, Valentina Sclafani, Annika Paukner, Stephen J. Suomi, & Pier F. Ferrari*
46. Children's STEM learning and transfer in a children's museum exhibit. *Erin A. Jant, Maria Marcus, Philip Hoffman, Tayler Grashel, Catherine A. Haden, & David H. Uttal*
47. Children's mental representations of negative numbers. *Caitlin C. Brez & Angela D. Miller*
48. Weird babies: A preliminary analysis of race, ethnicity, and SES differences in infant cognition. *Emily Hollenbeck, David Miller, & Susan Hespos*
49. Infants' quantity discrimination of non-solid substances. *Yin-Juei Chang, Susan J. Hespos, & Lance J. Rips*
50. Cross-cultural differences in perception and memory. *Yoonkyung Jeong & Mee-Kyoung Kwon*
51. Examining associations between sleep quality and autobiographical memory in young adults. *Valentina Valentovich, Jennifer G. Bohanek, & Angela F. Lukowski*
52. Children's and adults' differing evaluations of religiously- and secularly-motivated behaviors. *Larisa Heiphetz, Elizabeth S. Spelke, Liane Young, & Mahzarin R. Banaji*
53. Comparison and children's extension of familiar categories and properties. *Samuel B. Hunley & Laura Namy*
54. Relations between intuitive biology and evolutionary understanding in middle school. *John D. Coley*
55. Embodied learning of children's religious concepts. *Nicholas J Shaman*
56. Understanding temperament in middle childhood. *Alycia M. Hund, Heather Lacey, & Rachelle Cantin*
57. Children's understanding of real and cartoon pictures: An eye-tracking study. *Louise Bunce, Gert Westermann, & Julia Birchenough*
58. Dynamic neural fields models of infant theory of mind. *Caitlin M. Hudac*
59. Dependence is not just immaturity: Unpacking the utility of relying on others. *Elaine S. Barry*
60. Young children's ability to tailor their teaching to a learner's mistake. *Samuel Ronfard & Kathleen H. Corriveau*
61. Speech and gesture in children who do and do not stutter. *Laiah Factor, Lisa Gershkoff-Stowe & Dr. Julie Anderson*
62. A place for everything and everything in its place: The role of executive function in children's organizational strategy use. *Naomi Chatley, Stuart Marcovitch, & Stephanie E. Miller*
63. Children and adults' understanding of informants' relative accuracy. *Rebecca A. Williamson, Bethany J. MacDonald, Melissa L. Hrabic, & Rebecca A. Williamson*
64. Infants give to larger social sets: Decision rules are yoked to the psychophysics of larger social sets early in development. *David Pietraszewski & Karen Wynn*
65. Selective attention moderates 4-month-olds' category learning. *Julie Markant & Dima Amso*
66. The influence of physical manipulation experience on children's word learning. *Michele Wellsby & Penny M. Pexman*
67. How do learning styles develop? An experimental investigation of learning styles, feedback, and cognitive task performance. *Sarah L. Bunnell & Ethan Hovest*
68. Thyme to touch: 8- to 18-month-old infants show a reluctance to touch plants. *Annie E. Wertz*
69. The development of a concept of omniscience among Muslim children and adults. *Selin Gulgoz, Jonathan D. Lane, Henry M. Wellman, E. Margaret Evans, & Francine L. Dolins*
70. The effect of task-irrelevant variability on visual search in infancy. *Heidi A. Baumgartner & Lisa Oakes*
71. The effects of child- and adult-directed distractors on preschoolers' distractibility, inattention, and recall. *Kathryn O'Toole & Kathleen Kannass*
72. Executive function and the asymmetry between children's language production and comprehension. *Malathi Thothathiri & Whitley Lucio*
73. Teaching developmental psychology and research methods through museum exhibit design. *Kyle E. Chambers*
74. Short-term impact of television on preschool children's executive functions: A fNIRS study. *Hui Li, Angeline S. LIllard, Zongkui Zhou, & Fuxing Wang*
75. Neural correlates of memory in early childhood. *Alison Robey, Sarah Blankenship, Lauren Weiss, Leslie Rollins, & Tracy Riggins*
76. Developing notions of causal explanatory relevance. *Angie Johnston, Mariel Goddu, & Frank Keil*
77. 13-month-olds map novel labels to event categories. *Audrey K. Kittredge, Renée Baillargeon, & Cynthia Fisher*
78. Infants' early understanding of coincidences. *Zi L. Sim, Fei Xu, & Thomas L. Griffiths*
79. Object imitation in toddlers with and without autism. *Anna Gonsiorowski*

80. Children's and adults' understanding of prayer as a form of communication. *Jonathan D. Lane, Henry M. Wellman, E. Margaret Evans, Francine L. Dolins, Daniel Blumer, Amanda Cooper, Nouhad Alame, Alysia Haddix, & Mallory Stankovich*
81. Shifting the spatial representation of number across development. *Emily DeFouw*
82. The visual/analytic shift in the development of geometrical knowledge. *Smaragda Kazi, Stella Vosniadou, Giorgos Kospentaris, Nikos Giallousis, & Emiliana Thanou*
83. The effects of daily animal exposure on children's biological concepts. *Megan Geerdts & Gretchen Van de Walle*
84. Three-year-olds express tension and suspense when observing the actions of a misinformed agent. *Henrike Moll, Luke McGowan, & Sarah Thompson Kane*
85. Malleability of children's language-based preferences. *Hyesung Grace Hwang, Jeremy Winer, & Lori Markson*
86. The effect of infant perceptual skills and maternal input on 2-year-old vocabulary outcomes. *Rochelle Newman, Nan Bernstein Ratner, Meredith Rowe, & Cathy Eaton*
87. Changes in preschool children's reporting of temporal information. *Laura Melnyk & Wendy den Dunnen*

POSTER SESSION III: SATURDAY, OCTOBER 19, 12:45 – 2:00 PM

1. Children's snapshot perceptions of social status. *Elizabeth Brey*
2. Mapping the role of representations in spatial game play. *Jamie Jirout & Nora Newcombe*
3. Preschoolers track multiple minds. *M. Cheng & Alan Leslie*
4. Physical activity and familial influences on higher order cognitive processes. *Valarie M. Schroeder & Yvette R. Harris*
5. Does the relationship between spatial language and spatial cognition vary across different types of spatial words and spatial skills. *Marianella Cassasola*
6. Preschoolers use of rhyming features to learn the names of novel creatures: Rhyme, pausing and prediction in vocabulary acquisition. *Kirsten Read*
7. The pre-kindergarten numeracy and spatial environment survey: Examining early education settings for numeracy and spatial tools. *Shwetha Srikanth, Sandy Gonzalez, Amanda Costales, Natalie Herradon, & Shannon M. Pruden*
8. Changes in children's thinking on a number-line estimation task. *Carley Piatt*
9. Examining parental role in children's concepts of choice. *Shelby Distenfeld, Nadia Chernyak, & Tamar Kushnir*
10. These pretzels are going to make me thirsty tomorrow: Differential developmental trajectories of episodic future thinking tasks. *Caitlin Mahy, Julia Grass, Sarah Schwantes, & Matthias Kliegel*
11. Space and math: Early emergence of a relation between abilities. *Yi Ling Cheng, Kelly S. Mix, Susan C. Levine, Talia Berkowitz, Chris Young, & Raedy Ping*
12. Varied theory of mind measures do not form a unitary construct in early childhood or adulthood. *Katherine Rice & Elizabeth Redcay*
13. Development in the ability to learning perceptual causality. *Hyungwook Yim & Vladimir M. Sloutsky*
14. Ensemble representations of size and orientation in infancy. *Arin Tuerk*
15. Do children learn what they are taught or what they see? *Jordan Thevenow-Harrison, Charles Kalish, & Andrew Young*
16. Children and choice: How choosing among options affects preschoolers' satisfaction. *Amanda Skoranski and Lisa Feigenson*
17. Behavioral variability and vocalizations in tasks of inhibition in early childhood. *Christina Kirkman, & Sarah E. Berger*
18. Representation of numbers and objects in visual long-term memory. *Saebyul Lee & Vladimir Sloutsky*
19. Children's reasoning of numerosity changes reflects abstract knowledge of number. *Pierina Cheung & Mathieu Le Corre*
20. Factors that affect the development of the numerical middle concept. *Chi-Ngai Cheung & Stella Lourenco*
21. How do children learn best? Connecting parent beliefs with teaching strategies and children's learning. *Ashley M. Morris & Brandy N. Frazier*
22. Stop! But how? Multiple inhibitory processes in 5- and 6-year-olds. *Christopher H. Chatham, Katharine A. Blackwell, Melody Wiseheart, & Yuko Munakata*
24. An evaluation of social and individual influences on early math achievement. *Emily Slusser, Andrew Ribner, & Anna Shusterman*
25. Children show heightened memory for situations involving physical over psychological harm. *Robyn L. Kondrad*
26. Levels of perspective taking in a non-human primate. *Alia Martin & Laurie R. Santos*
27. Perception and inference as sources of knowledge in oneself and others. *Ercenur Unal & Anna Papafragou*

28. The origins of psychological essentialism: The case for the inherence heuristic. *Shelbie L. Sutherland & Andrei Cimpian*
29. Imagined spaces: 7-year-olds' ability to construct spatial representations from narrative and non-narrative passages. *Angela Nyhout & Daniela K O'Neill*
30. Daisy drawing in children with perinatal stroke. *Danah J. Alquraish, Angela O. Ballantyne, & Doris A. Trauner*
31. Fitting objects with and without handles. *Wendy P. Jung, Bjorn Alexander Kahrs, & Jeffrey J. Lockman*
32. Information processing strategies for addressing different spelling errors. *Nicholas Ullrich & Harriet S. Waters*
33. What's in a color: The influence of color on gender stereotyping in children. *Isabelle Cherney & Amy Wu*
34. Who is right? Children's use of local and global information in decision making. *Candace Lapan, Janet Boseovski, Chelsea Hughes, Laura Parker, & Kimberly Marble*
35. Measuring cognitive resources in early-acquisition bilinguals. *Amanda Brown, Laura Quiros, Ivelisse Burgo, Theodora Koumoutsakis, R. Breckinridge Church, & S. Mahootian*
36. Students who believe in the malleability of intelligence show a pronounced negative relation between anxiety and performance. *Daeun Park, Daeun Park, Emily Greenwood, Gerardo Ramirez, Elizabeth Gunderson, Susan Levine, & Sian Beilock*
37. Causal determinism in toddlers. *Paul Muentener & Laura Schulz*
38. Unfamiliar accents and foreign languages: How growing up bilingual influences children's in-group biases. *Diane Poulin-Dubois, André Luiz Souza, & Krista Byers-Heinlein*
39. Adaptation to a novel lexical stress pattern: Evidence for consistency in statistical learning across the lifespan. *Lucy C. Erickson & Erik D. Thiessen*
40. Are all apologies created equal? Making amends and restoring trust following an accidental transgression. *Marissa B. Drell & Vikram K. Jaswal*
41. Kindergartners' addition strategies on multidigit problems and their relation to base-ten understanding. *Anna Ermakova*
42. Teaching to learn: Imitation in the context of parent-child interaction. *Jennifer M. Clegg & Cristine H. Legare*
43. Children and adults singing without hearing themselves. *Sara Beck, Erdemir, & Rieser*
44. Vocal overimitation in preschool age children. *K. Winters, K. Krumpak, C. Core, & F. Subiaul*
45. Testing the limits of infants' early word comprehension. *Ruth Tincoff, Bridget Gates, Lauren Rambo, & Megan Snider*
46. Specific number sense skills mediate the association between inhibitory control and mathematics achievement. *Mary Wagner Fuhs, Caroline E. Byrd, & Nicole M. McNeil*
47. The relation between infants' preference for upright books, early reading experience, and vocabulary growth. *Gabrielle Strouse, Susan Neuman, & Ashley Pinkham*
48. Numerical discrimination depends on ratio difference and absolute value. *Richard Prather*
49. Interventions to improve preschoolers' number knowledge - what works? *Barbara Sarnecka, Meghan Goldman, Tanya Anaya, & James Negen*
50. Relations between anthropomorphism, predictability, and patterned outcomes. *Chelsea Cornelius & Gabriel Lopez-Mobilia*
51. The role of within-category variability in inductive learning across childhood. *Peter Liebenson & Marjorie Rhodes*
52. Do life stories begin with memories for repeated as well as unique experiences? *Carole Peterson, Lynne Baker-Ward, Tiffany N. Grovenstein, & Mary K. Thomas*
53. Used then lost: Infants use features to chunk objects, but do not store the features in memory. *Melissa M. Kibbe, Mariko Moher, & Lisa Feigenson*
54. The relationship between imaginary companion status and exposure to fiction. *Alison B. Sachet & Marjorie Taylor*
55. Learning self-regulatory strategies: The role of content and context. *Grace Min, Jason Chin, Katelyn Kurkel, Stacey Doan, & Kathleen Corriveau*
56. The relationship between ADHD and theory of mind in school-aged children. *Rachel J. Feigenbaum & Bruce D. Homer*
57. Do you have to eat the cookie or could you choose not to? The development of U.S. and Chinese children's beliefs about free will. *Adrienne Wente, Sophie Bridgers, Zhao Xin, Alison Gopnik, Zhu Liqi, & Elizabeth Seiver*
58. Developmental differences in partial-source memory. *Donna Drohan-Jennings & William Hockley*
59. Social cognition in daily life: Developmental changes from 12 to 40 months. *Joan Test & Karen Kwok*
60. The effect of SES on infants' selective exploration. *Nicholas Tacke, Lillian Bailey, & Melissa Clearfield*
61. Effect of relational training on children's analogical reasoning. *Nina Simms & Dedre Gentner*
62. Relational match-to-sample in children. *Jean-Rémy Hochmann & Susan Carey*

63. Preschoolers' use of ostensive and linguistic cues in guiding inductive inference. *Lucas P. Butler & Michael Tomasello*
64. Early preference for natural versus built environment types. *Salif Mahamane, Justice Morath, Kevin Grunig, & Kerry Jordan*
65. When feeling bad is good: Development in understanding the social signals of emotions. *Fan Yang & Douglas Frye*
66. Relations among gender essentialism, stereotyping, and behavior. *Meredith Meyer & Susan Gelman*
67. Parents' encouragement of children's critical thinking in a paleontology exhibit. *Claudia L Castañeda & Maureen Callanan*
68. When the gostak distims the doshes: Novel verb learning from novel nouns. *Leah Sheline & Sudha Arunachalam*
69. Effects of manual rotation experience on development of mental rotation strategies. *Julia X. Li, Linda B. Smith, Susan S. Jones, & Karin H. James*
70. Temporary enhancements to children's ANS precision improve their math performance. *Jenny Wang, Darko Odic, Justin Halberda, & Lisa Feigenson*
71. Inferring the causes of patterned sounds: Were those notes caused by an agent, or an inanimate force? *Adena Schachner*
72. Selective trust and theory of mind in Brazilian children: Effects of culture and socioeconomic background. *Debora Hollanda Souza, Melissa A. Koenig, & Rafael Lopes*
73. Manipulating the effects of stereotype threat on preschoolers' performance. *Christine Shenouda & Judith Danovitch*
74. The role of comparison processes in false belief understanding. *Christian Hoyos, William S. Horton, & Dedre Gentner*
75. Parentage information increases the likelihood of categorizing black/white biracials as biracial. *Steven O. Roberts & Susan A. Gelman*
76. Children's propensity to give in response to increased need and resources. *Tasha Posid, Allyse Fazio, & Sara Cordes*
77. Comparison processing: Are children vulnerable to the same asymmetries that influence adults? *Eleanor Chestnut & Ellen M. Markman*
78. Object of my desire: A first look into economic valuation in preschoolers. *Laura Hennefield*
79. Seventeen-month-olds reason by exclusion when searching. *Shilpa Mody, Roman Feiman, & Susan Carey*
80. Intuitive causal complexity in the absence of causal understanding. *Jonathan F. Kominsky, Anna Zamm, & Frank C. Keil*
81. Guidance of children in a science-related activity by Mexican-descent mothers from two schooling groups. *Graciela Solis & Maureen Callanan*
82. Compounding and derivation word formation strategies in children. *Denise Davidson, Katarzyna Grabiec, Elizabeth Hilvert, Ieva Misiunaite, & Sandra Vanegas*
83. The development of early theory of mind and language. *Kathryn Hobbs, Westley Resendes, Jennie Pyers & Susan Carey*
84. Event segmentation in infancy. *Trine Sonne, Osman S. Kingo, & Peter Krøjgaard*
85. Is more always better? The impact of background information on knowledge integration in children. *Elizabeth A. White & Patricia J. Bauer*
86. The inherence heuristic as a foundation for psychological essentialism. *Erika Salomon & Andrei Cimpian*
87. Children's reasoning about the refusal to help: The role of need, costs and social perspective taking. *Jellie Sierksma, Jochem Thijs, Maykel Verkuyten, & Aafke Komter*
88. Preschoolers' awareness of their memory states: The emergence of metamemory monitoring. *Emily Hembacher & Simona Ghetti*

POSTER SESSION IV: SATURDAY, OCTOBER 19, 5:45 – 7:00 PM

1. The impact of social group information on children's reasoning about contamination. *Jasmine M. DeJesus, Katherine D. Kinzler, & Kristin Shutts*
2. Perceptually constrained statistics in toddlers' word learning. *Sumarga H. Suanda, Seth B. Foster, Linda B. Smith, & Chen Yu*
3. The extension and retention of relational knowledge. *Nicole L. Varga, Rebekah A. Stewart, & Patricia J. Bauer*
4. Children's use of argument complexity to selectively learn from others: Circular versus non-circular arguments. *Katelyn Kurkul, Grace Min, & Kathleen Coriveau*
5. Learning object categories across time in 4.5-month-old infants. *Deon T. Benton*
6. Instructions influence children's use of body part as object and imaginary object pantomimes: A replication. *Robert W. Mitchell & Heather Clark*

7. A longitudinal study of children's theory of mind, self-concept, and perceptions of humor in self and other. *Sandra Bosacki*
8. Placing numerosities on nonsymbolic number line in preschoolers. *Maciej Haman*
9. Does autism affect the types of gesture and their relation to speech? *N. Dimitrova, S. Özçalıskan, & L. B. Adamson*
10. Spatial-numerical associations and motor memory in young children. *Koleen McCrink and Jennifer Galamba*
11. Visual biased-competition in infants: Evidence for memory guided attention. *Shannon Ross-Sheehy*
12. Metaphor embodiment in children: Hand cleanliness may impact preschooler's reactions to mishaps. *Hannah M. Smith*
13. Behavioral and neural effects of learning with different gesture strategies. *Elizabeth M. Wakefield & Karin H. James*
14. Parental disciplinary strategies, children's social behavior, and theory of mind development among Latino children. *Amy A. Weimer, L. A. Correa, & D. Kuri*
16. Early effects of bilingualism on perceptual development. *Christina Schonberg, Catherine Sandhofer, & Scott P. Johnson*
17. The roles of rationality, culture, and consensus in the imitation of questionable actions. *Cara DiYanni, Jad Nasrini, Grace Min, & Kathleen Corriveau*
18. Knowing how to look predicts the ability to draw realistically. *Jennifer E. Drake*
19. Agency affects memory in 9-month-old infants. *Lauren H. Howard, William L. Owens, Christina Merlo, & Amanda L. Woodward*
20. Does exposure to natural scenes restore attentional resources? An experimental investigation in school age children. *Lisa Cramer Whitfield*
21. The impact of actions and gestures on mathematical thinking: An embodied perspective. *Rebecca Boncoddo, Andrea Donovan, Martha Alibali, Mitchell Nathan, & Candace Walkington*
22. Parental talk about number and its relation to growth in Latino preschoolers' numeracy skills. *Diana Leyva & Virginia Nolivos*
23. Children's use of counting yields a better understanding of cardinality. *Tasha Posid & Sara Cordes*
24. Do bilingualism and attentional difficulties interact in executive function performance? *Geoff B. Sorge*
25. The impact of descriptive information on the referential comprehension of words and pictures. *Florencia Mareovich, Andrea Taverna, & Olga Peralta*
26. Social and non-social forms of divergent thinking in middle childhood. *Candice M. Mottweiler & Marjorie Taylor*
27. The inherence heuristic as an explanation for nominal realism. *Shelbie L. Sutherland & Andrei Cimpian*
28. The role of experience in linking sounds and meaning in language acquisition. *Danielle Perszyk*
29. Knowing how you know: Preschoolers show enhanced monitoring of informants over alternative sources of belief. *Elizabeth Stephens, Kathleen Corriveau, & Melissa Koenig*
30. Self-concept and projection to the future. *Christine Coughlin & Simona Ghetti*
31. Back to the titanic: A study of artifact authenticity. *Brooke J. Miller*
32. Do we behave morally towards robots? Self-generated, goal-directed movement predicts children's moral regard for a social robot. *Heather E. Gary & Nadia Chernyak*
33. The status of moral reasoning in children's understanding of the pretense-reality distinction. *Anne Fast & Jennifer Van Reet*
34. Exploring individual differences in children's causal stance. *Aubry Alvarez & Amy E. Booth*
35. Infants use language to predict third-party affiliation. *Zoe Liberman, Amanda L. Woodward, & Katherine D. Kinzler*
36. Children's evaluations of effective and ineffective symbol systems. *Andrea Astle, Corrie Vendetti, Charlotte Bradley, & Deepthi Kamawar*
37. Promoting mathematical problem solving and explanation at home. *Abbey M. Loehr, Bethany Rittle-Johnson, & Aditi Rajendran*
38. Infants learn who is valued by "emotional eavesdropping," with cultural differences. *Wanying Zhao, Janine Gellerman, & J. Kiley Hamlin*
39. Getting it wrong makes things right: Word-object mismatches facilitate subsequent word learning at 14 months. *Angeline Sin-Mei Tsui, Laurel Fais, & Christopher T. Fennell*
40. Preschoolers reduce harm when moral obligations are salient. *Janani Prabhakar & Alan M. Leslie*
41. Children's understanding of ideas. *Vivian Li*
42. The role of age in looking-time performance: Younger monkeys look longer in expectancy violation and preferential looking tasks. *Alexandra G. Rosati, April M. Ruiz, Lauren J.N. Brent, Michael L. Platt, & Laurie R. Santos*
43. The role of quizzing in children's learning on Ipad. *Arum Han & George Hollich*
44. Early inductive reasoning: Examining 11-month-olds' abilities. *Ena Vukatana, Susan Graham, & Suzanne Curtin*
45. Fast & stable: Words create better target representations in a visual search task. *Catarina Vales & Linda Smith*

46. The development of episodic memory: A yoyage through time and space. *Thanujeni Pathman*
47. Infants' understanding of others' goal-directed actions covaries with speed of encoding. *Aditi V. Deodhar, Ty W. Boyer, & Bennett I. Bertenthal*
48. Property rights: You get what you need. *Nicholaus Noles*
50. Children's expectations and understanding of kinship as a social category. *Annie C. Spokes & Elizabeth Spelke*
51. Looking ahead: Children's inferences from picture books. *Ruth Lee & Patricia Ganea*
52. The effect of analogy and iconicity on preschoolers' map reading. *Lei Yuan, David Uttal, & Dedre Gentner*
53. Assessing conceptual change in science and math: The re-categorization task (RECAT). *Stella Vosniadou, Anna Chountala, Kalliopi Eikospentaki, & Despina Lepenioti*
54. Examining children's moral judgments using a novel verbal spontaneous-response task. *Erin Braun-Janzen*
55. Gender differences in the development of advanced ToM as assessed by the flexibility and automaticity of social cognition (FASC). *Bruce D. Homer, Elizabeth O. Hayward, & Suzy M. Letourneau*
56. More similarity is better but not too much: The effect of extraneous similarity on 3-year-olds' symbolic understanding. *Kelly J. Sheehan*
57. Do like I do, be like I am: Rituals foster group cohesion in early childhood. *Nicole J. Wen, Patricia A. Herrmann, & Cristine H. Legare*
58. Developmental change in distribution of attention orienting in natural scenes with faces. *Sara Haas & Dima Amso*
59. Conscious awareness of cognitive processes during childhood and its relation to cognitive performance and executive function. *Nikos Makris, Dimitris Pnevmatikos, Apostolia Michalakoudi, & Stella Vosniadou*
60. The social facilitative effects of imitation: A developmental investigation. *Sarah Dunphy-Lelii & Kristin Lane*
61. Language facilitates 4-year-olds use of intrinsic reference frame during recall. *Hilary E. Miller & Vanessa R. Simmering*
62. Attentional disengagement and sensory response patterns of children with autism, developmental delay, and typical development. *Maura Sabatos-DeVito, Grace T. Baranek, John Bulluck, Sarah Schipul, Aysenil Belger, & J. Steven Reznick*
63. Rule makers and rule followers: Children's creation, learning, and enforcement of rules in a collaborative game. *Anne E. Riggs & Andrew G. Young*
64. Fostering children's STEM memories and transfer abilities through parent-child conversations. *Maria Marcus, C. A. Haden, David Uttal, L. C. Jones, & A. S. Auchstetter*
65. The effect of inhibitory control on preschoolers' prosocial behavior. *Arielle Wezdenko & Jennifer Van Reet*
66. Young infants use imitation to infer the social preferences of imitators but not those of their targets. *Lindsey J. Powell & Elizabeth Spelke*
67. Adult supportive language use and child language comprehension: Examining associations with delayed generalization across cues. *Janice N. Phung, Helen M. Milojevich, & Angela F. Lukowski*
68. Capuchin monkeys (Cebus apella) use goal information when deciding how to help a recipient. *Lindsey Drayton & Laurie Santos*
69. Effect of type A/B behavior and vocational maturity on anxiety level, mental health and ways of coping of adolescents. *Kavita Koradia, Medha Sharma, & Himani Bansal*
70. Four year-old's performance on three-alternative false belief tasks: Evidence for perceptual access reasoning. *Christopher Gonzales & William Fabricius*
71. Speaker variability: Implications for statistical learning. *Dylan Antovich & Katharine Graf Estes*
72. "I trust you because you're dressed nicer:" Young children's selective learning from others based on how they dress. *Kyla McDonald, Alyssa Payne, Robyn Nastaskin, & Lili Ma*
73. Books and baby time: The effect of early experiences on deferred imitation in infancy. *Emily Little*
74. Who taught you that? The role of self-acquired knowledge in children's ability to integrate novel information. *Shala N. Blue, Elizabeth A. White, & Patricia J. Bauer*
75. Learning about units of linear measurement from action to abstraction: Do children benefit from stepwise instruction? *Eliza Congdon*
76. Parental input about unpleasant aspects of the biological world. *Andrew Shtulman, Isabel Checa, Katherine Abelson, Devin Shermer, & Andrea Villalobos*
77. Storybooks and the malleability of the moral mind. *Joshua Rottman, Liane Young, Peter Blake, & Deborah Kelemen*
78. A change over development in the influence of distractors on maintenance in spatial working memory. *Brian Keiser, Heidi Fleharty, & Anne R. Schutte*
79. The effect of story framing on analogical transfer from fantasy. *Emily J. Hopkins & Angeline Lillard*

80. The impact of nature and urban walks on children's executive functions. *Heidi Fleharty, Julia Torquati, & Anne Schutte*
81. Operational momentum in symbolic subtraction: The role of problem type and approximate-number-system acuity. *Chin-Yuan Chang & Wen-Chi Chiang*
82. Developmental differences in the emergence of on-line action predictions. *Sheila Krogh-Jespersen & Amanda Woodward*
83. Young Korean children's understanding of teaching based on knowledge difference and belief about it. *Jeein Jeong & Douglas A. Frye*
84. Preschoolers selectively infer history to explain outcomes. *Shaylene E Nancekivell & Ori Friedman*
85. Word reading strategies in autism spectrum disorders: Evidence from Portuguese-speaking children and adolescents in Brazil. *Cláudia Cardoso-Martins*

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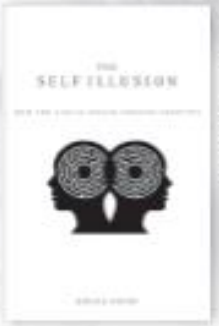

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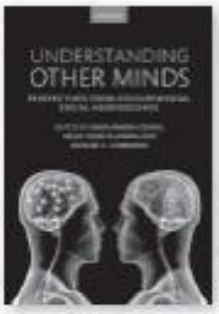

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PLENARY PROGRAM, SYMPOSIA, AND ORAL PAPER SCHEDULE

FRIDAY, OCTOBER 18

8:30 - 9:30	Ballroom CDE **PLENARY TALK** - *What's social about social cognition: The case of imitation and autism* Morton Gernsbacher (University of Wisconsin)
10:00 – 11:45	Ballroom CDE **PLENARY SYMPOSIUM** **Science at an exhibition: What we learn from Studying Children in Museums** (Organizer: Amanda Woodward) *Parent-child conversations in museums: Cognitive development embedded in everyday activity* Maureen Callanan (University of California, Santa Cruz) *Measuring children's developing expertise in word learning using large, diverse cross-sectional samples* Michael Frank (Stanford University) *How language shapes the development of social categorization: Museums as contexts for insight and intervention* Marjorie Rhodes (New York University) *Neither naive nor not: Psychological theory in the public domain* Laura Schulz (Massachusetts Institute of Technology)

FRIDAY, OCTOBER 18 (CONT'D)

2:00 – 3:45

CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS

Room 204/205

Concrete symbols and instructions: Do they facilitate or hinder learning? (Organizer: Katherine Herold)

Counting practice with pictures, but not objects, improves children's understanding of cardinality
Lori A. Petersen and Nicole M. McNeil

How do concrete symbolic objects affect children's understanding of letters?
David Uttal

The advantage of generic symbols for acquiring mathematical concepts
Jennifer A. Kaminski and Vladimir M. Sloutsky

Child characteristics influence the effectiveness of concrete instructions
Katherine H. Herold and Michèle M. M. Mazzocco

Ballroom C

Development of visual attention: Implications across contexts and populations (Organizer: Vanessa Simmering)

Developing a visual brain
Shannon Ross-Sheehy, Sebastian Schneegans, and John P. Spencer

Age differences in top-down control of visual attention during video viewing
Heather Kirkorian and Koeun Cho

Technology use and attentional control: Positives and negatives
C. Shawn Green

The Autism Gift? Visual Attention and Increased Perceptual Capacity in Autism Spectrum Disorder
Anna Remington, John Swettenham and Nilli Lavie

Ballroom D

New approaches to studying executive functions (Organizer: Chistopher Erb)

Development of selective sustained attention: Conceptual and measurement issues
Anna Fisher, Erik Thiessen , John Dickerson, and Lucy Erickson

Reach trajectory tracking as an online measure of executive control
Christopher Erb, Jeff Moher, Joo-Hyun Song, & David M. Sobel

The development of rule-guided behavior in the transition from childhood into adolescence
Dima Amso & David Badre

Discussant: Yuko Munakata

Ballroom E

Oral Paper Session - Language Development (Chair: Sandra Waxman)

Language and memory in preverbal children: Adult-provided linguistic support and child language comprehension
Angela F. Lukowski

The role of experience in linking sounds and meaning in language acquisition
Danielle Perszyk

Correcting false-beliefs: When do toddlers use language to update their knowledge of others' beliefs?
Valerie San Juan, Patricia Ganea, Katie Krutzelmann, and Vaunam Venkadasalam

How do words cue attention? Evidence from visual search with young children
Catarina Vales and Linda Smith

Color word comprehension precedes production
Katie Wagner, Jill Jergens, and David Barner

FRIDAY, OCTOBER 18 (CONT'D)

4:00-5:45

CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS

Room 204/205

Going beyond words: Children's use of pragmatic cues in evaluating communication (Organizer: Alia Martin)

Infants' use of shared experience to decode references to absent objects
Patricia Ganea and Megan Saylor

Sixteen-month-olds recognize the roles of common ground and intentions in third party communication
Alia Martin and Athena Vouloumanos

Flexibility in selective learning: 24-month-olds will learn unconventional labels from unconventional actors
Susan Graham, Annette Henderson, and Vanessa Schell

Children's Evaluations of Messages and Speakers: Integrating Accuracy and Benevolence
Caitlin Cole & Melissa Koenig

Ballroom C

Early non-verbal numerical intuitions and mathematics development: Establishing causality through experimental training studies (Organizer: Daniel Hyde)

Brief non-symbolic numerical training enhances symbolic arithmetic in children
Daniel C. Hyde, Saeeda Khanum, and Elizabeth S. Spelke

Non-symbolic approximate arithmetic training improves math proficiency in adults and children
Joonkoo Park and Elizabeth M. Brannon

Using symmetry to teach and learn the integers
Jessica M. Tsang, Kristen P. Blair, and Daniel L. Schwartz

Intervention and Transfer in the Approximate Number System (ANS)
Justin Halberda, Justin Halberda, Melissa Libertus, Jenny Wang, Darko Odic, and Lisa Feigenson

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Ballroom D

New perspectives on social event memory in young children (Organizer: Lauren Howard)

Learning from others: Effects of agency on event memory in children
Lauren Howard and Amanda Woodward

How goal inferences structure young children's memory and imitation for novel action sequences
Jeff Loucks and Andrew Meltzoff

Delving into developments in event processing
Dare Baldwin

Discussant: Vikram Jaswal

Ballroom E

Oral Paper Session - Infant Learning and Development (Chair: Cathy Sandhofer)

Nine-month-old infants' understanding of actions: What's priming got to do with it?
Ty W. Boyer, Sam Harding, and Bennett I. Bertenthal

Becoming human face detection specialists: Human faces capture attention more quickly than animal faces in 11-month-olds, but not 4- and 6-month-olds
Krisztina V. Jakobsen, Lindsey Umstead, Veronica Eisenmann, Sidney Cover, and Elizabeth A. Simpson

What do infants face? Statistical regularities in infants' natural environments
Swapnaa Jayaraman

Infants' sensitivity to statistical regularities and stimulus complexity in visual sequences
Lauren Krogh and Scott P. Johnson

The impact of action-specific experience on the neural processing of others' actions during infancy
Michaela Upshaw, Jessica A. Sommerville, and Raphael Bernier

SATURDAY, OCTOBER 19

8:30 - 9:30	Ballroom CDE **PLENARY TALK – *Early sociomoral reasoning*** Renee Baillargeon (University of Illinois, Champaign-Urbana)
10:00– 11:45	Ballroom CDE **PLENARY SYMPOSIUM** **Thinking, talking, and doing-or NOT: Relations among thought, language, and action** (Organizer: Judy DeLoache) *It Just Ain't So* Karen Adolph (New York University) *Sensitive periods in human development: Lessons from the Bucharest Early Invention Project* Nathan Fox (University of Maryland) *Developing inhibitory control* Yuko Munakata (Unversity of Colorado, Boulder)

SATURDAY, OCTOBER 19 (CONT'D)

2:00 – 3:45

CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS

Room 204/205

Developmental origins of the moral sense (Organizer: Joshua Rottman)

You've gotta have a goal to get helped: Selectivity in preverbal infants' social evaluations
J. Kiley Hamlin

Infants' reactions to punishment of fair and unfair agents
Luca Surian and Marek Meristo

The role of pretend play in young children's moral development
Jennifer Cole Wright, Anna Grace Burnett, Nathan Wills, and Sarah James

Children's Acquisition of New Moral Beliefs: The Role of Testimony
Joshua Rottman, Liane Young, Deborah Kelemen

Ballroom C

How words become labels: statistical, perceptual, and social contexts for language learning and use (Organizer: Lucy Erickson)

A part-word is not a word: Only statistically coherent linguistic labels facilitate infant object categorization
Lucy C. Erickson, Erik D. Thiessen and Katharine Graf Estes

Statistics are not enough: Integration of perceptual cues to reference and cross-situational statistics in early word learning
Sumarga H. Suanda, Seth B. Foster, Linda B. Smith, and Chen Yu

Developing social information processing and early word learning
Daniel Yurovsky, Anna Wade, and Michael C. Frank

Naming Phrases Boost Bilingual and Monolingual Infants' Learning of Minimal Pairs
Christopher T. Fennell and Krista Byers-Heinlein

Ballroom D

The role of pedagogy in learning from exploration (Organizer: Audrey Kittredge)

Curiosity and discovery learning
Tessa J. P. van Schijndel, Brenda R. J. Jansen, and Maartje E. J. Raijmakers

Learning is better with others
Andrew Young and Charles Kalish

Show and tell: The effect of instruction on discovery
Audrey K. Kittredge, David Klahr, and Anna V. Fisher

Discussant: David H. Uttal

Ballroom E:

Oral Paper Session - Conceptual Development (Chair: Douglas Frye)

The role of conceptual knowledge in the development of executive function in early childhood
Sabine Doebel and Philip David Zelazo

Does knowing what teaching is help children to learn? Korean young children's learning from explicit versus implicit teaching
Jeein Jeong & Douglas A. Frye

Numerical estimation under supervision
John E. Opfer and Clarissa A. Thompson

The mind behind the drawing: Cues to artist's intention facilitate 24-month-olds' representational insight
Romina A. Vivaldi and Analía Salsa

Two Bayesian models of the development of belief-desire reasoning
Lu Wang, Pernille Hemmer, and Alan M. Leslie

SATURDAY, OCTOBER 19 (CONT'D)

4:00-5:45

CONCURRENT SYMPOSIA AND ORAL PAPER SESSIONS

Room 204/205

Development of abstract reasoning about relational concepts (Organizer: Caren Walker)

The seed of analogical reasoning
Yin-Juei Chang, Alissa Ferry, Susan J. Hespos, and Dedre Gentner

Same and different relations in match- and mismatch-to-sample
Jean-Rémy Hochmann, Shilpa Mody, and Susan Carey

Infants infer higher-order relational principles in causal learning
Caren M. Walker and Alison Gopnik

A Hierarchical Bayesian Model for Making Relational Inferences
Tomer Ullman and Joshua Tenenbaum

Ballroom C

Young defenders of the status quo: Children's tendency to see their social systems as natural and legitimate (Organizer: Andrei Cimpian)

Preference for the higher status as an implicit form of system justification
Yarrow Dunham

Why do people think they live in a fair society? A new perspective on the cognitive origins of system justification
Larisa Hussak and Andrei Cimpian

Evidence for the role of the inherence heuristic in children's social stereotyping and system justification
Rebecca S. Bigler and Caitlin Clark

Young Children's Appreciation for Conventional Normativity
Marco F. H. Schmidt, Hannes Rakoczy, and Michael Tomasello

Ballroom D

Children's belief in the unseen and counterintuitive: Highlighting the roles of mental representation and cultural input (Organizer: Jonathan Lane)

Young children's trust in claims that defy their perceptions
Jonathan D. Lane, Paul L. Harris, Susan A. Gelman, Henry M. Wellman, and Daniel Blumer

Children's understanding of invisibility
Jacqueline D. Woolley and Melissa Ann McInnis

How children's understanding of physical possibility constrains their belief in Santa Claus
Andrew Shtulman and Rachel Yoo

Discussant: Paul L. Harris

Ballroom E:

Oral Paper Session - Basic processes: Learning, memory, and executive function (Chair: Vladimir Sloutsky)

Neural dynamics of cognitive flexibility in early childhood
Aaron T. Buss and John P. Spencer

Interference and memory development
Kevin Darby and Vladimir Sloutsky

Using functional magnetic resonance imaging techniques to probe learning mechanisms in young children
Karin H. James

Autobiographical memory skills as a foundation for deliberate remembering: Findings from the longitudinal cross-sectional study
Marina Larkina and Patricia J. Bauer

Executive function's role in a utilization deficiency observed in preschoolers: Developmental trends & individual differences
Mary M Stone and Fran C Blumberg

PLENARY PROGRAM, SYMPOSIA, AND ORAL PAPER ABSTRACTS

FRIDAY, OCTOBER 18, 8:30AM – 9:30AM

PLENARY TALK

Ballroom CDE

WHAT'S SOCIAL ABOUT SOCIAL COGNITION: THE CASE OF IMITATION AND AUTISM

Morton Gernsbacher (University of Wisconsin)

Imitation has been deemed "crucial for the normal development of social cognition." Indeed, imitation has been considered "essential to development of both the infant's purposeful consciousness and his or her ability to learn from [other people]." Moreover, because imitation is considered the highest form of flattery, the inability to act like other people is often misconstrued as a metric of liking other people. In this talk, I will argue that a more parsimonious account of imitation lies within the motor, rather than the social or cognitive, domain.

FRIDAY, OCTOBER 18, 10:00AM – 11:45AM

PLENARY SYMPOSIUM

Ballroom CDE

SCIENCE AT AN EXHIBITION: WHAT WE LEARN FROM STUDYING CHILDREN IN MUSEUM

ORGANIZER: Amanda Woodward (University of Chicago)

PARENT-CHILD CONVERSATIONS IN MUSEUMS: COGNITIVE DEVELOPMENT EMBEDDED IN EVERYDAY ACTIVITY

Maureen Callanan (University of California, Santa Cruz)

For many children and families, children's museums can serve as a natural setting for researchers to capture cognitive development in action. I will discuss theoretical approaches that emphasize the importance of studying children's thinking in settings outside of the laboratory. Museums, as public places where many families feel comfortable, are argued to provide opportunities to observe authentic family practices. I will present a sample of findings from my lab, illustrating ways that museum research can provide a view of development in action. At the same time, I will argue that partnerships with children's museums can also effectively link research findings with more practical issues of designing informal learning settings for children. Finally, I will consider the limits of this approach – acknowledging that museums are just one example of a natural setting, and one that is part of everyday life for some children but not others.

MEASURING CHILDREN'S DEVELOPING EXPERTISE IN WORD LEARNING USING LARGE, DIVERSE CROSS-SECTIONAL SAMPLES

Michael Frank (Stanford University)

Empirical work on language acquisition is typically supported by data from small, select populations within tight age ranges. In contrast, my lab's experience recruiting participants in a local children's museum has brought us in contact with a broad spectrum of children across a wide range of ages and language backgrounds. In this talk, I'll reflect on both the methodological challenges and theoretical benefits of gathering large, diverse cross-sectional samples. I'll end by discussing some of the unexpected scientific opportunities that have come our way as a result of our work in the museum.

HOW LANGUAGE SHAPES THE DEVELOPMENT OF SOCIAL CATEGORIZATION: MUSEUMS AS CONTEXTS FOR INSIGHT AND INTERVENTION

Marjorie Rhodes (New York University)

Museums are important instruments of cultural education, providing unique environments for learning about the social histories and traditions of diverse social groups. Within these contexts, a critical challenge is to convey information about unfamiliar cultures in a manner that leads participants to develop positive beliefs and attitudes. The present talk will describe research, conducted at the Children's Museum of Manhattan, examining how subtle differences in language shape whether families develop positive or negative beliefs and attitudes as they learn about new social groups. Further, this talk will discuss our ongoing efforts to incorporate these findings into the design of a new exhibit that provides opportunities for learning about Muslim cultures. This research program illustrates how museums can serve as important contexts for studying the basic processes that shape social cognitive development, as well as important vehicles for applying this research to benefit our communities.

NEITHER NAIVE NOR NOT: PSYCHOLOGICAL THEORY IN THE PUBLIC DOMAIN

Laura Schulz (Massachusetts Institute of Technology)

Scientists are always supposed to communicate their research findings to the public. However, this becomes particularly imperative when scientists conduct research in museums. How can we make good on this mandate? For a start, we might want to know what the public already knows about cognitive development, where this knowledge comes from, and how we can best present new information. Questions of this form are strikingly similar to the questions that inform much of developmental research broadly: "What are learners' domain-specific beliefs, where do these beliefs come from, and how do they change with evidence?" Here, I look at folk theories of our theories. I will present preliminary data suggesting that what the public believes about developmental research may differ in important ways from what we, as a field, believe. I will thus also discuss some preliminary attempts to change people's minds.

FRIDAY, OCTOBER 18, 2:00PM - 3:45PM
SYMPOSIA AND ORAL PAPERS

Room 204/205

CONCRETE SYMBOLS AND INSTRUCTIONS: DO THEY FACILITATE OR HINDER LEARNING?

ORGANIZER: Katherine H. Herold (University of Minnesota)

Educators often use concrete symbols or contextualized instructional discourse to facilitate young children's learning of abstract symbol systems, such as numbers or letters. However, evidence on the effectiveness of the use of concrete symbols is limited, and existing findings are mixed. More detailed evidence is needed to understand when, whether, and how concrete symbols or contextualized instruction facilitate the development of children's understanding and use of more abstract symbol systems, and when the use of these symbols may be appropriate in educational settings. This symposia assembles innovative researchers in cognitive development to present cutting-edge work on the effects of concrete symbols and instruction on the learning of crucial abstract symbolic systems. Four presentations provide a broad range of perspectives, collectively examining the effects of concrete symbols on mathematical and literacy learning during developmental periods from preschool through middle childhood. Presentation 1 examines the effect of representational status on preschoolers' understanding of cardinality. Presentation 2 examines the role of playing with symbolic objects on preschoolers' letter recognition. Presentations 3 and 4 both consider the role of concrete symbols and instruction on more advanced mathematical skills. Presentation 3 discusses the effect of concrete instructional material on early elementary school-aged children's knowledge of fractions and bar graphs. Presentation 4 presents longitudinal data on whether contextualized instruction differentially affects performance on a fractions task, and adds the unique perspective of whether the effect of contextualized instruction varies by individual child characteristics (e.g., math achievement level, executive function skills). Taken together, these talks reflect exciting new research on the effectiveness of concrete symbols and instruction on learning throughout the early- and middle-childhood years.

COUNTING PRACTICE WITH PICTURES, BUT NOT OBJECTS, IMPROVES CHILDREN'S UNDERSTANDING OF CARDINALITY

Lori A. Petersen and Nicole M. McNeil (University of Notre Dame)

When counting, the word that tags the final item in the set represents the cardinality, or total number, of the set. In this study, we extended previous research by investigating if the particular items children count affect their understanding of cardinality. We focused specifically on the to-be counted items' representational status (i.e., ease with which the items can be used to represent something else). Items with higher representational status, like pictures, may be less distracting, and may encourage greater focus on sets (versus individuals) than those with lower representational status, like concrete objects (DeLoache, 1991; Gelman et al., 2005). Thus, we predicted that children would construct a better understanding of cardinality from practice with pictures versus objects. We tested our hypothesis by randomly assigning preschoolers (M age = 3 years, 6 months) to receive counting practice with either pictures or objects over five practice sessions. Understanding of cardinality was assessed at pretest and posttest with Wynn's (1990) Give-a-number task. As predicted, we found an interaction between condition and test. Children in the picture condition improved their understanding of cardinality from pretest to posttest, but children in the object condition did not. Results suggest that picture books are better than concrete objects at supporting children's understanding of cardinality.

HOW DO CONCRETE SYMBOLIC OBJECTS AFFECT CHILDREN'S UNDERSTANDING OF LETTERS?

David Uttal (Northwestern University)

We present the results of two studies in which we directly investigated the effect of playing on symbolic understanding. Specifically, we investigated whether playing with letter blocks affects children's (a) letter recognition, and (b) their knowledge of the symbolic properties of letters. Four-year-olds played a variety of games with the letter blocks, some of which treated the blocks as toys (e.g., building towers) or as symbolic representations (e.g., using the blocks to help remember the contents of a closed box). Children who recognized less than ½ of the letters prior to the task performed better after playing with the blocks as toys. However, children who already knew all or most of the letters either were not affected or recognized fewer letters after playing with them with toys. Second, using the blocks symbolically did lead to more generalized improvements in use of other representational toys (e.g, crayons) to represent the contents of the boxes. We conclude that concrete symbolic objects may be particularly helpful in the early stages of learning, but in latter stages, they may distract from children focusing on the symbolic properties of these objects.

THE ADVANTAGE OF GENERIC SYMBOLS FOR ACQUIRING MATHEMATICAL CONCEPTS

Jennifer A. Kaminski and Vladimir M. Sloutsky (Ohio State University)

We present evidence that children demonstrate better knowledge of fractions and bar graph reading when instructional material is simple and generic than when material is contextualized and perceptually rich. Previous research has demonstrated that undergraduate students who learned a novel concept were more likely to transfer this knowledge when the concept was initially instantiated in a symbolic format that minimized extraneous information than when the concept was instantiated in a more contextualized, perceptually rich format. While these findings suggest that adults can benefit from learning mathematical concepts in a generic, symbolic format, many argue that the advantage of generic learning formats may not hold for younger learners and that children will better learn from contextualized instructional material because it is more engaging and familiar than generic symbols. However, children have less ability than adults to control their attentional focus. Contextualized material can communicate extraneous information that may divert children's attention from the very mathematical structures and procedures they are trying to learn. In a series of studies, we tested the hypothesis that children in early elementary school can better learn and transfer mathematical knowledge from simple generic material than from contextualized, perceptually rich material. The results support this hypothesis.

CHILD CHARACTERISTICS INFLUENCE THE EFFECTIVENESS OF CONCRETE INSTRUCTIONS

Katherine H. Herold and Michèle M. M. Mazzocco (University of Minnesota)

The use of contextualized instruction is common in the teaching of fractions. In the present study we administered a fractions magnitude comparison task that included visual symbols, half of which were paired with contextualized instruction and half of which were not, to 159 children in Grades 4 and 5. We examined whether the contextualized instruction differentially affected performance of children with mathematical learning disability (MLD) versus low achievement (LA) or typical achievement (TA) in mathematics. Contextualized instruction did not improve children's

performance regardless of math achievement group. In fact, contextualized instruction hindered performance overall for children with MLD and also led to poorer performance on harder items for all three groups. Vocabulary, number sense and executive function skills accounted for variability in performance, but the relative contribution of each skill varied according to whether the fractions magnitude comparison performance being predicted occurred under the contextualized or standard condition.

Ballroom C

DEVELOPMENT OF VISUAL ATTENTION: IMPLICATIONS ACROSS CONTEXTS AND POPULATIONS

ORGANIZER: Vanessa Simmering (University of Wisconsin, Madison)

Cognitive development research has seen a recent surge in studies of visual attention as more theorists recognize that visual attention can serve not only as an index of what infants and children may learn in a given context, but also what prior knowledge they may bring to bear on the current situation (Hunnius, 2007). Furthermore, visual attention is one of the few cognitive processes that can be studied across the lifespan, allowing for remarkable assessments of long-term continuity and change. Analyses of visual attention have shown explanatory promise in domains as varied as word learning (e.g., Yu & Smith, 2012), mood disorders (e.g., Eizenman, et al., 2003), and executive function (e.g., Schmiechel, 2007). One potential downside of this increase in research on visual attention is the possibility of fractionation and disconnection across historically separate domains of inquiry. Indeed, even the definition of visual attention may differ depending on the context in which it is tested (Chun et al., 2011). The goal of this symposium is to provide a synthesis of findings on visual attention by bringing together scholars who study related constructs across different populations and domains. These four speakers will address (1) attention in infancy with minimal influence of memory, (2) changes in top-down influences on attention from infancy through adulthood, (3) effects of technology on different subtypes of attention in adults, and (4) how attention differs in autism spectrum disorder. These diverse topics demonstrate the wide applicability of visual attention across contexts and populations.

DEVELOPING A VISUAL BRAIN

Shannon Ross-Sheehy (East Tennesse State University), Sebastian Schneegans (Institut für Neuroinformatik), and John P. Spencer (University of Iowa)

The phrase visual attention has been used freely in infant research, lumping together phenomena as distinct as low-level eye movements, and high-level cognitive processes. The liberal use of this phrase has lead to myriad attention measures, most of which are at least partially dependent on co-developing memory processes (e.g., habituation, paired-comparison, anti-saccade, etc.). The net result is a diverse set of task-dependent behaviors that predict all manner of cognitive development. Clearly, visual behavior is an ideal window into the developing infant – and these tasks all share three important features: 1) they involve gaze and/or eye movements, 2) they involve some type of visual competition, and 3) they use reaction time and/or duration as primary measures. The goal of the present work was to create a novel visual task that capitalizes on these basic visual behaviors, while minimizing the confounding influence of memory. The result is a robust measure of visual orienting based on well-known spatial cueing effects; the Infant Orienting with Attention task (IOWA). Presented here are data from infants and adults that reveal the multi-process developmental nature of even simple visual orienting tasks. Using this task, we hope to begin to define the developmental trajectory of one very specific infant attentional behavior, and in so doing, reveal the developmental underpinnings of infant visual cognition in both typical and atypical development.

AGE DIFFERENCES IN TOP-DOWN CONTROL OF VISUAL ATTENTION DURING VIDEO VIEWING

Heather Kirkorian and Koeun Cho (University of Wisconsin-Madison)

Adults' visual attention is guided by both bottom-up and top-down control (Henderson, 2003), but attention development theories posit that top-down, endogenous control develops through early childhood (Columbo, 2001; Posner & Rothbart, 2007). In studies of adults' eye movements during video viewing, individual differences are low and fixations are strategic (e.g., fixate center of screen following cut) (Mital et al., 2010; Tosi et al., 1997). We explored age differences in top-down control during dynamic scene viewing. In Study 1, 1-year-olds, 4-year-olds, and adults (N=62) watched a 20-min segment of Sesame Street (author citation). Visual attention became more systematic with age indicated by decreasing individual differences, consistent with prior research using 4-sec clips (Frank et al., 2009). Moreover, only older viewers exhibited strategic fixations following cuts. In Study 2 (N=62), these age differences

were disrupted when video was rendered incomprehensible, suggesting that these differences are at least partly driven by top-down control (e.g., comprehension, story schema). In Study 3, we explored whether 1-year-olds, 4-year-olds, and adults (N=48) would anticipate the reappearance of objects following cuts to new scenes. Only adults reliably anticipated the reappearance, whereas infants' fixations to the objects were only reactive. Together these studies support the hypothesis that endogenous control of attention increases with age and extends prior research by examining developmental changes across infancy, early childhood, and adulthood using complex, dynamic stimuli.

TECHNOLOGY USE AND ATTENTIONAL CONTROL: POSITIVES AND NEGATIVES

C. Shawn Green (University of Wisconsin, Madison)

A large body of evidence suggests that long-term use of various forms of technology, video games in particular, alters fundamental aspects of the brain and behavior - from basic perception (Green & Bavelier, 2007) and speed of processing skills (Dye, Green, & Bavelier, 2009) to emotional processing and social behavior (Gentile et al., 2009). One area of both substantial practical and theoretical relevance relates to the effects of video game play on attention, both in children and in adults. Here the literature appears on the surface to be somewhat equivocal. While some have reported enhancements in attention (Green & Bavelier, 2012), others report diminished attentional abilities as a result of video game play (Gentile, Swing, Lim, & Khoo, 2012). We will present work from our lab that attempts to resolve this apparent contradiction by more closely considering two key points. The first is that "video games" is a label that is so broad as to lack all predictive value (encompassing everything from simple mobile apps to multi-million dollar highly realistic platform games). The second key point is that "attention" is a similarly broad term that encompasses many theoretically distinct abilities. Here we will present work that, indeed, different types of gaming or interactions with technology differentially affects separate aspects of attention (i.e. selective attention in highly dynamic environments versus sustained attention to unchanging or slowly changing stimuli).

THE AUTISM GIFT? VISUAL ATTENTION AND INCREASED PERCEPTUAL CAPACITY IN AUTISM SPECTRUM DISORDER

Anna Remington, John Swettenham (University College, Oxford) and Nilli Lavie (University College, London)

The attentional and perceptual abnormalities seen in Autism spectrum Disorder (ASD) are well documented (see Ames & Fletcher-Watson, 2010). As one of the earliest identifiable features of the condition (Zwaigenbaum et al., 2005; Elsabbagh et al., 2009; Merin, Young, Ozonoff, & Rogers, 2007), attention has become the focus of a growing body of research that highlights the numerous changes to such cognitive processes. Results in this area of research, however, are diverse and often conflicting. Our work aims to resolve this discrepancy by using the Load Theory of Attention and Cognitive Control (Lavie, 2005) to examine the issue. Load theory states that distractor processing depends on the extent to which a task engages full capacity (in conditions of high load) or leaves spare capacity (in low load conditions) that 'spills over' resulting in distractor processing. I will discuss how, by employing this framework, my research offers evidence for increased perceptual capacity, rather than a distraction deficit in ASD.

Ballroom D

NEW APPROACHES TO STUDYING EXECUTIVE FUNCTIONS

ORGANIZER: Christopher Erb (Brown University)

Executive functions (EFs) have been linked to a host of outcomes ranging across the lifespan, including school readiness, academic and professional success, and mental and physical health (for a review, see Diamond, 2011). However, many existing EF measures are limited in their sensitivity to developmental and individual differences. The goal of this symposium is to introduce recent methodological advances in the study of EFs, with a particular emphasis on continuous measures that (a) can be used across broad age ranges, including adults, (b) are sensitive to individual differences, and (c) provide new insight into the processes underlying EFs. The first paper (A. Fisher) introduces the Track-It task, a new measure of selective sustained attention (SSA). This task evaluates how endogenous and exogenous factors influence SSA across the lifespan, and is predictive of children's learning in applied settings. The second paper (C. Erb) presents research applying reach-tracking technology to the study of cognitive flexibility in 5-8-year-olds and adults. This technology provides a continuous measure of manual responses as they unfold over time, revealing new insights into how cognitive control is implemented during task switching. The third paper (D. Amso) presents a task for measuring hierarchically organized rule-guided behavior across the lifespan. Research with the task demonstrates that developmental change in rule-guided behavior may reflect

differences in one's ability to generate abstract rules, as distinct from improvements in general working memory skill. The discussant (Y. Munakata) will consider the implications of these new methods for broader issues facing the study of EFs.

DEVELOPMENT OF SELECTIVE SUSTAINED ATTENTION: CONCEPTUAL AND MEASUREMENT ISSUES

Anna Fisher, Erik Thiessen , John Dickerson, and Lucy Erickson (Carnegie Mellon University)

Selective sustained attention (SSA) is crucial for higher-order cognition. A number of theories suggest that early in life SSA is driven largely by exogenous factors (e.g., stimulus salience and novelty). With development, SSA becomes increasingly influenced by endogenous factors which are commonly described as core executive functions (i.e., inhibition and maintenance of goal representations). Despite the widespread consensus that the preschool years are the critical period in this transition, the contribution of exogenous and endogenous factors to SSA has been challenging to quantify, primarily due to the lack of appropriate experimental paradigms. Towards making progress on this issue, we developed the Track-It task - a measure of visual attention that can be used to dissociate exogenous and endogenous contributions to sustained attention in participants ranging from three years of age to adulthood. This task can measure either overt behavioral responses or patterns of eye movements to examine SSA. In this talk, we will discuss how these measures allow us to assess the differential contributions of endogenous and exogenous factors to SSA across development. As we will discuss, the Track-It task is sensitive to developmental as well as individual differences, and is predictive of performance on different types of learning tasks.

REACH TRAJECTORY TRACKING AS AN ONLINE MEASURE OF EXECUTIVE CONTROL

Christopher Erb, Jeff Moher, Joo-Hyun Song, & David M. Sobel (Brown University)

In order to exercise executive control, children must be able to coordinate processes that occur in parallel across cognition, action, and perception in a flexible, online fashion. Yet, many of the tasks used to investigate children's executive control feature discrete measures that provide limited information about the nature of these underlying processes. Such measures often lack the sensitivity required to track developmental trends over the lifespan or to capture individual differences in performance. Using reach trajectory tracking (RTT), we investigated the development of cognitive flexibility in adults and children 5 to 8 years of age. Participants were presented with a computerized version of the Dimensional Change Card Sort (Zelazo, 2006) while the trajectories of their manual responses were tracked and reaction times were measured. Children and adults' reactions times were significantly slower for responses following a rule switch, replicating work by Diamond and Kirkham (2005). Reaction time also significantly correlated with age. Children's reach trajectories were significantly more curved towards previously relevant targets following a rule switch, indicating that participants were temporarily 'pulled' toward incorrect response options despite providing accurate responses on the vast majority of trials. There was also evidence of improved curvature between ages 5-8. This work offers new insights into the developmental continuities and individual differences underlying executive control. In addition to reviewing these findings, we will discuss the potential implications of this new methodology for developmental theory.

THE DEVELOPMENT OF RULE-GUIDED BEHAVIOR IN THE TRANSITION FROM CHILDHOOD INTO ADOLESCENCE

Dima Amso & David Badre (Brown University)

The transition from middle childhood into adolescence is marked by extensive change in the child's environment, including changes in peer relations, independence, and academic demand. To manage this increased complexity, children must develop the ability to use abstract rules that guide the choice of behavior across a range of circumstances. Importantly, the variability and enrichment in a child's environment itself may influence developmental change in abstract rule use. Here, we tested children through adults in a task that requires increasing levels of rule abstraction, while separately manipulating competition among alternatives in working memory. We found that developmental change in rule-guided behavior can be explained only in terms of improvement in rule abstraction. Furthermore, family socioeconomic status (SES) uniquely predicted change in rule abstraction, such that higher SES predicted better performance with development. We discuss these results within a working memory gating framework for abstract rule use.

DISCUSSANT: Yuko Munakata (University of Colorado)

Ballroom E

ORAL PAPER SESSION: LANGUAGE DEVELOPMENT

CHAIR: Sandra Waxman (Northwestern University)

LANGUAGE AND MEMORY IN PREVERBAL CHILDREN: ADULT-PROVIDED LINGUISTIC SUPPORT AND CHILD LANGUAGE COMPREHENSION

Angela F. Lukowski (University of California, Irvine)

Adult language use shapes event memory in children. Supportive adult language has been shown to facilitate delayed recall and generalization across cues in preverbal children. In the current set of studies, we examined associations between supportive adult language use, child language comprehension, and recall memory and generalization across cues in preverbal children. Our data indicate that adult language use and child language comprehension are differentially and independently associated with immediate imitation and delayed generalization across cues but also serve to jointly structure event memory in the second year of life. We suggest that children with better comprehension abilities may be able to more effectively use adult-provided supportive language to shape their event memories for use over the long term. As such, adults may be able to facilitate the flexible application of knowledge through the provision of supportive language, ultimately enriching children's early understanding of the world in which they live.

THE ROLE OF EXPERIENCE IN LINKING SOUNDS AND MEANING IN LANGUAGE ACQUISITION

Danielle Perszyk (Northwestern University)

Human language is a unique evolutionary adaptation within the animal kingdom, and it is the most powerful means of shaping human thought and communication. By three months, infants prefer human speech and are beginning to establish a link between language and object categorization (Ferry, Hespos & Waxman, 2010). At this early age, non-human primate vocalizations (Madagascar, blue-eyed lemur: Eulemur macaco flavifrons) also facilitate this link. Within only a few months, infants' broad response to these primate calls is tuned to become specialized for human speech (Ferry, Hespos & Waxman, in press). Here we investigated the role of experience in this tuning process. We exposed seven-month-olds to lemur vocalizations for 10 minutes before the task. Our results indicate that this brief exposure enabled infants beyond the age at which they would have normally "tuned out" lemur vocalizations to remain "open" to them in linking sound with meaning.

CORRECTING FALSE-BELIEFS: WHEN DO TODDLERS USE LANGUAGE TO UPDATE THEIR KNOWLEDGE OF OTHERS' BELIEFS?

Valerie San Juan, Patricia Ganea, Katie Krutzelmann, and Vaunam Venkadasalam (University of Toronto)

Research has shown that 18-month-olds can update their representations of another person's belief using only verbal information (Song, Onishi, Baillargeon, & Fisher, 2008). However, other research has shown that older children have difficulty using verbal testimony to update their own representations of an object's location (Ganea & Harris, 2010). The current study was designed to address this discrepancy. Children (18- to 24-month-olds) view videos in which an agent fails to witness the displacement of a target object. A verbal statement about the object's location (e.g., "The ball is in the cup") is then presented in either the presence or absence of the agent. Preliminary results indicate that while toddlers can use verbal testimony to update their expectations about an agent's actions (i.e., where she will search for the object), they do not vary their predictions based on whether verbal information is privileged or shared between themselves and the agent.

HOW DO WORDS CUE ATTENTION? EVIDENCE FROM VISUAL SEARCH WITH YOUNG CHILDREN

Catarina Vales and Linda Smith (Indiana University)

What are the attentional consequences of learning words? Although research with adults (Estes, Verges & Barsalou, 2008; Lupyan, Rakinson & McClelland, 2007) and children (Christie & Gentner, 2007; Sloutsky, Lo & Fisher, 2001) has shown that language can modulate performance in many cognitive tasks, less is known about the mechanisms by which those linguistic effects develop. In this set of experiments we used a visual search task with young children to clarify the processes through which words direct attention. Before each search, the target object was either previewed in silence or named. We found evidence that words can rapidly modulate what children attend to, decreasing overall reaction times. The results suggest that words enhance the working memory representation of the objects they refer

to, consequently directing attention to objects that better match that representation. The implications of these results to the development of linguistic biases on attention will be discussed.

COLOR WORD COMPREHENSION PRECEDES PRODUCTION

Katie Wagner, Jill Jergens, and David Barner (University of California, San Diego)

Children use color words in a seemingly haphazard manner before mastering adult meanings. The most common explanation is that children struggle to abstract color properties as a domain of linguistic meaning, and this results in a stage in which children produce but do not comprehend color words. However, recent evidence suggests that children's early usage of color words is not random, but instead children acquire partial but systematic meanings prior to acquiring adult-like meanings. Here we provide evidence that infants acquire color word meanings even before beginning to produce them. Parent reports, a color word production task, and an eye-tracking comprehension task provide converging evidence that partial color word meanings precede production. We conclude that in most children color word comprehension precedes production, and this rules out the idea that children's late acquisition of adult-like meanings is due to a failure to abstract color as a domain of linguistic meaning.

FRIDAY, OCTOBER 18, 4:00PM – 5:45PM
SYMPOSIA AND ORAL PAPERS

Room 204/205

GOING BEYOND WORDS: CHILDREN'S USE OF PRAGMATIC CUES IN EVALUATING COMMUNICATION

ORGANIZER: Alia Martin (Yale University)

Understanding communication goes beyond associating words with referents in the world. Mature communicators use a rich array of pragmatic factors to decode communication, recognizing that even a simple utterance could have different meanings depending on factors like shared knowledge, relevance, and prior information about the communicator's intentions and actions. This symposium examines how children use pragmatic cues to decode meaning. Studies 1 and 2 focus on how children use features of a speaker (e.g., common ground and intentions) to interpret communication. Ganea & Saylor find that 15- and 18-month-olds can use their common ground with a speaker, as well the speaker's previous reference, to interpret the speaker's ambiguous reference to an absent object. Martin & Vouloumanos find that 16-month-olds weigh the importance of common ground against a speaker's underlying intentions in interpreting a third-party communicative interaction. Studies 3 and 4 examine how children use features of messages (e.g., relevance and accuracy) to evaluate communication. Graham et al. find that 24-month-olds attribute meaning to unconventional labels only when they might be relevant to a future interaction. Cole & Koenig show that the ability to evaluate a speaker's accuracy (but not benevolence) increases between ages 3 and 5, and that evaluations of benevolence and accuracy affect each other. Together, our work suggests that infants use pragmatic cues to evaluate communication as early as the second year of life. Children's ability to interpret multiple cues to meaning suggests that they can already navigate some of the complexities and ambiguities inherent in communication.

INFANTS' USE OF SHARED EXPERIENCE TO DECODE REFERENCES TO ABSENT OBJECTS

Patricia Ganea (University of Toronto) and Megan Saylor (Vanderbilt University)

Mature speakers keep track of and use the common ground with the speaker to make inferences about intended referents. In this talk we will present data on infants' ability to use information from a person's past behavior and speech to make inferences about ambiguous requests for absent objects. In one paradigm, two researchers played with infants separately with one of two different objects (a red ball or a blue ball). The objects were placed in opaque containers, and one researcher asked infants to retrieve an object using an ambiguous request ("Where's the ball?"). Infants successfully used the researcher's previous experience to interpret her request. They did so by regularly approaching the container that held the object she played with. Importantly, infants' tendency to do so was tied to their interpretation of the request; when the researcher did not verbally request an object (but merely sat in front of the objects' containers) infants did not reliably select her object. In another paradigm, an experimenter mentioned an

absent object (e.g., telephone) several times while looking around for it. After the experimenter searched for the object, she opened a door to another room where she found 2 objects (e.g., telephone and duck) and asked the child, "Can you give it to me?" Both 15- and 18-month-olds used the speaker's previous reference to the absent object to interpret the request. When the request was made by a person who did not participate in the conversation, the infants did not use the prior verbal information. These findings suggest that infants use others' knowledge of objects (as reflected in tracking what others have had experience with and what other have previously said) to interpret ambiguous request for absent objects.

SIXTEEN-MONTH-OLDS RECOGNIZE THE ROLES OF COMMON GROUND AND INTENTIONS IN THIRD PARTY COMMUNICATION

Alia Martin (Yale University) and Athena Vouloumanos (New York University)

Pragmatic inferences are often required to resolve communicative ambiguity. For instance, a listener might consider the common ground she shares with a speaker (e.g., "She must mean the one that we can both see"), and information about the speaker's intentions (e.g., "She must mean the one she can use"), to interpret the speaker's utterance. We investigated 16-month-olds' understanding of the roles of common ground and prior intentions in a third-party communicative interaction. In each experiment, infants observed a communicative interaction in which a speaker directed an utterance, "I want the key", to a listener. The utterance was ambiguous from the infant's point of view because there were always two keys on the table. The listener then offered a key. In Experiment 1, the listener could see both keys but the speaker could see only one. Infants looked longer when the listener offered the key that was not in common ground. In Experiment 2, the listener had prior information that only one key functioned to open a box, and that the speaker had the intention of opening the box. Infants looked longer when the listener offered the dysfunctional key. In Experiment 3, common ground and intentions were placed in conflict: the dysfunctional key was the key in common ground. Infants showed a trend toward looking longer when the listener provided the dysfunctional key. By 16 months, infants use information about common ground and intentions to interpret communicative interactions, and may start to recognize when one type of information should be privileged.

FLEXIBILITY IN SELECTIVE LEARNING: 24-MONTH-OLDS WILL LEARN UNCONVENTIONAL LABELS FROM UNCONVENTIONAL ACTORS

Susan Graham (University of Calgary), Annette Henderson (University of Auckland), and Vanessa Schell (University of Calgary)

A large body of empirical research has demonstrated that preschoolers are highly selective word learners. They will, however, demonstrate flexibility in their selective learning, if they are given a reason to think a label might be relevant in the current context. Here we examined whether 24-month-olds also demonstrate flexibility in their selective word learning. Specifically, we asked whether infants acquire an unconventional object label, such as a nonlinguistic sound, if they have reason to suspect that the label will be relevant in the current context. In Experiment 1, we familiarized 24-month-olds to an actor whose object-directed actions were either conventional (e.g., pretended to eat soup with a toy spoon) or unconventional (e.g., used the spoon to brush her hair). The actor then labeled a novel object using a conventional label (i.e., a word) or an unconventional label (i.e., a sound). In Experiment 2, 24-month-olds were familiarized to an actor who acted on object in an unconventional manner, but were taught an unconventional label by a second speaker who was not present during the familiarization period. Performance on a comprehension test revealed that infants correctly extended word labels regardless of whether the labels had been offered by a conventional or unconventional actor. Infants only learned sound labels when an unconventional actor provided the labels. This is the first evidence that toddlers, like preschoolers, will learn unconventional labels if they are given reason to suspect such labels will be useful. Results will be discussed in the context of relevance theory.

CHILDREN'S EVALUATIONS OF MESSAGES AND SPEAKERS: INTEGRATING ACCURACY AND BENEVOLENCE

Caitlin Cole & Melissa Koenig (University of Minnesota)

Young children are sensitive to speakers' accuracy (e.g., Koenig & Harris, 2005) and benevolence (e.g., Mascaro & Sperber, 2009) and use this information to evaluate informants. In two studies, we assessed preschoolers' integration of these two dimensions while evaluating messages (Study 1) and speakers (Study 2). In Study 1, 3-,4-,and 5-year-olds (N=50) viewed four speakers who each made one of four types of statements: Nice-True, Mean-False, Nice-False, or Mean-True. Half of the children evaluated the statements' benevolence and half evaluated the statements'

accuracy. All age groups correctly classified all statement types in terms of benevolence, but age groups differed in their classifications of statements in terms of accuracy. Three-year-olds conflated benevolence and accuracy, classifying mean statements as "false" and nice statements as "true." Older children were more successful at evaluating statements' accuracy. In Study 2, another group of 3-, 4-, and 5-year-olds (N=98) viewed a single speaker who consistently made statements of one of the four types above. We asked children to rate how much they liked the speaker. Results showed that the speaker's benevolence supported recognition of her accuracy (children distinguished Nice-False and Nice-True speakers but not Mean-False and Mean-True speakers), and the speakers' accuracy supported recognition of her benevolence (children distinguished Nice-True and Mean-True speakers but not Nice-False and Mean-False speakers). Thus, positive or default values in one dimension (i.e., accuracy or benevolence) supported children's ability to recognize and evaluate the other dimension whereas negativity in benevolence or accuracy hampered children's ability to evaluate the other dimension.

Ballroom C

EARLY NON-VERBAL NUMERICAL INTUITIONS AND MATHEMATICS DEVELOPMENT: ESTABLISHING CAUSALITY THROUGH EXPERIMENTAL TRAINING STUDIES

ORGANIZER: Daniel C. Hyde (University of Illinois, Urbana-Champaign)

Humans have a rich set of non-verbal numerical intuitions, which are present from early infancy and are thought to guide early mathematics development. Recent work has shown that individual differences in these primitive, non-verbal numerical abilities correlate with symbolic mathematics performance. From correlational work alone, however, it is unclear if non-verbal numerical abilities play a causal role in the development of symbolic mathematics, if mathematics development influences non-verbal number systems, or if additional factors mediate this relationship. Several independent groups are now employing experimental training paradigms to better understand the direction of this relationship. The purpose of this symposium is to highlight emerging empirical results from four of the world's leading research groups on early mathematics and cognitive development. Despite diverse training procedures and outcome measures, each group reports success in training non-verbal numerical intuitions to enhance symbolic math performance. Together, these results suggest that non-verbal numerical intuitions may play a causal role in the development of uniquely human symbolic mathematics. Furthermore, these results suggest content and methods for early math curriculum and educational intervention.

BRIEF NON-SYMBOLIC NUMERICAL TRAINING ENHANCES SYMBOLIC ARITHMETIC IN CHILDREN

Daniel C. Hyde (University of Illinois, Urbana-Champaign), Saeeda Khanum (Quaid-i-Azam University), and Elizabeth S. Spelke (Harvard University)

Recent research reveals a correlation between individual differences in mathematics achievement and performance on tasks that activate the approximate number system (ANS): a cognitive system shared by diverse animal species and by humans of all ages. Here we used a brief experimental training paradigm to test one causal hypothesis suggested by this relationship: activation of the ANS may enhance children's performance of symbolic arithmetic. Over 4 experiments, children who briefly practiced training tasks that engaged primitive approximate numerical quantities performed better on subsequent exact, symbolic arithmetic problems than did children given control tasks involving comparison and manipulation of non-numerical magnitudes (brightness and length). In contrast, no enhanced performance was observed on a subsequent reading task of comparable difficulty, providing evidence that the effects of ANS activation were specific to mathematics. These results move beyond correlational research and provide evidence that the exercise of non-symbolic numerical processes can enhance performance of symbolic math.

NON-SYMBOLIC APPROXIMATE ARITHMETIC TRAINING IMPROVES MATH PROFICIENCY IN ADULTS AND CHILDREN

Joonkoo Park and Elizabeth M. Brannon (Duke University)

The approximate number system (ANS) permits estimation and rough calculation of number without symbols. Recent studies both in young children and in adults have shown that the acuity of the ANS correlates with formally learned symbolic math performance. While these findings have led to a proposition that the ANS serves as a cognitive foundation for the uniquely human capacity for symbolic mathematics, a causal link between the ANS and symbolic mathematics has not yet been tested. Here, in two experiments with adult participants in a pre- and post-test training paradigm, we show that ANS training on non-symbolic approximate arithmetic selectively improves symbolic

arithmetic. That is, adult participants who underwent multiple days of approximate arithmetic training showed significant improvement in a multi-digit addition and subtraction test from pre-test to post-test, compared to control group participants. This effect was replicated in a third pilot experiment with first and second grade children. Children who completed between six to ten 15-minute sessions of approximate arithmetic training showed greater improvement in the symbolic arithmetic assessment and the TEMA-3 (Test of Early Mathematics Achievement, version 3) relative to children in a no-contact control group. These findings support the hypothesis that complex math skills are founded on rudimentary preverbal quantitative abilities. They also raise the possibility that math interventions via ANS training could benefit young children even before they are introduced to formal math instructions.

USING SYMMETRY TO TEACH AND LEARN THE INTEGERS

Jessica M. Tsang, Kristen P. Blair, and Daniel L. Schwartz (Stanford University)

Babies, monkeys, and even insects can detect symmetry in their surroundings. Can this ubiquitous perceptual capacity be harnessed for symbolic numerical understanding? Existing behavioral and functional Magnetic Resonance Imaging (fMRI) research suggests that adults use symmetry processing when thinking about the integers – positive and negative whole numbers and zero – even though negative integers and zero represent imperceptible quantities (one cannot see negative three things). Current integers curricula do not emphasize symmetry about zero. Therefore, third- and fourth-grade children (n= 74) were taught integer concepts and arithmetic in a classroom setting either with a symmetry focus or without a symmetry focus. Results showed all condition led to equal gains in symbolic fluency. However, the symmetry curriculum led to greater improvements in students' abilities to model and solve real-world problems. This research extends the notion that numerical intuitions contribute to basic symbolic number processing by beginning to address whether and how perceptual abilities support our understanding of math beyond the natural numbers.

INTERVENTION AND TRANSFER IN THE APPROXIMATE NUMBER SYSTEM (ANS)

Justin Halberda, Justin Halberda, Melissa Libertus, Jenny Wang, Darko Odic, and Lisa Feigenson (Johns Hopkins University)

Here we show that the precision of the Approximate Number System (ANS) is plastic in young children, and that the benefits of training transfer broadly. First, (N=40) 5-year-olds participated in 8-minutes of ANS confidence training that scaffolded them towards making finer and finer numerical discriminations. We found improved ANS precision (compared to a control group) and superior performance in a symbolic math task (TEMA-3) administered immediately after the ANS task and that these improvements did not transfer to a vocabulary task (PPVT-4). Second, (N = 85) 4- to 7-year-old children from a 4-year longitudinal cohort trained at home with 4-week scaffolded visual ANS confidence training or with phonological awareness training. We found that the ANS-trained children had greater improvements in visual ANS precision (i.e., they were faster than phonological awareness-trained children) and that these improvements generalized to an auditory ANS task. We also observed improvements in ordering of numerical symbols and numeral writing 3 months following the conclusion of our training program. We take the ANS to be a model system of how the more abstract representations of the dorsal stream may be responsive to training and how their precision can affect cognition quite broadly.

Ballroom D

NEW PERSPECTIVES ON SOCIAL EVENT MEMORY IN YOUNG CHILDREN

ORGANIZER: Laura Howard (University of Chicago)

This symposium will present newly emerging findings that reveal interactions between social cognition and the processes involved in encoding and remembering events during early childhood. Social environments are complex and information-rich. It has long been known that older children's and adults' event memory is supported by top-down knowledge about people's goals and intentions, as is evident in their verbal recollections of narrative events (see Bower & Rinck, 1999). Other work has shown that nonverbal representations of others' goals are evident even during infancy (e.g., Woodward, 1998). New findings, presented here, have begun to reveal the interplay between social cognition and more general cognitive functions in segmenting and remembering events. The goal of this symposium is to highlight new and converging findings focusing on how children understand and remember social events. Paper one (Howard & Woodward) will report results showing that the inclusion of an agent in an event alters attention patterns, neural responses, and memory for simple sequences in young children. Paper two (Loucks &

Meltzoff) will examine whether higher-level goal structures are used when remembering familiar versus unfamiliar actions. Paper three (Baldwin) will investigate role of executive function in event segmentation and memory for goal-directed actions. Together, this symposium will shed new light on the way children perceive, comprehend, and recall events that involve social beings. The discussant, Vikram Jaswal, whose work examines the contexts and conditions under which children learn from social partners, will evaluate these new findings in the broader context of social cognition during early childhood.

LEARNING FROM OTHERS: EFFECTS OF AGENCY ON EVENT MEMORY IN CHILDREN

Lauren Howard and Amanda Woodward (University of Chicago)

Research suggests that the inclusion of a person in an event affords goal-specific segmentation and increased memory in older children and adults (see Foss & Bower, 1986; Trabasso, Stein, Rodkin, & Munger, 1992; Anderson & Conway, 1997). However, the effect of agency on young children's event memory is virtually unknown. Across 3 studies, we examined the developmental significance of agentive events (e.g., those including a person) on memory in 3-year-old children. Study 1 demonstrated that children who viewed an agentive event remembered significantly more at test than those who saw the same event without an agent. Study 2 examined global and fine-grained attention patterns to the events on a Tobii eye-tracking screen. In Study 3, the neural signature in response to an agentive vs. non-agentive event was examined via event-related potential (ERP) waveforms. Results demonstrate that the inclusion of a person increases memory for an event in young children. This is seen via behavioral reconstruction measures, in the neural signature, and is not due to global attention differences across conditions. Of particular interest is the fact that focusing on the agent (looking at her hands or face) is positively correlated with recall for the event, though such glances take attention away from the to-be-remembered items. Our findings suggest that people are particularly important for learning and memory in young children. The simple inclusion of a person creates a social framework that is not found in non-agent events. Preliminary data examining this phenomenon in infancy will also be discussed.

HOW GOAL INFERENCES STRUCTURE YOUNG CHILDREN'S MEMORY AND IMITATION FOR NOVEL ACTION SEQUENCES

Jeff Loucks (University of Regina) and Andrew Meltzoff (University of Washington)

Observers of human action typically place more emphasis on underlying goals over the means by which goals are carried out. Goals can be represented hierarchically, with sub-goals (e.g., get mug, pour coffee, add cream) fulfilling a higher-level goal (e.g., make a cup of coffee). But sometimes higher-level goals are interleaved together in their execution: an actor may be distracted by another task, or may purposefully be multitasking. In such cases, do learners prioritize information about the hierarchical goal structure or the sequential structure (the temporal order of the actions)? Loucks & Meltzoff (2013) recently found that 3-year-old children's action memory prioritizes hierarchical goal structure over sequential structure, to the extent that they reorganize interleaved sequences according to goals. In their task, children observed an adult carry out two familiar goals in an interleaved fashion (goal A and goal B, sequenced (A1, A2, B1, A3, B2, B3). Children predominantly imitated the actor by grouping the goals together (e.g, A1, A2, A3), to the same extent as children who saw the goals grouped together in the demonstration. But what happens when higher-level goals are relatively novel, as is often the case for young children, who are acquiring cultural action sequences? If children cannot infer the overarching goal, then sequential organization may be prioritized in memory. In the present talk, we will present ongoing research that addresses this issue, by examining 3-year-old children's memory for interleaved action sequences in which all, some, or none of the higher-level goals are familiar.

DELVING INTO DEVELOPMENTS IN EVENT PROCESSING

Dare Baldwin (University of Oregon)

This much is obvious: children's understanding of events is often quite different from adults'. Imagine a two-year-old's take on a high-stakes poker game, for example; no doubt it would be quite different from that of any adult with even a passing knowledge of poker. Precisely what is changing to give rise to such developmental differences in event processing? Recent research of my own and others' indicates that skilled event processing involves flexible deployment of selective attention to key, information-rich portions of a given event stream. Thus developmental change in event processing seems in part due to increasing knowledge and/or experience that highlights what is relevant or significant within dynamically unfolding events, and hence deserving of selective attention. Of course, individuals differ in their ability to flexibly deploy selective attention. Such executive function differences are

apparent early in life, and they may predict children's developmental trajectories in event processing skill. Our recent research provides initial evidence confirming such a relation. In particular, children who perform well on tests of executive function a) display sensitivity to segmental structure within goal-directed action events, b) show strong recognition memory for event content, and c) are successful at re-enacting intentional event sequences; children whose executive skills are poor lag in all these respects. These findings suggest that developing executive function skills "sharpen" children's event processing, thereby enhancing their ability to learn from others and to make sense of the happenings of their lives.

DISCUSSANT: Vikram Jaswal (University of Virginia)

Ballroom E

ORAL PAPER SESSION: INFANT LEARNING AND DEVELOPMENT

CHAIR: Cathy Sandhofer (University of California, Los Angeles)

NINE-MONTH-OLD INFANTS' UNDERSTANDING OF ACTIONS: WHAT'S PRIMING GOT TO DO WITH IT?

Ty W. Boyer (Georgia Southern University), Sam Harding (Indiana University), and Bennett I. Bertenthal (Indiana University)

Is it necessary for infants to perceive a fully specified human form in order to simulate a goal-directed action? Three experiments tested for simulation using an observation version of the A-not- B paradigm, where simulation of the experimenter's reaches results in infants committing a perseverative error. Here, unlike previous studies, only the experimenter's hands were visible, without any verbal input (Experiment 1), with verbal input (Experiment 2), and after infants' were primed with a representation of the experimenter's full body before hiding all but his hands behind a curtain (Experiment 3). The results revealed that infants only simulate the experimenter's reach following priming in Experiment 3. This suggests that infants differentiate disembodied from fully specified hands, do not simulate disembodied hands unless the representation is linked with a fully specified body, and that recent experience modifies infants' understanding of goal-directed agents.

BECOMING HUMAN FACE DETECTION SPECIALISTS: HUMAN FACES CAPTURE ATTENTION MORE QUICKLY THAN ANIMAL FACES IN 11-MONTH-OLDS, BUT NOT 4- AND 6-MONTH-OLDS

Krisztina V. Jakobsen, Lindsey Umstead, Veronica Eisenmann, Sidney Cover, and Elizabeth A. Simpson (James Madison University)

Faces indicate fitness-relevant challenges (e.g., threats) and opportunities (e.g., maternal care), and therefore, are important stimuli to monitor. In support of this hypothesis, adults appear better at detecting human faces than other visual stimuli. We tested whether infants likewise exhibit a human face detection advantage. We predicted that younger infants—who have not yet specialized in processing human faces—would orient equally fast to human and animal faces, whereas older infants and adults would orient faster to human faces. Using eye tracking, we examined 4- to 11-month-olds' (n=41) and adults' (n=43) passive viewing of human, primate, and mammal faces, presented in heterogeneous 9- and 25-item arrays. Our results support our hypotheses: young infants appear to be face detection generalists, but 11-month-olds exhibit a human face detection advantage. We propose that face discrimination models (e.g., perceptual narrowing, learned attention) may be useful for modeling the development of face detection.

WHAT DO INFANTS FACE? STATISTICAL REGULARITIES IN INFANTS' NATURAL ENVIRONMENTS

Swapnaa Jayaraman (Indiana University)

The development of face processing in humans has been studied extensively with considerable emphasis on and debate over the role of input. Statistical properties of face experience are considered to influence the unique properties of human face processing (Kanwisher, 2000; Mondloch_et_al, 2010). To understand these regularities in infant environments, we use head cameras that infants wear during daily activities at home to measure the changing statistical structures of face input available in visual environments across development. We present findings on the natural statistics of face exposure that infants typically receive in their first year. Faces available in view (frequency, duration, number of identities, size, and orientation) are analyzed as a function of age. Results suggest that faces in the learning environment are ordered in time such that young infants receive richly clustered input early in development that sets their systems on a path towards expertise in face processing and recognition.

INFANTS' SENSITIVITY TO STATISTICAL REGULARITIES AND STIMULUS COMPLEXITY IN VISUAL SEQUENCES

Lauren Krogh and Scott P. Johnson (University of California, Los Angeles)

Recent studies suggest that humans discriminate random from structured visual sequences from birth (Bulf et al., 2011; Kirkham et al., 2002). However, these studies did not investigate infants' ability to extract statistical regularities from visual sequences or segment sequences based upon these regularities. The present series of studies investigated 2- to 8-month-olds' ability to distinguish random from structured visual shape sequences, as well as extract and segment these sequences based on statistics such as transitional probability and frequency. Results suggest infants discriminate random from structured sequences under several tested conditions, but there is no evidence they segment the same sequences based on statistical information; segmentation based on statistics appears to be constrained by stimulus complexity and the developmental state of the learner. These findings have implications for the domain-general nature of statistical learning, as they contrast sharply with findings on infant's auditory statistical learning ability (e.g., Saffran et al., 1996).

THE IMPACT OF ACTION-SPECIFIC EXPERIENCE ON THE NEURAL PROCESSING OF OTHERS' ACTIONS DURING INFANCY

Michaela Upshaw, Jessica A. Sommerville, and Raphael Bernier (University of Washington)

Research has established that, in adults, the neural processing of others' actions is affected by one's own action experience. Using an EEG paradigm we investigated the impact of action experience on the neural processing of others' actions, by measuring the central mu rhythm, a neural frequency that becomes attenuated both during the production and observation of action, while 12-month-old infants produced and observed a skilled action (lifting blocks). Mu attenuation was present during action production, but varied during action observation as a function of infants' task experience with lifting the blocks: infants who frequently lifted the blocks showed significant mu attenuation whereas infants that infrequently lifted the blocks did not. In contrast, experience manipulating the blocks more broadly (pushing the blocks) had no impact on mu attenuation during action observation. These findings suggest that the neural processing of others' actions is tightly linked to infants' experience producing the witnessed action.

SATURDAY, OCTOBER 19, 8:30AM – 9:30 AM

PLENARY TALK

Ballroom CDE

EARLY SOCIOMORAL REASONING

Renee Baillargeon (University of Illinois, Urbana-Champaign)

Recent research indicates that infants and toddlers possess rich expectations about how social interactions among individuals will unfold. My collaborators and I have been examining what sociomoral principles guide these early expectations. Results so far support three main conclusions. First, infants and toddlers generally expect individuals to act in accordance with principles of fairness, no-harm, reciprocity, and (when individuals are identified as members of the same social group) ingroup affinity. Second, these four principles interact in subtle ways. In some cases, principles modulate expectations set by other principles; in other cases, competing principles must be rank-ordered, and infants must learn the orderings preferred within their sociocultural environments. Finally, taken together, the principles make clear that infants do not expect all individuals to be treated positively, nor do they expect outgroup individuals to necessarily be treated negatively; rather, infants expect ingroup individuals to be treated preferentially, with support and loyalty.

SATURDAY, OCTOBER 19, 10:00AM – 11:45AM

PLENARY SYMPOSIUM

Ballroom CDE

THINKING, TALKING, AND DOING-OR NOT: RELATIONS AMONG THOUGHT, LANGUAGE, AND ACTION

ORGANIZER: Judy DeLoache (University of Virginia)

IT JUST AIN'T SO

Karen Adolph (New York University)

In this presentation, I refute three entrenched beliefs about the development of locomotion: That alternating leg movements form the basis for infant walking; that locomotor development proceeds in a series of functionally connected stages; and that infants avoid going over the edge of a drop-off because they are afraid of heights. These long-held beliefs have guided research for decades and are treated as facts in introductory textbooks. However, recent research indicates that, for each one, "it just ain't so." I present evidence to counter these claims about the development of locomotion and suggest a different view of how infants learn to walk.

SENSITIVE PERIODS IN HUMAN DEVELOPMENT: LESSONS FROM THE BUCHAREST EARLY INVENTION PROJECT

Nathan Fox (University of Maryland)

Developmental psychologists and educators assume that early experiences shape the brain's neural circuitry for emerging cognitive and social behaviors and that the first years of life represent critical or sensitive periods for these processes. Most of the evidence for these assumptions is based on rodent and non-human primate animal research. Far less has been published on the effects of early experience that is not correlational in nature. The Bucharest Early Intervention Project, a randomized control trial of foster care intervention for young children living in institutions in Romania, provides the opportunity to examine the effects of early severe psychological deprivation on brain and behavior and allows examination of the presence of sensitive periods. Three questions will be posed in this talk: first, are there lasting effects of early psychosocial deprivation as children develop over the school years. Second, is intervention successful in ameliorating deficits that are a result of early deprivation? And third, are there sensitive periods in delivering the intervention that explain both success and failure to improve cognitive and socio-emotional behavior.

DEVELOPING INHIBITORY CONTROL

Yuko Munakata (University of Colorado)

Children show remarkable limitations in their ability to inhibit inappropriate thoughts, utterances, and actions. The development of inhibitory control is essential in life, but targeted intervention efforts have shown limited success. Two theoretical advances suggest an alternative approach. First, a core component of mature inhibitory control is the ability to proactively monitor the environment for signals that indicate the need to inhibit. Second, children transition from reactive (in-the-moment) forms of executive function to increasingly proactive (anticipatory) forms. Together, these advances suggest that children's struggles with inhibitory control reflect the prolonged development of proactive control. We test implications of this framework for improving children's inhibitory control, by supporting reactive control in 3-4 year-olds, and training proactive control in 7-9 year-olds. The findings are promising, but the development of executive function comes with costs as well as benefits, raising issues of when and whether to intervene.

SATURDAY, OCTOBER 19, 2:00PM – 3:45PM
SYMPOSIA AND ORAL PAPERS

Room 204/205

DEVELOPMENTAL ORIGINS OF THE MORAL SENSE

ORGANIZER: Joshua Rottman (Boston University)

How do babies evaluate their social world, and what factors contribute to the later elaboration of this early-developing moral sense? This symposium addresses the roots of moral cognition in infancy and its development during childhood. Our first speaker will provide evidence for the selectivity of early social evaluations. In particular, she will present research demonstrating that infants will reliably evaluate actors only when their prosocial or antisocial actions are directed toward an agent who exhibits signs of goal-directedness. Our second speaker will present data showing that infants have an early-emerging understanding of fairness. He finds that 10-month-olds prefer to look at scenes in which antisocial actions are directed toward unfair, rather than fair, agents. Our third speaker will discuss her utilization of the CHILDES database in a longitudinal examination of the role of pretend play in children's moral development from 2 to 5 years of age. Her analysis demonstrates that pretend play serves an important exploratory function for young children as they begin confronting moral issues in their daily lives. Our final speaker will introduce another pathway for moral learning: the acquisition of new moral beliefs via adult testimony. He will present research showing that 7-year-olds readily form novel moral beliefs when they are told that actions are disgusting but not when the emotion of disgust is induced. In sum, this symposium contains new cutting-edge research from scholars with a broad range of expertise in moral development, thereby consolidating emerging understandings of the complex developmental origins of the moral sense.

YOU'VE GOTTA HAVE A GOAL TO GET HELPED: SELECTIVITY IN PREVERBAL INFANTS' SOCIAL EVALUATIONS

J. Kiley Hamlin (University of British Columbia)

Preverbal infants have been shown to prefer helpful to unhelpful others (e.g., Hamlin et al., 2007), but what inferences constrain infants' preferences? This talk will present a series of studies examining the role of recipient mental states in early social evaluations. In 4 studies, infants chose between a character who pushed a "(C)limber" to the top of a hill and a character who pushed C to the bottom of the hill. Across studies, though C always moved up and down the hill twice before being pushed up or down, the presence of cues to whether C had the goal to reach the top of the hill were varied. First, in 2 studies C's eyes pointed constantly toward the top of the hill; in 2 they were unfixed. Second, in 3 studies C decelerated while ascending the hill and accelerated while descending as though the climb were a struggle; in 1 there were no acceleration changes. Finally, in 1 study C bounced upon reaching the top of the hill; in 3 he did not. Infants' choices suggested that whether or not C demonstrates a clear goal to reach the top of the hill is an essential aspect of their evaluations of individuals who pushed C up and down the hill, but bouncing is not. Infants preferred the "Helper" in all studies in which C's eyes were fixed uphill; bouncing had no systematic influence on infants' choices. These results highlight the critical role of mental states in early social evaluation.

INFANTS' REACTIONS TO PUNISHMENT OF FAIR AND UNFAIR AGENTS

Luca Surian (University of Trento) and Marek Meristo (University of Gothenburg)

Do infants have a sense of fairness? The present study investigated this question by testing whether 10-month-olds react differently to events that instantiate punishments performed toward fair and unfair agents. Infants were first familiarized with two agents (i.e. simple geometrical shapes) that distributed resources to two identical possible recipients. One agent always distributed the goods fairly (equally), while the other always performed an unfair (unequal) distribution by giving all to one recipient. In the test phase of the first experiment, infants then saw a third agent, an orange circle, hitting and pushing away either the fair or the unfair distributor. Infants looked reliably longer at the latter event in which the hitting was directed towards the unfair agent. In the test phase of the second experiment, a strawberry was placed close to each of the two distributors and a human hand was depicted to behave antisocially towards the fair or unfair distributor by taking away one of the strawberries. Once again, infants looked longer when the antisocial actions were directed towards the unfair agent. We argue that the results of the present experiments suggest that infants evaluated fair agents more positively than unfair agents, encoded the antisocial character of the third agent's action in the test phase, and preferred to look at test events that were more coherent

with the events seen in the familiarization phase. We discuss the implications of these findings for theories claiming continuity or discontinuity in the development of implicit and explicit representations underpinning socio-moral cognition.

THE ROLE OF PRETEND PLAY IN YOUNG CHILDREN'S MORAL DEVELOPMENT

Jennifer Cole Wright, Anna Grace Burnett, Nathan Wills, and Sarah James (College of Charleston)

How do children first learn about, and begin to explore, the moral domain? While research has identified several different opportunities for moral learning, one area that has received less attention is pretend play. We hypothesized that pretend play serves as an important context for moral learning in two ways. First, it provides opportunities for positive/negative moral evaluation – e.g., when a caregiver chastises a child for shooting an imaginary gun because "we don't shoot guns, they hurt people". Second, it provides opportunities for moral exploration, as children take on/explore various "moral themes", both fantastical (e.g., a "brave knight" fighting an evil dragon) and realistic (e.g., a fire-fighter/ nurse). Using the CHILDES database, we studied five children (three boys/two girls) from 2.0 to 5.0-years-old. We coded separately for when they engaged in pretend play and when morally relevant parent/child dialogue occurred, mapping the extent to which these two overlapped. While there was a developmental decrease in the frequency of moral dialogue in general, there was no developmental change in the frequency of moral dialogue within the context of pretend play. We then coded that overlap for whether it involved moral evaluation or exploration, finding that while always present their prevalence changed, with evaluation decreasing and exploration increasing over time. Additional findings suggest that not only do children increasingly use pretend play as a medium through which to explore moral themes, doing so allows for an increased sensitivity to the feelings, dispositions, and behaviors of those (real/imaginary) with whom they interact.

CHILDREN'S ACQUISITION OF NEW MORAL BELIEFS: THE ROLE OF TESTIMONY

Joshua Rottman (Boston University), Liane Young (Boston College), Deborah Kelemen (Boston University)

Traditional perspectives on moral acquisition have focused on children's active construction of moral beliefs through firsthand experience (e.g., Turiel, 1983). In contrast to cases where negative consequences (e.g., suffering) are apparent, adult testimony may be necessary for the formation of moral beliefs that do not involve perceivable harm (e.g., taboos). Indeed, this testimony may be a more powerful mechanism of moralization than emotional responses, contrary to social intuitionist models of morality (e.g., Haidt, 2001). To test this, seven-year-old children were presented with 12 scenarios describing anthropomorphic aliens engaging in novel behaviors involving their bodies or the environment (e.g., walking around with fake legs; putting cottonballs in the forest), which did not impact others' welfare. Children were asked to judge whether each behavior was "wrong" or "OK." In the "Smell" condition, participants were exposed to an ambient disgusting odor. In the "Testimony" condition, participants were told that the novel behaviors were "disgusting" and "gross." In the "Control" condition, neither of these manipulations was present. Findings demonstrated that, relative to the Control condition in which participants judged the actions to be permissible, moral wrongness judgments were significantly elevated in the Testimony condition but not the Smell condition. This research is consistent with a socialization model of moral acquisition in which testimony is a key contributor to moralization in children. This research also suggests that, although the induction of emotions like disgust has been found to change adult moral judgments, this may not substantially contribute to the developmental acquisition of novel moral beliefs.

Ballroom C

HOW WORDS BECOME LABELS: STATISTICAL, PERCEPTUAL, AND SOCIAL CONTEXTS FOR LANGUAGE LEARNING AND USE

ORGANIZER: Lucy Erickson (Carnegie Mellon University)

A great deal of language acquisition research has focused on whether "speech is special": whether vocal input activates unique processes. While there is evidence that speech can influence learning in ways that non-speech does not, it is unclear how much of this difference is due to the effect of speech itself. After all, except for controlled experiments, speech never occurs in isolation of meaningful contexts, and infants have different kinds of experience with speech than with non-speech stimuli. This symposium will explore labeling, a fundamentally linguistic phenomenon. Each speaker will demonstrate that the mere presence of speech may not be sufficient for learning word-to-world associations. Instead, these talks suggest that speech acts are supported by a wide variety of

contexts—statistical, perceptual, attentional, and social—that transform a vocalization into a linguistic representation: a word. This symposium brings together research with different ages (infants, toddlers) and populations (monolinguals, bilinguals). The experiments employ a range of methodologies (habituation, head camera recordings, forced-choice paradigms, novelty-preference procedures, preferential-listening procedures), and they examine different aspects of cognitive development in which words are central, namely phonology, word learning, and object categorization. Together, they suggest that 'language' and 'speech' are not isomorphic. Instead, speech acts become linguistic when supported by converging contexts and children's expectations. This symposium will help move language acquisition research beyond questions about whether "speech is special" toward investigations of how infants' prior experience, perceptual biases, and expectations about conspecifics leads them to treat vocalizations as informative about the communicative intent of others.

A PART-WORD IS NOT A WORD: ONLY STATISTICALLY COHERENT LINGUISTIC LABELS FACILITATE INFANT OBJECT CATEGORIZATION

Lucy C. Erickson, Erik D. Thiessen (Cargenie Mellon University) and Katharine Graf Estes (University of California at Davis)

Questions about the extent to which speech is special (i.e. invokes unique kinds of processes) have been central to the study of language acquisition. A large body of research indicates that speech promotes object category formation in infants and young children (e.g., Ferry, Hespo, & Waxman, 2010). However, the mere presence of speech may not be enough for learning associations between labels and referents. The present research explores the role that statistical structure of linguistic utterances plays in the process of category learning in 8-month-old infants. Specifically, we tested whether asymmetrical benefits of labels can be found as a function of whether that label was characterized by high statistical coherence in a speech stream heard prior to experiencing a novel category. After exposure to a language that contained statistical cues to word boundary, 36 infants were tested on their ability to categorize an unfamiliar category in the presence of either high-probability or low-probability labels from the exposure phase. Infants who heard the labels that were high-probability items from the exposure phase categorized. In contrast, infants who heard labels characterized by low internal probabilities showed no evidence of categorization. A follow up study with 18 infants revealed that this effect was due to facilitation for high-probability words rather than inhibition for low-probability. These results indicate that, under certain conditions, a linguistic label is insufficient to promote categorization, and they further highlight the role of supporting cues (e.g., statistical coherence) in transforming speech into a linguistic representation linked to real-world referents.

STATISTICS ARE NOT ENOUGH: INTEGRATION OF PERCEPTUAL CUES TO REFERENCE AND CROSS-SITUATIONAL STATISTICS IN EARLY WORD LEARNING

Sumarga H. Suanda, Seth B. Foster, Linda B. Smith, and Chen Yu (Indiana University-Bloomington)

Two approaches dominate the study of early object label learning. One approach concentrates on the cues children employ to disambiguate reference within labeling events (or cues to “fast mapping”). The other approach focuses on the accumulation of information across events (or “cross-situational statistical word learning”). We examined how disambiguating cues, specifically perceptual cues, might be integrated into the statistical learning process. Twenty-month-olds and their parents engaged in brief free-play sessions with novel objects. We recorded parents’ labeling events during the sessions (they were taught object labels prior to the sessions). Additionally, using head cameras worn by children, we recorded child-perspective views of objects during labeling events (i.e., which objects were in view and their sizes). Thus, we documented both within-event perceptual cues to reference (e.g., visual size of the referent) and cross-event co-occurrence statistics (i.e., the probability of the referent being in view). We analyzed the relation between these input properties to toddlers’ object label learning (which we assessed through a forced-choice-task following the session). Our results suggest that co-occurrence statistics alone were insufficient to account for children’s learning patterns. However, co-occurrence statistics that incorporated in-the-moment perceptual features of labeling events (co-occurrences between words and objects were weighted proportional to the objects’ visual sizes during labeling events) successfully accounted for children’s learning patterns. Our results suggest that a statistical word learning framework that takes the perceptual contexts, and likely other contexts as well, in which labels occur is needed to account for children’s learning.

DEVELOPING SOCIAL INFORMATION PROCESSING AND EARLY WORD LEARNING

Daniel Yurovsky (Stanford University), Anna Wade (University of California, San Francisco), and Michael C. Frank (Stanford University)

Although word learning unfolds over days, weeks, and months, individual naming events are over in seconds. To benefit from naming events, children must at least hear the labels and see the referents. Over the first two years, children make rapid gains in processing continuous speech and extracting labels; gains that predict successful word learning (Fernald et al., 1998; Fernald, et al., 2006). Less is known, however, about children's developing abilities to quickly process social cues that may indicate a label's referent. To characterize the development of social information processing, and to measure its contribution to word learning, we tested a large cross-sectional sample of 1-5 year-olds in a naturalistic word-learning task (N = 260). Children watched a series of videos in which a speaker labeled one of the two toys on a table. In half of these videos, she gave an Extended Cue indicating her target referent—picking up the object and interacting with it. In the other half, she gave a Brief Cue—only a quick glance to the target. After each trial, children's word learning was measured by preferential looking. Children of all ages successfully learned words from the Extended trials, with the biggest gains coming between 1-year-olds and 2-year-olds. However, only the oldest two age groups learned word-object mappings from the Brief trials. Further, for 4-year-olds, the Brief Cue was just as informative as the Extended Cue. While disambiguating social cues may be readily available in children's input, their uptake is fundamentally limited by developing social processing.

NAMING PHRASES BOOST BILINGUAL AND MONOLINGUAL INFANTS' LEARNING OF MINIMAL PAIRS

Christopher T. Fennell (University of Ottawa) and Krista Byers-Heinlein (Concordia University, Montreal)

Seventeen-month-old infants learning English and another language show difficulty learning English-produced novel minimal pairs (similar-sounding words, like "bin" and "din") in a task where the words are presented in isolation. English monolinguals, however, succeed. Conversely, in the same task, when the novel words are produced such that their phonetic properties fall between bilinguals' two languages, bilinguals succeed but monolinguals fail (Fennell, Byers-Heinlein & Werker, 2007; Mattock, Polka, Rvachew & Krehm 2010). Thus, infants have problems using phonological information atypical of their language environments. We examined if infants could overcome these difficulties using more a naturalistic stimulus presentation that clarifies the linguistic context of target words. Instead of using isolated tokens, we presented the target words "kem" and "gem" to 17-month-old bilinguals (French-English) and monolinguals (English, French) in naming phrases (e.g., "Look at the kem." or "Regarde, c'est le kem."). The naming phrase served both to signal that the target was a noun and to indicate the word's language. In a between-subjects design, infants received either "bilingual" tokens with phonetic values falling within the range for both languages (N= 16 monolinguals, N= 16 bilinguals), or "monolingual" tokens (N= 16 monolinguals, N = 9 bilinguals to date). The results suggest that, when supported by naming phrases, both monolingual and bilingual infants can learn the target minimal pair words irrespective of their phonetic realization (monolingual or bilingual production). Thus, linguistic context ameliorates infants' learning of atypically produced minimal pairs.

Ballroom D

THE ROLE OF PEDAGOGY IN LEARNING FROM EXPLORATION

ORGANIZER: Audrey Kittredge (Carnegie Mellon University)

Understanding the influence of pedagogy on children's learning is critical for determining the role of social influences in cognitive development, as well as for improving education. While some direct instruction improves grade school children's learning more than independent exploration (Klahr & Nigam, 2004), even preschoolers can generate informative evidence and learn from it during play (Cook et al., 2011; Bonawitz et al., 2012). Past research thus leaves many important questions unanswered: In which contexts and ages does pedagogy impede or enhance learning? Should instruction involve passive observation or collaborative action? Do individual differences modulate the effect of pedagogy? These open questions are addressed with a variety of ages and topics in this symposium, which focuses on children's goal-directed exploration. Van Schijndel and colleagues bring an informal learning perspective to the symposium, demonstrating that grade-school children's curiosity, not pedagogy, predicts how well they can explore to isolate causal variables. Young and Kalish combine expertise in inductive inference, social cognition, and educational psychology, showing that passive observation is best for preschoolers' and kindergartners' learning, while collaborative investigation yields better learning after formal schooling. Kittredge and colleagues reveal both positive and negative effects of different pedagogical techniques on children's exploration-based discoveries,

underscoring the complexity of direct instruction. David Uttal brings an interest in pedagogy and extensive experience in the cognitive and learning sciences to his discussion of the research. This symposium thus combines multiple perspectives to enrich our understanding of pedagogy's role in cognitive development, and may yield new recommendations for classroom practice.

CURIOSITY AND DISCOVERY LEARNING

Tessa J. P. van Schijndel, Brenda R. J. Jansen, and Maartje E. J. Raijmakers (University of Amsterdam)

This study investigated how individual differences in curiosity (defined as uncertainty preference, Jirout & Klahr, 2011) affect the discovery-learning process (defined as inquiry-based, constructivist instruction), and the extent to which children profit from adult guidance (pedagogy) during this process. Discovery-learning tasks generate high levels of uncertainty, because in these tasks many variables are unknown, and children are asked to come up with strategies for investigating the variables themselves. We therefore expected low-curious children to demonstrate less exploration during discovery learning, and profit more from guidance than high-curious children (Arnone, Grabowski & Rynd, 1994). 187 7- to 9-year-olds were administered the curiosity measure "Underwater Exploration!" (Jirout & Klahr, 2011), and a discovery-learning task consisting of a balance scale on which transparent balls, each containing three colored blocks, could be hung. Children were asked to figure out which color block was the heaviest. To this end, they had to make informative comparisons: to compare two balls that are identical except for one color change, such as Red/Blue/Green and Red/Blue/Blue. Only in the guidance condition this strategy was explained. Preliminary analyses showed that high curious children performed better on the discovery-learning task than low curious children. No effect of guidance was found, nor a difference between curiosity groups in the extent to which they profited from guidance. Strikingly, even non-guided children performed well on the discovery-learning task, suggesting children possess intuitive knowledge about using informative comparisons. As discovery-learning is at the core of science education, these findings are of importance to educational practices.

LEARNING IS BETTER WITH OTHERS

Andrew Young and Charles Kalish (University of Wisconsin-Madison)

Do children learn more from observing another, acting on their own, or a collaborative combination of observation and action? We report two studies suggesting that younger children may learn more from observing another's demonstration than when they have to plan their own explorations. Older children seem to benefit from collaboration. In Study 1 children were asked to identify the causal (and non-causal) effects of different combinations of elements. They encountered identical data produced collaboratively with a partner, actively by the child alone, or via passive observation of a partner. First-graders learned best in the collaborative condition, Kindergarteners worst. Kindergarteners learned best in the observe condition, First-graders worst. In Study 2 preschool-aged children had more difficulty learning novel words when given the opportunity to ask for labels of novel objects than when presented labels for the same objects. These findings have several potential implications for instruction. In general, children did not learn best from their own exploratory/data generating actions. Younger children may benefit the most from the social or communicative contexts of demonstrations. In Study 1 grade was a more significant predictor of condition effects than was age, suggesting that experience with formal instruction may prepare children to learn collaboratively.

SHOW AND TELL: THE EFFECT OF INSTRUCTION ON DISCOVERY

Audrey K. Kittredge, David Klahr, and Anna V. Fisher (Cargenie Mellon University)

Although exploration-based activities are common in early childhood classrooms, there is little consensus to guide teachers on the optimal mix of open-ended v highly directive instruction (Lillard et al., 2013). Bonawitz et al. (2011) report that when preschoolers' attention is directed toward a specific function of a novel toy, children discover fewer of its other functions during a subsequent period of free play, compared to children who receive no demonstration. However, little is known about the ways in which different degrees of pedagogical explicitness affect young children's exploration in other contexts. We ask 4-6 year-old children to find toy animals in a miniature forest with many possible hiding places. Children are assigned to one of three conditions: No Instruction, Instruction, or Enhanced Instruction. Children are told to find animals in all conditions, but in the Instruction and Enhanced Instruction conditions, the experimenter subsequently demonstrates how to find an animal. During Enhanced Instruction, the experimenter also comments, "There could be lots of other ways to find animals". Children receiving Instruction discover fewer animals in undemonstrated hiding places, compared to children receiving No Instruction. Children receiving Enhanced Instruction discover more animals than those receiving Instruction, and also seem to

discover more rarely found animals than children with No Instruction. These results suggest that the power of pedagogy is multifaceted: Instruction can limit discovery, but simply mentioning the possibility of other ways to explore may enhance discovery. Moreover, the emergence of these effects in adult-initiated exploration indicates they are relevant to classroom practice.

DISCUSSANT: David H. Uttal (Northwestern University)

Ballroom E

ORAL PAPER SESSION: CONCEPTUAL DEVELOPMENT

CHAIR: Douglas Frye (University of Pennsylvania)

THE ROLE OF CONCEPTUAL KNOWLEDGE IN THE DEVELOPMENT OF EXECUTIVE FUNCTION IN EARLY CHILDHOOD

Sabine Doebel and Philip David Zelazo (University of Minnesota)

Executive function (EF), the ability to exercise flexible control over thought, emotion, and action, develops rapidly in early childhood. Research indicates a role for language in the development of EF, however many questions remain concerning specific mechanisms. We hypothesize that the acquisition of specific conceptual knowledge through linguistic experience provides children with the representational structure needed for cognitive flexibility. Specifically, the use of negation to represent alternatives as mutually exclusive (e.g., Not playing the shape game; playing the color game) may be critical to children's resolution of conflicting rules. We summarize experiments in which children completed a card-sorting task in which labels were provided to prime the use of negation to represent the relevant task rules (e.g., "Not red. Rabbit," when sorting by shape). This resulted in more accurate sorting compared to versions with standard labels. We discuss the implications of these findings for theories of the development of EF.

DOES KNOWING WHAT TEACHING IS HELP CHILDREN TO LEARN? KOREAN YOUNG CHILDREN'S LEARNING FROM EXPLICIT VERSUS IMPLICIT TEACHING

Jeein Jeong & Douglas A. Frye (University of Pennsylvania)

Young children come to understand teaching involves an instructional goal with the development of theory of mind during the preschool years. The current study examined the influence of recognizing the intentionality of teaching on children. Thirty-four 3-year-olds, forty-four 4-year-olds, and forty 5-year-olds were individually taught new animal names through a game, either in an experimental condition in which the instructional intention of the game was identified or a control condition in which the goal was not given. Children were assessed on the number of animal names they acquired and on a separate set of 10 tasks that measured understanding of the intentionality of teaching. Results showed that children who were aware of the intentionality of teaching learned more, particularly in the experimental condition. This result indicates that the development of the recognition of the intentionality of teaching may influence children's engagement in the instructional goal and learning.

NUMERICAL ESTIMATION UNDER SUPERVISION

John E. Opfer and Clarissa A. Thompson (Ohio State University)

Children's number-line estimation has produced a lively debate about representational change, supported by apparently incompatible data regarding the descriptive adequacy of logarithmic (Opfer et al., 2011) and power models (Slusser et al., 2013). To test whether methodological differences--oversampling estimates of low numbers (as in Opfer et al., 2011) or supervising estimates of 500 on a 0-1000 number-line (as in Slusser et al., 2013)--might explain discrepant findings, we created a fully-crossed 2 (sampling) x 2 (supervision) design and assigned 96 children to one of four cells. In three conditions (oversampling/unsupervised-83%, even-sampling/unsupervised-100%, and oversampling/supervised-63%), a majority of children provided estimates better fit by logarithmic than power functions. In the last condition (even-sampling/supervised-25%), the reverse was found. Overall, a reliable association ($p<.0001$) existed between proportion best fit by the power function and supervision. Results suggest that the fit of the power function to children's number-line estimates is likely an artifact of supervision.

THE MIND BEHIND THE DRAWING: CUES TO ARTIST'S INTENTION FACILITATE 24-MONTH-OLDS' REPRESENTATIONAL INSIGHT

Romina A. Vivaldi and Analía Salsa (Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina)

A privileged route towards the understanding of pictorial symbols is to infer the intentions of their creators. This research examined whether 24-month-olds would be able to grasp the symbolic nature of drawings if they were provided with explicit cues to artist's referential intention. Using a drawing-referent matching task, Study 1 tested the effect of the combination of non-linguistic and linguistic cues to intention: creator's eye gaze and verbal scripts about her drawing actions. The data provide clear evidence that 24-month-olds relate drawings to referents only when the adult highlights his/her referential intention. Study 2 was designed to determine the differential impact of non-linguistic and linguistic cues as components of artist's intention. Results show that linguistic cues were critical for 24-month-olds' achievement of representational insight. These results are discussed in terms of the relations between drawing, referent, artist and observer on pictorial symbol comprehension.

TWO BAYESIAN MODELS OF THE DEVELOPMENT OF BELIEF-DESIRE REASONING

Lu Wang, Pernille Hemmer, and Alan M. Leslie (Rutgers University)

Children's understanding of false belief has been investigated for over 30 years. Starting around age four, children typically pass standard verbal tests of false belief in which they are asked to predict what a person with an outdated belief will do to get a target object. Further development occurs when children have to predict a person's action out of a false belief and a desire to avoid the target (avoidance desire). Two computational hypotheses have been proposed to explain children's false belief reasoning associated with an avoidance desire (e.g. Leslie, et al., 2005). Both models emphasize the role of children's inhibitory ability in successful belief-desire reasoning. We formulated two Bayesian models that implement these computational hypotheses by specifying the mechanism underlying belief-desire reasoning with associated probabilities. Predictions made by the models about children's inhibitory ability and their performances in a novel false belief task can be tested empirically.

SATURDAY, OCTOBER 19, 4:00PM – 5:45PM
SYMPOSIA AND ORAL PAPERS

Room 204/205

DEVELOPMENT OF ABSTRACT REASONING ABOUT RELATIONAL CONCEPTS

ORGANIZER: Caren M. Walker (University of California, Berkeley)

Reasoning about abstract relations is essential for rapid learning, and may explain how children acquire the impressively general and abstract causal knowledge evident in early "intuitive theories." Recent theoretical perspectives have also claimed that relational reasoning may serve as the cornerstone of higher cognition, distinguishing the impressive cognitive abilities in humans from non-human primates. This symposium will explore the mechanisms underlying the human ability to infer higher-order relational concepts, featuring research exploring the development of relational reasoning as a means for building abstract knowledge, and the relevance of these abilities for the study of human learning. In particular, we will examine the origins of relational reasoning in infants (Chang, Ferry, Hespos, & Gentner; Hochman, Mody, & Carey), explore the relationship between causal and relational reasoning in early learning in toddlers (Walker & Gopnik), and discuss recent computational approaches to examining these issues (Ullman & Tenenbaum). These papers each explore a similar concept, but draw from distinct methodologies: habituation measures, anticipatory-looking paradigms, action on a causal system, and computational modeling.

THE SEED OF ANALOGICAL REASONING

Yin-Juei Chang, Alissa Ferry, Susan J. Hespos, and Dedre Gentner (Northwestern University)

We traced the origins of analogical reasoning by examining infants' abilities to generalize simple abstract relations among objects – specifically the same/different relational comparison. Across a series of experiments infants were habituated to object pairs that were in either a same relation or a different relation. We found that with as few as six training trials, 7- and 9-month-old infants could abstract the same/different relation and generalize the relation to novel pairs of objects. We also found phenomena that parallel analogical learning in older children. First, increasing

individual object saliency disrupts the ability to detect the relations. Further, the abstraction of the relation is facilitated by labeling the relational pairs and disrupted by labeling the individual objects. These findings begin to characterize the nature of infants' early relational learning and demonstrate that certain signatures of analogical learning emerge in infancy and are continuous across development.

SAME AND DIFFERENT RELATIONS IN MATCH- AND MISMATCH-TO-SAMPLE

Jean-Rémy Hochmann, Shilpa Mody, and Susan Carey (Harvard University)

In match-to-sample (MTS) and mismatch-to-sample (mMTS) paradigms, participants are shown a sample stimulus, and must choose between two alternatives: the SAME-alternative, which is identical to the sample; and the DIFFERENT-alternative, which is different from the sample. Success on MTS consists in choosing the SAME–alternative and is thought to show the representation of the abstract relation SAME. Success on mMTS consists in choosing the DIFFERENT–alternative and is thought to show the representation of the abstract relation DIFFERENT. However, representing only one of these relations may be sufficient to succeed in both tasks. For instance, participants may learn to pick the SAME-alternative in MTS, and avoid the SAME-alternative in mMTS, thus basing their responses only on the SAME relation in both tasks. We studied 14-month-olds' behavior in MTS and mMTS using an anticipatory looking paradigm. In Familiarization trials, participants were shown a sample, a SAME-alternative, and a DIFFERENT-alternative. The correct alternative was indicated by a short animation. We observed an increase of correct anticipations to the SAME-alternative in MTS, and to the DIFFERENT-alternative in mMTS. In Test trials, only one alternative was revealed. Results suggest that infants anticipated to the known SAME-alternative in MTS, and avoided that alternative in mMTS. Crucially, infants in mMTS failed to look at the correct DIFFERENT-alternative when only that alternative was known. We thus found strong evidence that infants learned rules based on a representation of the relation SAME, but we found no evidence of such representation for the relation DIFFERENT.

INFANTS INFER HIGHER-ORDER RELATIONAL PRINCIPLES IN CAUSAL LEARNING

Caren M. Walker and Alison Gopnik, (University of California, Berkeley)

Causal knowledge allows you to act on the world – if you know A causes B, you can act on A to bring about B. Recent studies show that children can make inductive inferences about the causal properties of individual objects from a very young age. However, less is known about the development of children's ability to infer higher-order relational causal principles. Discovering when children can learn relational properties is important for understanding causal learning, but it is also important for understanding the development of relational reasoning, both in ontogeny and phylogeny. In three experiments, we examined 18- to 30-month-olds' relational inferences using a causal version of match-to-sample (MTS) and relational match-to-sample tasks (rMTS). Results suggest that children are able to infer the relational causal principles "same" and "different" from just a few observations and use this inference to guide their own subsequent actions and bring about a novel outcome on the causal system. These abilities appears to be in place surprisingly early in human development – emerging spontaneously only a few months after the first evidence of the ability to learn about specific causal properties from contingency information. These results stand in contrast to previous research that has suggested that relational reasoning may be a late developing ability that relies on language and cultural scaffolding. Findings are considered in light of recent discussion about the nature of relational and causal reasoning, and their evolutionary origins.

A HIERARCHICAL BAYESIAN MODEL FOR MAKING RELATIONAL INFERENCES

Tomer Ullman and Joshua Tenenbaum (Massachusetts Institute of Technology)

The proposal that children and adults construct their knowledge of the world in the form of 'theories' has been computationally formalized in recent years, cast as rational inference over structured models. I will consider a particular such computational proposal for learning theories, built on relations between logical predicates, drawn from a generative grammar. This proposal makes use of `templates' - valuable higher-level relations that capture knowledge across domains. It also addresses a particular version of the `chicken-and-egg' problem, posed as a challenge for any mechanism of theory-construction by several philosophers. I will end by suggesting that relational learning has some limitations that require us to further expand our current formalisms, in order to capture several basic domains of knowledge, such as intuitive physics and dynamics.

Ballroom C

YOUNG DEFENDERS OF THE STATUS QUO: CHILDREN'S TENDENCY TO SEE THEIR SOCIAL SYSTEMS AS NATURAL AND LEGITIMATE

ORGANIZER: Andrei Cimpian (University of Illinois, Urbana-Champaign)

How do children make sense of the patterns that structure their societies? The four papers in this symposium advance our theoretical understanding of the processes that lead young children to view prevalent social patterns as natural, normative, and fair. Specifically, the speakers will present empirical tests of hypothesized cognitive, affective, and motivational mechanisms underlying children's tendency to defend the status quo. The talks feature a diversity of methodological approaches (e.g., they use both implicit and explicit measures) and report evidence from participants spanning a broad range of ages (from 3-year-olds to adults) and cultures (from the US to India and South Africa). First, Dunham will present evidence that children from three diverse parts of the world evaluate high-status groups positively, thereby justifying and perpetuating existing social hierarchies. Next, Hussak and Cimpian will argue that children's endorsement of these hierarchies is due to a bias to explain observed patterns in terms of inherent properties (e.g., "They're rich because they're smart"). Bigler and Clark will present evidence that the same explanatory bias leads young children to display prejudice toward same-sex couples and parents and to defend aspects of the political status quo (the absence of female presidents). Finally, Schmidt, Rakoczy, and Tomasello will demonstrate that even 3-year-olds view arbitrary social conventions as creating a normative status quo that they are motivated to defend against third-party violations. Moreover, children defend such conventions regardless of whether they are well-established or agreed on jointly in an ad hoc way by the children and others.

PREFERENCE FOR THE HIGHER STATUS AS AN IMPLICIT FORM OF SYSTEM JUSTIFICATION

Yarrow Dunham (Yale University)

Social systems can be described as systems of hierarchically arranged social groups, with "higher" status groups enjoying greater prestige and access to resources (e.g. Sidanius & Pratto, 1999). This arrangement has clear benefits for members of higher-status groups, but endorsement of such systems by lower-status groups is more puzzling. We propose that one factor contributing to this state of affairs is an early emerging and automatic tendency to positively evaluate higher-status groups, independent of one's membership in them (Dunham, Chen, & Banaji, 2013). Thus, members of lower-status groups will tend to positively evaluate higher-status outgroups, even in the face of stark inequities and historic oppression. In a series of recent studies conducted in the US, India, and South Africa, my colleagues and I measured the intergroup attitudes and beliefs of children from various positions along the local status hierarchy. Results demonstrate that by around age six children have internalized a multi-leveled evaluative map of the status hierarchy that is heavily influenced by status (high status = good). Thus, depending on their own position in the hierarchy, children show ingroup preference, relative neutrality, or even outgroup preference in favor of higher-status outgroups. While the specific source of these preferences is still somewhat mysterious, our data suggest that awareness of and preference for tangible markers of socioeconomic status is one predictor of greater liking for members of higher-status groups. These globally positive evaluations of higher-status outgroups plausibly contribute to the tendency to implicitly justify and even endorse pervasive systems of inequality.

WHY DO PEOPLE THINK THEY LIVE IN A FAIR SOCIETY? A NEW PERSPECTIVE ON THE COGNITIVE ORIGINS OF SYSTEM JUSTIFICATION

Larisa Hussak and Andrei Cimpian (University of Illinois)

There is a pervasive tendency, even among disadvantaged groups, to defend the legitimacy and fairness of current societal systems. This phenomenon is often explained via system justification theory (Jost, 2003). According to this theory, people defend societal arrangements because of a motivation to reduce anxiety about their social standing: If society is fair, there is no reason to be frustrated about one's position in it. We propose that while the motivation to reduce anxiety can modulate people's tendency to defend the status quo, this motivation is not necessary for this tendency to emerge. Rather, system justification emerges from a broad cognitive bias to interpret patterns in the world in terms of their inherent features (Cimpian & Salomon, under review). In the case of sociopolitical patterns, this bias might lead people to explain status differences by referring to the inherent characteristics of groups (e.g., "They're poor because they're lazy"), making these differences appear legitimate and fair. We provide evidence for this proposal in two new studies showing that system justification arises even when there is arguably no motivation to reduce anxiety. First, adult participants endorsed the status quo even in a context far removed from their own sociopolitical system (e.g., on a planet far away). Moreover, participants' defense of the status quo was significantly

predicted by their endorsement of inherent explanations. Second, 5- to 8-year-old children—who are arguably too young to experience anxiety over their place in society—also showed a preference for inherent explanations of status differences and thus a tendency to defend the status quo.

EVIDENCE FOR THE ROLE OF THE INHERENCE HEURISTIC IN CHILDREN'S SOCIAL STEREOTYPING AND SYSTEM JUSTIFICATION

Rebecca S. Bigler and Caitlin Clark (University of Texas, Austin)

Once children have sorted individuals into categories (e.g., men, women), they begin to associate these groups with particular traits, objects, roles, and behaviors. Children construct the content of social stereotypes via several distinct cognitive mechanisms, including explicit instruction (e.g., "girls like pink"), and the detection of group-to-attribute links via statistic computation (e.g., the frequency with which boys vs. girls wear pink). According to recent theorizing (Cimpian & Salomon, 2013), once these associations are detected, an inherence heuristic guides children's interpretation of the group-to-attribute links. Specifically, the heuristic is believed to lead children to explain observed patterns in terms of the inherent features of their constituents. We will present evidence for the operation of an inherence heuristic—and associated justification of the status quo as natural and legitimate—from two sources. First, we will present evidence concerning an understudied form of stereotyping among children: heterosexism. In a new study, we tested the hypothesis that 5- to 8-year-old children: (a) detect relations among types of social bonds (e.g., spouses) and their gender compositions, and (b) view these bonds via an inherence heuristic that results in negative biases towards gay and lesbian couples, including a view of them as illegitimate. Second, we will present evidence from recent work (Patterson, Pahlke, & Bigler, 2013) and a new study by Bigler and her colleagues of children's views of the U.S. presidency, including quantitative and qualitative data concerning children's knowledge of, interpretation of, and justification for the absence of female U.S. presidents.

YOUNG CHILDREN'S APPRECIATION FOR CONVENTIONAL NORMATIVITY

Marco F. H. Schmidt (Max Planck Institute), Hannes Rakoczy (University of Göttingen), and Michael Tomasello (Max Planck Institute)

Young children's socio-cultural learning is aimed not only at reproducing what others actually do in certain situations, but also at what people ought to do in those situations (Bruner, 1993; Mead, 1934; Tomasello, 2009). Recent research has documented that young children appreciate this normative aspect of the social world: They actively correct third parties who deviate from a norm (e.g., Rakoczy et al., 2008). Young children's propensity to share intentions and emotions with others in social activities (Tomasello et al., 2005) and their identification with their cultural group (Schmidt & Tomasello, 2012) are likely candidates for their motivation to uphold the group's ways of doing things. In past research, however, the norms, such as game rules, were introduced by authorities as already existing. Thus, we do not know whether young children understand that a fundamental feature of human institutional reality is that norms can be brought into existence (including their scope) by jointly agreeing on a course of action. Participating in the process of norm creation and understanding its normative consequences are major building blocks of mature conventional normativity. We will present evidence that 3-year-old children jointly create novel conventional norms with others in an experimental setting. More specifically, we found that they considered the scope of the novel norm, such that they criticized deviation when an actor had previously agreed on the norm, but not when the actor had been ignorant of the agreement or had stated that she would not enter into the agreement.

Ballroom D

CHILDREN'S BELIEF IN THE UNSEEN AND COUNTERINTUITIVE: HIGHLIGHTING THE ROLES OF MENTAL REPRESENTATION AND CULTURAL INPUT

ORGANIZER: Jonathan Lane (Harvard University)

Much of our thinking is focused not on the concrete and obvious, but rather on the speculative, non-obvious, or intangible. Children and adults can entertain ideas of unseen, yet supposedly real, scientific entities (e.g., germs); believe in phenomena that defy their first-hand perceptions (e.g., that the earth is a sphere); and entertain ideas of otherworldly, counterintuitive beings, such as Santa Claus. Under what conditions do children believe in entities and phenomena that violate their intuitions or perceptions? We present three interrelated lines of research, which collectively demonstrate how children's belief in these phenomena is a product of (a) their ability to mentally

represent and to think critically about the ideas and (b) socio-cultural input, including direct testimony and pervasive cultural messages. The first paper demonstrates how young children's representational capacities--notably, their understanding of the appearance-reality (AR) distinction--as well as qualities of the testimony they receive combine to influence their belief in claims that defy their perceptions. Relatedly, the second paper demonstrates that young children's understanding of the AR distinction predicts their accuracy in reasoning about the status of invisible-real entities (e.g., germs) as compared to invisible-pretend entities (e.g., imaginary friends). The final paper explores children's understanding of Santa Claus--an extraordinary being they believe in because of pervasive cultural messages. The study demonstrates that children's general ability to reason about the improbable and impossible is strongly related to their ability to reason about Santa's extraordinary capacities. The discussant will highlight connections among the three lines of research.

YOUNG CHILDREN'S TRUST IN CLAIMS THAT DEFY THEIR PERCEPTIONS

Jonathan D. Lane, Paul L. Harris (Harvard University), Susan A. Gelman, Henry M. Wellman, and Daniel Blumer (University of Michigan)

The world is full of things that defy our perceptions. Our eyes tell us that we walk on flat ground, but the Earth is really a sphere. The Earth revolves around the Sun, but the reverse appears to be true. Individuals worldwide believe in a god, though they do not perceive that directly. How do we come to believe in things that defy our perception? This is a crucial question for research on children's learning from testimony. We assess how (a) children's representational capacities (appearance-reality understanding), and (b) informants' testimony influence young children's acceptance of claims that defy their perceptions. Children aged 3 to 6 years were shown familiar objects (e.g., a rock), were asked to identify the objects, and were then told that each object was something else (e.g., that the rock was soap). For some children, informants explicitly stated that the objects were different from what they appeared to be, whereas other children received testimony about the objects' identities without any reference to the discrepancy between appearance and reality. Children also completed standard tasks measuring appearance-reality understanding. When later asked about the objects' identities and properties, children who had a firm understanding of the appearance-reality distinction and those who heard informants mention that distinction were more accepting of the informants' counterintuitive claims. Thus, receptivity to counterintuitive claims need not reflect simple deference or conformity. It also reflects children's sensitivity to signals offered by an informant as well as conceptual growth in understanding that reality may belie appearance

CHILDREN'S UNDERSTANDING OF INVISIBILITY

Jacqueline D. Woolley and Melissa Ann McInnis (University of Texas-Austin)

Visual input is a primary source of information about the environment and is often used to confirm existence. Yet visibility is not a foolproof method for determining whether something exists, nor is existence a direct line to visibility. There are things that we can see that are not real (e.g., illusions) and there are entities that exist but are not visible (e.g., air). To understand invisibility, children must be able to divorce appearance (or lack thereof) from reality. As such, understanding or believing that invisible entities exist may rest upon an understanding of the appearance-reality distinction Forty-eight 3- to 7-year-olds completed a standard appearance-reality task (AR) and were queried about the visibility ("Can you see X with your eyes?") and reality status ("Is X real or pretend?") of a variety of visible and invisible, real and pretend entities. Results showed that children's concepts of visibility and reality status are intertwined--children were more likely to say they could see real than not-real entities (both visible and invisible), and their reality status judgments varied as a function of the visibility of the entities. The ability to answer correctly regarding both visibility and reality status of the entities varied as a function of age, entity type, and AR performance. Seven-year-olds were the only age group to reliably differentiate invisible real and pretend entities in terms of whether each could be seen with a microscope, suggesting that an understanding that some entities are necessarily un-seeable develops between 3 and 7 years of age.

HOW CHILDREN'S UNDERSTANDING OF PHYSICAL POSSIBILITY CONSTRAINS THEIR BELIEF IN SANTA CLAUS

Andrew Shtulman and Rachel Yoo, (Occidental College)

What role does children's understanding of physical possibility play in their acceptance of adults' testimony about Santa? This question was addressed by comparing children's ability to differentiate events that do and do not violate physical laws to their emerging skepticism toward Santa. Forty-seven children aged 4 to 9 completed three tasks. First, they were asked to generate a list of questions for Santa, subsequently coded as factual (e.g., "Is the North Pole

cold?") or conceptual (e.g., "How do you make your sled fly?"). Second, they were asked whether they believe that Santa performs the various extraordinary activities he is purported to perform (e.g., traveling around the world in a single night, knowing whether every child has been naughty or nice) and, if so, to explain how. Third, they were presented with five impossible events (e.g., walking on water) and five possible, yet improbable, events (e.g., eating pickle-flavored ice cream) and asked whether they thought each could occur in real life. It was found that children who were better at differentiating possible events from impossible events had also begun to engage with the mythology surrounding Santa at a conceptual level, questioning the feasibility of Santa's extraordinary activities while also positing "placeholder" explanations for those activities in the absence of a known answer. These findings suggest that children's acceptance of testimony about Santa--and possibly other forms of counterintuitive testimony--is dependent not just on the consistency of that testimony but also on the child's own conceptual abilities.

DISCUSSANT: Paul L. Harris (Harvard University)

Ballroom E

ORAL PAPER SESSION: BASIC PROCESSES - LEARNING, MEMORY, AND EXECUTIVE FUNCTION

CHAIR: Vladimir Sloutsky (Ohio State University)

NEURAL DYNAMICS OF COGNITIVE FLEXIBILITY IN EARLY CHILDHOOD

Aaron T. Buss and John P. Spencer (University of Iowa)

The Dimensional Change Card Sort (DCCS) task requires children to switch between shape and color rules when sorting cards. Three-year-olds typically perseverate and show weak frontal cortex activation, while 4-year-olds switch rules and show strong frontal cortex activation. Despite weak frontal activation, 3-year-olds can reliably switch rules when conflict is absent (No-Conflict version) during the pre-switch phase. We test hemodynamic predictions of Dynamic Field Theory (DFT) regarding the source of 3-year-olds success in this version. DFT has previously been used to simulate these developmental changes in behavior and neural activation. The model predicts that 3-year-olds who perseverate in the standard task should show stronger frontal activation when they switch rules in a No-Conflict version. We successfully tested this prediction using Near Infrared Spectroscopy (NIRS) with 3- and 4-year-olds: Perseverators showed stronger frontal activation when switching in the No-Conflict version compared to when they perseverated in the standard task.

INTERFERENCE AND MEMORY DEVELOPMENT

Kevin Darby and Vladimir Sloutsky (Ohio State University)

People learn almost constantly and learning new information can reduce memory for past learning (retroactive interference, or RI) and can make future learning more difficult (proactive interference, or PI). The current work aims to understand the mechanisms of PI and RI and developmental changes in these effects. A new 3-phase learning paradigm was developed in which participants learned a set of dependencies in Phase 1, a new set in Phase 2, and then relearned the first set in Phase 3. Results of four experiments with preschoolers and adults indicate that (1) interference effects stem from stimulus overlap and can be attenuated by the ability to encode complex stimuli structures; (2) interference effects decrease dramatically with age, perhaps more so for PI than RI, and (3) PI and RI have common as well as separate components. These results have implications for our understanding of mechanisms of memory and memory development.

USING FUNCTIONAL MAGNETIC RESONANCE IMAGING TECHNIQUES TO PROBE LEARNING MECHANISMS IN YOUNG CHILDREN

Karin H. James (Indiana University)

Increased use of fMRI in young children has led to valuable insights into brain organization and plasticity. Here we discuss a variety of findings that show that fMRI can be used as a tool to understand how different types of learning change brain responses. We discuss results of several research studies from our lab that have shown that learning through active interaction with stimuli leads to very different neural responses than learning through observation. Importantly, the observed changes in activation profiles are related to learning, but allow a more precise measure

given that overt responses are not required. In outlining these research findings we show that how a child learns is perhaps as important as what a child learns. Issues related to using fMRI as a method for studying very young (4-5 year-old) children is discussed, with the assertion that the benefits in understanding learning mechanisms at this level, in this population, far outweigh the costs.

AUTOBIOGRAPHICAL MEMORY SKILLS AS A FOUNDATION FOR DELIBERATE REMEMBERING: FINDINGS FROM THE LONGITUDINAL CROSS-SECTIONAL STUDY

Marina Larkina and Patricia J. Bauer (Emory University)

Autobiographical memory and strategic remembering emerge and rapidly change during early and middle childhood. These memory abilities show differential developmental trajectories: although 4-year-olds are relatively capable in reporting personal past experiences, explicit indicators of strategic behavior and improvements in deliberate memory are not apparent until around age 7. To test relations between these mnemonic domains, we longitudinally assessed memory competency in past event talk and deliberate sort-recall tasks in 4-, 6- and 8-year-olds across 4 years (N=101). Overall, children who at the beginning of the study provided more complete personal narratives had higher levels of performance and were more strategic in deliberate memory tasks, and had better metamemory understanding across all time points. The findings support the hypothesis that children who early on have more developed skills in telling personal stories will be better prepared to remember material in more deliberate memory contexts.

EXECUTIVE FUNCTION'S ROLE IN A UTILIZATION DEFICIENCY OBSERVED IN PRESCHOOLERS: DEVELOPMENTAL TRENDS & INDIVIDUAL DIFFERENCES

Mary M Stone and Fran C Blumberg (Fordham University)

This study examined how the development of aspects of executive function (EF) account for the utilization deficiency (UD) observed in preschoolers' spatial recall. Three to five-year-olds were asked to relocate one of two sets of 4 miniature toys (animals or chairs) after studying their location and participating in a brief cover task. Significant developmental changes in the participants' ability to remember the toy locations were observed. Specifically, most participants spontaneously produced a memory enhancing strategy as reflected in the removal and/or relocation of the toys by set (66%). However, this strategy only improved the older participants' recall. Three-year-olds demonstrated a UD in that producing the strategy did not facilitate their recall of toy locations. Performance on psychometrically sound measures of EF predicted which participants would benefit from strategy production beyond the influence of age and IQ. Therefore, the UD phenomena may be partially understood via developments in EF.

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POSTER ABSTRACTS

Posters are listed alphabetically by the first author's last name. The Roman numeral indicates the poster session; the Arabic numeral indicates the poster number within the session.

III.30

DAISY DRAWING IN CHILDREN WITH PERINATAL STROKE

Danah J. Alquraish, Angela O. Ballantyne, & Doris A. Trauner
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Objectives: To determine whether the Daisy Drawing task can identify hemi-spatial neglect in children with perinatal stroke. Methods: 20 children with perinatal stroke ages 4-16 years and 16 controls were instructed to copy a drawing of a daisy. Drawings were scored based on the number of distortions on each side. Results: Within the left hemisphere lesion group, children had more distortions on the right side of the drawing than on the left side, and compared with controls they had significantly more distortions on the right side but not the left. Children with right hemisphere lesions had more distortions on both the left and the right sides than did controls. Conclusions: The pattern of right-sided distortions in left hemisphere lesion subjects is suggestive of contralateral neglect. In contrast, children with right hemisphere lesions demonstrated a higher number of bilateral distortions than did controls. This could be caused by bilateral neglect, as has been seen in adults after stroke, or may represent a more generalized visual spatial or visual motor deficit. The Daisy Drawing task may be beneficial in identifying neglect in children with unilateral brain damage, but additional studies with a larger number of children are necessary to delineate more precisely the effect of unilateral brain damage on spatial functioning and neglect.

IV.34

EXPLORING INDIVIDUAL DIFFERENCES IN CHILDREN'S CAUSAL STANCE

Aubry Alvarez & Amy E. Booth
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Preschoolers, as a group, are highly attuned to causality, and this attunement is known to facilitate memory, learning, and problem solving. However, recent work reveals substantial individual variability in the strength of this 'causal stance.' In the current project, we began to investigate the origins of this variability in preschoolers. We focused particularly on the role of parents' explanatory behaviors in shaping their child's causal stance. Measures of attention to, preference for, and exploration of causal information were strongly correlated across parent-child pairs, $r(21) = .62$, $p < .05$. Parents' 'causal stance' was also strongly correlated with the nature of their explanatory talk as observed in co-playing and video co-viewing activities with their children, $r(18) = .62$, $p < .05$. These findings suggest that young children's focus on causal information can be shaped by experience. Implications for facilitating early learning, and the development of scientific literacy, will be discussed.

I.73

THE EFFECTS OF PERSPECTIVE AND MATH LEVEL ON DEVELOPMENTAL MATH STUDENTS' CONCEPTUAL UNDERSTANDING OF MATHEMATICS

Eric Amsel
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Eighty-five college developmental math students (retaking middle school math classes) completed three math assessments. The assessments addressed students' general math reasoning and their understanding of key algebraic concepts of equivalence (=) and variable (n). Assessments were completed by students in Pre-algebra, Algebra I, and Algebra II, who were randomly assigned to complete them from their own perspective (Self Condition) or the perspective of a logical person (Logical Person Condition). A factor analysis revealed that the three assessments formed a single dimension. The factor scores were subject to a 2 (Perspective Condition) by 3 (Math Level) ANOVA. The findings showed that students had higher factor scores in more advanced math classes and in the logical person condition. The findings suggest that students are acquiring more conceptual knowledge about algebra, but under certain conditions can better access the knowledge they have already acquired.

II.3

THE DEVELOPMENT OF THE DISTINCTION BETWEEN REGRET, DISAPPOINTMENT, AND SADNESS

Eric Amsel
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The present study tests for when children distinguish between negative situations which elicit different kinds and intensities of emotional reactions. Twenty-four 4- and 24 6-year-olds were told of three protagonists each of whom who could win stickers if the box containing them was chosen over another box. Participants rated each protagonist's feelings and behavior after being told that the protagonist chose the wrong box and did so without expecting to win (eliciting sadness), expecting to win (eliciting disappointment), expecting to win but, at the last second, shifting the choice from the right to the

wrong box (eliciting regret). Results show that only 6-year-olds distinguish the regret situation as eliciting more negative emotions, followed by disappointment, and then sadness. The findings suggest that 4-year-olds may not fully understand the distinctions between emotional reactions to negative outcomes due to their lack of appreciation of the subtle differences in cognitive processes underlying them.

I.1

A YOUNG CHILD'S REFERENTIAL ASSOCIATIONS BETWEEN QUANTITIES AND NUMBER WORDS AND NUMERALS

Ursula S Anderson & Sara Cordes
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Three-, four-, and five-year-olds were given a series of tasks to assess how well they understood that number words and numerals (from 1 to 5) refer to quantities (Word-to-Quantity and Numeral-to-Quantity, respectively) and that quantities and numerals can be referenced by number words (Quantity-to-Word and Numeral-to-Word, respectively). A mixed 3 x 4 ANOVA revealed that children master these referential associations by 4 years of age. Analyses revealed that at 3 years of age, Numeral-to-Word associations are superior to Quantity-to-Word, Word-to-Quantity, and Numeral-to-Quantity, which remain modest or weak. Moreover, 3-year-olds understood that quantities may be referenced using words better than they understand that words refer to quantities, which shows asymmetric learning. Stepwise linear regression revealed that Numeral-to-Word and Word-to-Quantity associations were significant predictors of Numeral-to-Quantity associations at age three, which points to transitive learning. Together, the findings suggest interdependence in the learning of referential associations between quantities, numerals, and number words.

I.66

BLICK-WHAT? SEARCHING FOR A LABEL BROADENS CHILDREN'S INDUCTIVE INFERENCES

Florencia K. Anggoro, Lauren M. Bellerose, Melanie R. Forte, & Kerry L. Simon
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We examined children's use of category labels to reason about biological entities. Six- and eight-year-olds were shown multiple exemplars from three categories: dogs, mammals, and animals. For each category, the base exemplars were labeled with the same novel word (e.g., blicket). In the Word-Elicited condition, children were asked if they could come up with another name (i.e., a name they already know) for the base category, while in the NoWord-Elicited condition they were not. Then they were told about an invisible property of the exemplars and were asked whether they would extend the property to a set of targets: people, animals, plants, and non-living things. Preliminary results suggest that children in the Word-Elicited condition are more likely to generalize the property to atypical animals (humans, fish) than those in the NoWord-Elicited condition. Thus, being invited to label may activate children's category knowledge, which subsequently guides their inductive reasoning.

IV.71

SPEAKER VARIABILITY: IMPLICATIONS FOR STATISTICAL LEARNING

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Speech is inherently variable, and infants internalize speech from numerous speakers as they build a representation of their native language. It is possible that this variability would inhibit recognition of familiar patterns in linguistic input. Alternatively, variability may highlight language-relevant consistencies across input, promoting successful learning. Infants are able to use distributional patterns such as transitional probabilities to segment words from a fluent stream of speech, but it is unclear whether infants can track these regularities across multiple speakers, a challenge inherent to infants' language environments. In a preliminary study we examined 8- and 10-month-olds' abilities to use transitional probability cues to segment words from speech presented by eight different speakers. Our findings show that infants learned the words despite speaker variability. Ongoing work is further probing the impact of variability on learning, utilizing a low-variability, two-speaker paradigm and a high-variability paradigm with increased vocal pitch spread across eight speakers.

IV.36

CHILDREN'S EVALUATIONS OF EFFECTIVE AND INEFFECTIVE SYMBOL SYSTEMS

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An effective symbol system is one that reliably communicates the relation between symbols and their referents to an unknowing symbol-user. Goodman (1976) identifies one-to-one-mapping as an essential feature of such systems. To investigate 4- and 5-year-olds' sensitivity to violations of this feature, we are presenting them with legends that: (1) are effective; (2) violate Goodman's mapping rules; or (3) contain incorrect information. In our task, children are shown a set of boxes with symbols on top (e.g., a triangle, a square, and a circle), and watch as items of a particular kind are removed (e.g., moons, clouds, and stars). Children judge whether the legends will help an

unknowing other return the items to their correct boxes. Data collection is well underway, and results will provide insight into children's understanding of effective symbol systems in relation to other cognitive abilities, such as ambiguity detection, working memory, and inhibitory control.

I.38

CULTURE OF HONOR IN MEDIA AND DEVELOPMENT

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The term "Culture of Honor" refers to a socio-cultural variable that centers on the importance of reputation and retribution within a society. While an increasing amount of research has examined potential links between Culture of Honor ideology, conflict-related violence, and risk-taking (e.g. Barnes, Brown, and Tamborski, 2012), little to no work has examined the emergence of honor ideology in development. Here, we present data looking at the degree to which popular movies targeted at children and adults contain and endorse Culture of Honor-related themes and discuss the need for research that brings a developmental perspective to the Culture of Honor literature.

II.59

DEPENDENCE IS NOT JUST IMMATURITY: UNPACKING THE UTILITY OF RELYING ON OTHERS

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Children's dependence on adults is often viewed as a necessary evil, while how and when to begin promoting independence is culturally defined. In American culture, parents tend to encourage early independence in cognitive and social development. But what are the costs? Increasing evidence shows that there may be long-term costs associated with promoting too much independence, too early. What are the benefits to allowing early dependence? In learning language, organizing memory, and developing problem-solving skills, for example, guidance from adults (and dependence on them) is critical. This poster will examine the evidence in these areas, comparing theoretical perspectives and analyzing research investigating children's dependence/ independence. I argue that allowing early dependence, and even encouraging appropriate dependence on adults, is associated with greater independence later in development.

I.3

DO CHILDREN RELY ON A NON-EPISTEMIC MECHANISM TO ENRICH THEIR EPISTEMIC STATUS?

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In this experiment, preschool children were presented with slides on a computer screen showing a novel object, together with two informants, one with an attractive and one with a less attractive face. Children were asked which informant they would like to ask about the name of the novel object. After hearing the informants' testimony, children were asked who they thought was correct. Children were more likely to endorse names provided by the person with the more attractive face, a bias that cannot be justified on epistemic grounds. The implications of this finding and the extent to which non-epistemic factors can influence children's learning about the world are discussed.

II.70

THE EFFECT OF TASK-IRRELEVANT VARIABILITY ON VISUAL SEARCH IN INFANCY

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Infants' visual search behavior can provide understanding into developing visual attention. Using eye-tracking, we studied the effect of distractor variability on visual search in 12-month-old infants. First, infants received 8 training trials in which a triangle was presented in isolation and then replaced with a rewarding stimulus following fixation. On subsequent trials, the triangle was presented with 7 distractor circles; on 'same color' trials all items were the same color and on 'variable color' trials they were all different colors. Preliminary results with 18 12-month-old infants show that on variable color trials infants visited fewer items before locating the target as they got older (correlation between age and number of locations, $r = -.543$, $p = .02$); the correlation was non-significant for same color trials ($r = -.293$, $p = .24$). Thus, search efficiency in the face of irrelevant variability improves with age.

III.43

CHILDREN AND ADULTS SINGING WITHOUT HEARING THEMSELVES

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To sing a familiar tune, people rely on efferent motor plans to sing the pitches and auditory and proprioceptive feedback to fine tune the sung pitches. Earlier research shows most adults sing poorly when they cannot hear themselves sing. Trained singers perform better, reflecting accurate efferent motor plans and skillful use of proprioceptive feedback. In this

study we asked 5 -12 year-olds and adults to sing the ABC song with and without auditory feedback. Data collection is ongoing and will be complete before the meeting. In addition, we made a novel discovery: We mask children's ability to hear themselves singing and devised methods to verify they cannot hear. But children and adults report the illusion that they can hear themselves and that they are singing on pitch, whereas in fact they cannot hear themselves and are off pitch. The illusion reflects "efference copy", a topic seldom studied with children and adults.

IV.5

LEARNING OBJECT CATEGORIES ACROSS TIME IN 4.5-MONTH-OLD INFANTS

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The present study investigated whether infants can connect their learning experiences across time with novel object exemplars to segregate a test display 72 hours later. We examine this question by familiarizing infants to these exemplars in their homes on two days separated by 24 hours and then on a third day 72 hours after the second familiarization session. Immediately following this final familiarization session, we tested infants under one of two conditions: either the infants would view two distinct objects move together (the move-together test event) or move apart (the move-apart test event) after being initially adjoined. When familiarization was immediately followed by a nap, infants looked longer at the move-together test event than at the move-apart test event, suggesting they were able to connect their experiences with the object exemplars across an extended period of time. This result has implications for learning under natural conditions.

I.39 - *Withdrawn*

RELATIVE NEED AND RESOURCE ALLOCATION IN YOUNG CHILDREN

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Past research has shown that children show a strong preference for equality over equity in their resource allocation decisions (LoBue, Nishida, Chiong, DeLoache & Haidt, 2010). However, the influences of relationships, competition, merit, and need can prompt older children to take a more equity-based approach in their distributive choices (McGillicudy-De Lisi, Watkins & Vinchur, 1994; Shaw, DeScioli & Olson, 2012; Kanngiesser & Warneken, 2012). Interestingly, preschool-aged children are able to make use of some of these cues, such as merit (Ng, Heyman & Barner, 2011), but not others, such as relative need (Olson, Dweck, Spelke & Banaji, 2011). This study proposes to further explore the use of relative need as a social cue to guide the allocation decisions and expectations of very young children. Having knowledge of social cues that guide distributive choices may provide an avenue through which to further explore the development of proportional reasoning in early childhood.

II.42

TODDLERS EXPECT INDIVIDUALS FROM NOVEL SOCIAL GROUPS TO PREFER AND ALIGN WITH INGROUP MEMBERS

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Do toddlers expect individuals from novel social groups to prefer ingroup members and to align their choices with those endorsed by ingroup members? Two violation-of-expectation experiments examined these questions using minimal groups identified by nonsense labels. Toddlers watched live events involving three experimenters: E1, IG-E2, and OG-E3; E1 belonged to the same group as IG-E2 but to a different group than OG-E3. In Experiment 1, IG-E2 and OG-E3 read identical books, and toddlers expected E1 to approach IG-E2 as opposed to OG-E3. In Experiment 2, IG-E2 and OG-E3 each played with a different toy; identical copies of the toys stood at the center of the apparatus, and toddlers expected E1 to select the same toy as IG-E2 as opposed to OG-E3. In both experiments, toddlers held no expectations when group markers were removed. Together, these results indicate that toddlers generally expect individuals to prefer and align with their ingroup members.

II.11

CHILDREN'S KNOWLEDGE AND AVOIDANCE OF CONTAGIOUS ILLNESS

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Despite a large number of studies in the literature that have investigated children's concepts of illness and contagion, very little is known about how children's conceptual knowledge relates to their ability to act adaptively to avoid getting sick. The current study investigates 4- to 7-year-old children's understanding of contagion and their behavioral avoidance of people who are sick. Children were invited to play with two experimenters, and were told that one of them was sick. In a forced choice paradigm, each experimenter offered the child identical toys and snacks. Next, the child played with both experimenters and their toys in a five-minute free play session. Last, children's conceptual knowledge of illness and contagion was assessed in an interview. Results indicate that conceptual knowledge does not predict avoidance behavior; children begin to show an understanding of contagion by the age of five, but do not begin to avoid until much later.

IV.74

WHO TAUGHT YOU THAT? THE ROLE OF SELF-ACQUIRED KNOWLEDGE IN CHILDREN'S ABILITY TO INTEGRATE NOVEL INFORMATION

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Semantic memory can be extended via self-generation of new knowledge through integration of information acquired in two separate but related learning episodes. To further explore the workings of self-generation, we examined the differences in children's ability to integrate new pieces of knowledge as a function of whether they were reading the information themselves or having it read to them. Children ages 8 to 11-years participated in a board game activity in which they were exposed to previously unknown "stem" facts, each of which could be paired and integrated to form additional "integration facts". Half of the integration fact pairs were read by the child, and half were read by the adult experimenter. Children's ability to self-generate the integration facts at test did not differ based on whether facts were read by the child or the experimenter, yet older children demonstrated a trend for increased performance in the experimenter-read condition.

I.6

MORAL IDENTITY IS RELATED TO SELF-PERCEIVED AND TEACHER-RATED BEHAVIORAL CONDUCT IN 3RD-7TH GRADE CHILDREN

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This study assessed relations between individual differences in children's social behavior and moral identity (i.e., the extent to which moral traits are important to self-concept). 191 3rd-7th graders completed the Self-Perception Profile for Children (Harter, 1985), an adapted version of the Moral Identity Questionnaire (Aquino & Reed, 2002), and two measures of advanced theory of mind (Bosacki & Astington, 1999; Liddle & Nettle, 1996). Teachers completed a questionnaire assessing aggression, prosocial behavior and peer victimization. Results indicated that one factor of moral identity, Moral Internalization, was significantly correlated with self-perceived behavioral conduct ($r = .20$, $p < .01$), teacher-rated prosocial behavior ($r = .22$, $p < .01$), and teacher-rated aggression ($r = -.21$, $p < .01$). The second factor, Symbolization, was not significantly correlated with either self-perceived or teacher rated social behavior. Theory of mind scores (controlling for verbal age) also were not significantly correlated with social behavior.

I.89

A LONGITUDINAL STUDY OF LIFE STORY DEVELOPMENT FROM AGE 9 TO AGE 12

Annette Bohn & Dorthe Berntsen
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Cross sectional studies have found that length and coherence of children's life stories increase with age (Bohn & Berntsen, 2008; Habermas & de Silviera, 2008), and that cultural life scripts (culturally shared representations of an idealized life; Berntsen & Rubin, 2004) become more adultlike or typical, and life script typicality predicts life story coherence, but not single event story coherence (Bohn & Berntsen, 2008). The present study investigated the development of life scripts and life stories longitudinally. Forty-one children (age 9.5 at T1; 25 boys) participated. At T1 and 3½ years later (T2), children wrote (1) about a single event from their recent past, (2) their life stories, and (3) a cultural life script. Results showed that within subjects, life script typicality increased across time, and life stories grew longer and more coherent. Further, life script typicality at T1, but not at T2, predicted life story coherence at T2.

I.28

STICKING TO THE EVIDENCE? A BEHAVIORAL AND COMPUTATIONAL CASE STUDY OF MICRO-THEORY CHANGE IN THE DOMAIN OF MAGNETISM

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An intuitive theory is a system of abstract concepts and laws relating those concepts that together provide a framework for explaining some domain of phenomena. Constructing an intuitive theory from evidence confronts learners with a "chicken-and-egg" problem: the laws can only be expressed in terms of the theory's core concepts, but these concepts are only meaningful in terms of the role they play in the theory's laws. How is a learner to discover appropriate concepts and laws simultaneously, knowing neither to begin with? We explore how children can solve this chicken-and-egg problem in the domain of magnetism, drawing on perspectives from the history of science, computational modeling, and behavioral experiments. In a series of experiments, we present preschoolers with ambiguous, but informative causal events where both concepts and laws must be simultaneously learned. We show how our empirical results can be explained as rational inferences within a Bayesian computational framework.

I.31

PRACTICE WITH QUANTITIES PROMOTES TRANSFER IN ARITHMETIC PROBLEMS

Rebecca Boncoddo, Jordan T. Thevenow-Harrison, Martha W. Alibali, Timothy T. Rogers, & Charles W. Kalish
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A concern in mathematics education is that students fail to transfer learning to novel problems. Past research shows that this occurs when problems are experienced as relations among nominal symbols. We identify three kinds of transfer---novel elements (does practicing 12 + 7 = ? transfer to 13 + 6 = ?), novel task (transfer to 12 + ? = 19), and novel format (transfer to number-line or manipulative representations)---and assess whether each is improved by embedding problem-solving practice within a coherent system of quantitative relations. A study teaching adults novel arithmetic relations (base-8 addition) found that such practice improves transfer to novel-elements and novel-format problems, but not novel task problems. In 2nd and 3rd- grade students learning two-digit addition, this form of practice improved transfer to novel element problems but not novel format or novel task problems. We saw little transfer when students practiced problems in the standard "school" format (e.g., 12 + 7 = ?). The results suggest that practice highlighting important quantitative relationships can improve some kinds of transfer.

IV.21

THE IMPACT OF ACTIONS AND GESTURES ON MATHEMATICAL THINKING: AN EMBODIED PERSPECTIVE

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This research explored the impact of participants' actions and gestures on their ability to solve mathematics problems. The first study investigated children (M=8.2) learning to solve two digit equivalence problems, both without manipulatives, and with three different types of manipulatives, including stacking blocks, a pan balance, and the child acting as a balance scale themselves. The second study investigated the impact of directed actions on undergraduate participants' ability to solve geometric and simple physics problems. Both studies provide evidence for an embodied perspective on learning, such that participants' actions and gestures influenced both their solutions to the problems and the gestures they produced when talking about the underlying concepts.

I.23

SPECIFYING THE EFFECTS OF CAUSAL INFORMATION ON EARLY WORD LEARNING

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Existing evidence demonstrates that causal information facilitates novel word learning in preschoolers (Booth, 2009; Kemler Nelson et al, 2008). However, the mechanisms underlying this effect remain underdetermined. In order to elucidate these mechanisms, the current study carefully examines the time-course over which new words are learned and retained by preschoolers with the support of either causal or non-causal information. Results indicate that causal information increases the efficiency with which novel words are learned. However, when the level of initial learning is equated across conditions, causal information appears to have no further effect on the longevity of memories for those words. These findings suggest that causal information facilitates early word learning by enhancing attention, and thereby encoding, during training, rather than by enhancing the coherent elaboration of semantic memories.

IV.7

A LONGITUDINAL STUDY OF CHILDREN'S THEORY OF MIND, SELF-CONCEPT, AND PERCEPTIONS OF HUMOR IN SELF AND OTHER

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Longitudinal relations among theory of mind (ToM) understanding, self-perceptions, and perceptions of humor were explored in 28 school-aged children, (16 girls, 12 boys, 8-12 years). Theory of mind, perceptions of self, and of humor in self and other were assessed at Time 1 (T1, M = 8 y 5 m), and two years later at Time 2 (T2, M =10 y 4 m). Longitudinal findings showed significant correlations between T2 Humor-Self and T1 physical-self ($r = -.469$, $p = .012$; T1 humor-self $r = -.165$, ns), whereas no relations were found in other directions (T2 physical-self and T1 humor-self, $r = -.153$, ns; T2 physical and T2 humor-self, $r = .269$, ns). Implications for socioemotional and cognitive development are discussed.

I.18

THE DEVELOPMENT OF DOMAIN-SPECIFIC BELIEFS ABOUT THE HOMOGENEITY OF ANIMAL, ARTIFACT, AND SOCIAL CATEGORIES

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Cognitive processes differ substantially as a function of domain. For example, knowing whether something is a person, animal, or human-made artifact has important implications for the inferences we make about its

properties and category structure. In this paper, we examine the development of knowledge about the animal, artifact, and social domains. In particular, we ask whether children (age 4 to 10 years) and adults have domain-specific expectations about the coherence and homogeneity of novel animal, artifact, and social categories and whether these expectations vary by the nature of the target property (e.g., color, part, behavior/function) and the age of the participant. Preliminary results suggest that domain-specific beliefs about category homogeneity are in place during early childhood. These findings contribute to our understanding of the structure of children's categories and highlight the important role of domain in how children organize their knowledge about the world.

IV.54

EXAMINING CHILDREN'S MORAL JUDGMENTS USING A NOVEL VERBAL SPONTANEOUS-RESPONSE TASK

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This study explored children's moral reasoning using a novel verbal spontaneous-response moral judgment task. Tracking participant's eye gaze, it was predicted that preschool age children would understand the intentions of an actor who committed an accidental or intentional transgression, thus inferring the development of moral reasoning skills. Twenty-four 4- and 5-year-old children listened to a story illustrating an intentional or accidental transgression. Eye-gaze duration was used as an indicator of participant's underlying beliefs of the unfolding scene. Non-significant results were obtained for both transgression types, suggesting that preschool aged children have not developed moral reasoning skills. Additionally, an experimenter position confound was present. Similarities between the pictures choices in the testing protocol may have created ambiguity in the task, which contributed to the findings. Eye-gaze testing methods have not yet been applied within a moral framework. This study has therefore added to the body of literature examining this construct.

III.1

CHILDREN'S SNAPSHOT PERCEPTIONS OF SOCIAL STATUS

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Like other social animals, humans are highly attuned to social hierarchies in their environment. In the present research, we examined the developmental origins of social status perception in young children. Participants (3-6 years of age) saw photographs featuring pairs of unfamiliar adults. In each photo, one adult appeared to be more powerful than the other because of differences in posture, head orientation, and eye gaze. Participants were above chance in identifying the person who was "in charge", $t(15)=10.63$, $p<.001$. The findings indicate that very young children are adept at using subtle gestures exhibited by adults in everyday social interactions to determine others' relative power. Ongoing research is focused on determine which cues are most potent in supporting children's perceptions of social status.

II.47

CHILDREN'S MENTAL REPRESENTATIONS OF NEGATIVE NUMBERS

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Many studies exist to explain how children mentally represent numbers (e.g., Dehaene, 2003; Siegler & Opfer, 2003), and to document the shift from a logarithmic to a linear representation (e.g., Siegler, Thompson, & Opfer, 2009). It is important to study children's mental representations of number because this outcome correlates with important educational outcomes such as scores on math achievement tests (e.g., Booth & Siegler, 2006, 2008). However, children's mental representation of numbers less than zero has yet to be studied because all previous studies have used number lines that begin at zero. The current study addressed whether or not children's mental representations of negative numbers parallel their representation of positive numbers by presenting children (2nd, 4th, and 6th-graders) with estimation tasks using number lines that include negative numbers as well as positive numbers. Data analysis is ongoing and the results of this study will be presented in this poster.

II.1

GESTURE IS IN THE MIND, NOT IN THE HANDS: HOW GESTURE INFLUENCES CHILDREN'S MENTAL ABACUS PERFORMANCE

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Gesture is a powerful tool in learning and cognition. We explored the mechanisms by which gesture facilitates cognition by studying children who use the Mental Abacus (MA) technique to do arithmetic. These children employ gesture prolifically, and past research had shown that motor interference significantly reduces MA ability. We isolated the contributions of visual feedback, proprioceptive feedback, and motor planning on children's spontaneous MA gestures. While blindfolding participants or requiring them to hold their hands still did not impact performance ($ts < 1$, $ps > 0.1$), motor interference caused a significant decrease in performance ($\beta=-2.45$, $t=-3.88$, $p<0.001$). The mechanism for gesture's effect on mental abacus may thus be in

motor planning, rather than instantiating the movements themselves. This result constrains hypotheses about whether or how gesture might be promoting imagery on this highly visuospatial task. It also supports past research suggesting that gestures can be internalized over time.

I.33

PRESCHOOLERS' USE OF PAST ACCURACY WHEN LEARNING OBJECTIVE AND SUBJECTIVE INFORMATION

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Children typically prefer to learn new information from previously accurate individuals over previously inaccurate ones. However, this selective strategy sometimes has limitations. For instance, an individual's past accuracy is a poor indicator of how much others would agree with any subjective information that they convey. We tested whether preschoolers are sensitive to this distinction. Twenty-four 4-year-olds were presented with two puppets who differed in their accuracy at stating the functions of common objects. The puppets subsequently provided conflicting information about labels for novel objects (objective information) and about which novel foods were tastier (subjective information). Children significantly preferred to learn labels from the previously accurate individual but were at chance when learning about food taste. This suggests that children understand that past accuracy is not equally predictive of future reliability for all types of information.

III.35

MEASURING COGNITIVE RESOURCES IN EARLY-ACQUISITION BILINGUALS

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This study examined bilingual individuals who acquired two languages early in development to determine whether they activate both of their available language systems simultaneously while speaking. A cognitive load paradigm was used to measure the difference between bilinguals' and monolinguals' working memory while speaking. We measured 14 English, 24 Spanish monolinguals and 12 bilingual participants' ability to do 2 simultaneous tasks; recall a list of numbers (task 1) while narrating a cartoon story (task 2). Bilingual participants remembered fewer numbers compared to monolinguals, suggesting greater cognitive load on working memory. We also examined participants' narrations for evidence of simultaneous activation of two language systems. Though monolinguals tended to express motion events using only one system; path-focused for Spanish monolinguals and manner-focused for English monolinguals; bilinguals expressed motion events using both language systems (manner and path) across speech and gesture. The difference in cognitive resources for bilinguals versus monolinguals is discussed.

II.57

CHILDREN'S UNDERSTANDING OF REAL AND CARTOON PICTURES: AN EYE-TRACKING STUDY

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Our visual world is proliferated with pictures that we need to interpret appropriately. In this study 2;9- 3;11-year-olds and adults (n = 91) examined 24 images composed of real photographs and/or cartoons, each featuring a person and vehicle, while an eye-tracker recorded spontaneous eye-movements. Half of the images involved a perceptual match between the person and vehicle (e.g. cartoon person + cartoon vehicle) and half contained a perceptual mismatch (e.g. cartoon person + real vehicle). Also, half the images contained person/vehicle pairings that were semantically congruent, e.g. fireman + fire-truck and half that were incongruent, e.g. fireman + postvan. The results revealed that semantic congruency affected fixations on images containing real people but not cartoon people, whereas the level of perceptual match between the person and vehicle affected fixations on real people and cartoon people. The results have implications for understanding the difference between real and cartoon worlds.

II.67

HOW DO LEARNING STYLES DEVELOP? AN EXPERIMENTAL INVESTIGATION OF LEARNING STYLES, FEEDBACK, AND COGNITIVE TASK PERFORMANCE

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There are clear links between cognitive developmental research and educational practice. For instance, beliefs about the existence of learning styles, and that these learning styles influence task-relevant performance, are widely held. We were interested in the impact of feedback about learning abilities on cognitive performance. Fifty-four young-adults were randomly assigned to receive feedback about their visual/verbal learning style that was either consistent or inconsistent with their previously reported learning style. Participants then completed a visual discrimination task and a sentence completion task. This work found significant interactions between self-reported learning styles and feedback, such that informing self-reported verbal learners that they were actually visual learners enhanced their visual task performance, while self-reported visual learners who were informed that they were verbal learners demonstrated enhanced verbal task performance. These results provide evidence regarding

the development of learning styles, as well as the role of feedback in altering learning style-related performance.

I.59

INCONSISTENT AND AMBIGUOUS EVIDENCE INFORM HYPOTHESIS-TESTING BEHAVIOR IN YOUNG CHILDREN

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Research has shown that young children provide sophisticated causal explanations in the physical, psychological, and biological domains (Wellman, Hickling, & Schult 1997). The drive to generate explanation is early developing, and has a strong influence on young children's developing causal knowledge systems (Legare, Wellman, & Gelman 2009). Recent research in the physical domain has shown that inconsistent information motivates children to construct explanations (Legare, Gelman, & Wellman 2010). However, little is known about how children modify their explanations in response to new information. In this study, 5-6 year old children were asked to provide explanations for consistent, inconsistent, and ambiguous events within the psychological domain. Children then had the opportunity to seek out additional information and were prompted for a revised explanation. The results suggest that inconsistent and ambiguous evidence increase children's propensity for belief revision, and willingness to entertain explanations they may not have otherwise considered.

III.63

PRESCHOOLERS' USE OF OSTENSIVE AND LINGUISTIC CUES IN GUIDING INDUCTIVE INFERENCE

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Assessing whether novel information is generic knowledge about the world is critical in development (Gelman, 2003; Markman, 1989), but requires inductive inference from limited information. Building on work by Csibra and Gergely (2009), recent findings suggest that preschool children leverage social cues from others around them to solve this problem. Children as young as 4 make stronger inferences about whether a novel function generalises across an artifact category when evidence for that function is produced ostensively, rather than merely intentionally (Butler & Markman, 2012). The current experiment found that children as young as 2.5 years of age show the same effect, but only when the artifact category had been given a kind label. This finding contributes to a broader perspective on how children integrate a variety of social, pragmatic, and contextual cues in order to judiciously evaluate novel information and incorporate it into their understanding of the world.

IV.85

WORD READING STRATEGIES IN AUTISM SPECTRUM DISORDERS: EVIDENCE FROM PORTUGUESE-SPEAKING CHILDREN AND ADOLESCENTS IN BRAZIL

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We investigated word reading and spelling ability in a group of 19 6- to 18-year-old children and adolescents with Autism Spectrum Disorder (ASD) in Brazil, most of whom read below age level and had mild to moderate intellectual disabilities (Mean IQ=65.68; SD=16.14). Nineteen younger typically developing children (M=6.21 years; SD=.42), matched with the individuals with ASD for word reading ability, participated as controls. Relative to controls, the group with ASD showed language and phonological difficulties. Notwithstanding, an analysis of their reading and spelling errors revealed that, similar to the TD group, they learned to read by processing and remembering letter-sound relations in words. The pedagogical implications of these findings along with their implications for a theory of reading acquisition are discussed.

I.57

SOURCE CONSTRAINED RETRIEVAL IN CHILDREN AND YOUNG ADULTS

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As children mature, their ability to engage in cognitive control improves. Cognitive control has recently been shown to affect the nature of retrieval processes that are used in memory tasks. Rather than merely relying on information that "comes to mind," one may utilize controlled retrieval processes that deliberately bring to mind only wanted information. Jacoby and his colleagues (e.g., Jacoby et al., 2005a, 2005b) have recently proposed a source-constrained retrieval mechanism that regulates memory retrieval in such a way that only information from a desired source is retrieved. The present research tested whether there are differences in the use of source-constrained retrieval between children and adults. Similar to the pattern exhibited by older adults (Jacoby et al., 2005b), children demonstrated a deficit in the use of source constrained retrieval when compared to young adults. These results have important implications for current theories of cognitive control and memory development.

II.30

INFORMATION SAMPLING IN CHILDREN'S RELATIONAL THINKING: EFFECTS OF COMPARISON AND LABELING

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Children show less targeted scanning of visual information than adults (Mackworth, 1970), which is often reflected in their poorer ability to visually detect differences and similarities in visual arrays (Vurpillot, 1968). Interestingly, when learning a new relational property (e.g., sameness), children benefit from the presentation of two examples of the relation compared to only one (Christie & Gentner, 2010), and from the addition of a label (Christie & Gentner, 2007). We investigated how does adding (1) a second example and (2) a label to the presentation of one or two examples in a relational match-to-sample task changes preschooler's visual sampling. The results indicate increased sustained attention when two examples are presented and when a label is added: adding a second sample increases the proportion of time spent fixating each of the objects during study while adding a label reduced the number of saccades between the options and the initial samples.

III.5

DOES THE RELATIONSHIP BETWEEN SPATIAL LANGUAGE AND SPATIAL COGNITION VARY ACROSS DIFFERENT TYPES OF SPATIAL WORDS AND SPATIAL SKILLS

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We examined the relationship between spatial language and spatial cognition across two spatial abilities and distinct spatial terms. Preschoolers (M = 4.63 months, SD = .45 months) were tested on their acquisition of spatial relations terms (e.g., "in", "on") and geometric shapes (e.g., "circle", "rectangle"), and tested on two spatial tasks, the Mental Translation task (MTT, Levine et al., 1999) and the Picture Rotation Task (PRT). Results showed strong effects of age on the MTT, $F(1, 11) = 13.24$, $p < .01$, and children's ability to name shapes, $F(1, 8) = 15.18$, $p < .01$. Interestingly, only children's comprehension of spatial relation terms (e.g., "in") was positively related to their score on the PRT, $r = .63$, $p < .05$. The results suggest that different aspects of spatial language may differ in their relationship to spatial skills.

III.67

PARENTS' ENCOURAGEMENT OF CHILDREN'S CRITICAL THINKING IN A PALEONTOLOGY EXHIBIT

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Children's development of scientific ways of thinking is of great interest for developmental researchers and educators. Little is known about families' everyday practices that encourage critical thinking. This study investigates variation in parents' encouragement of children's critical thinking through questions asked during a visit to a paleontology exhibit. Conversations of 80-dyads were coded for High Cognitive Demand questions (e.g., "How do you know it's a mammoth skull?"); additionally, parents completed an "Attitudes toward Science" survey, and a personality inventory measuring rational thinking style. We hypothesize a positive correlation between frequency of parents' High Demand questions and their attitudes toward science, and a positive correlation between High Demand questions and rational style. Beyond group variables such as income and education level, investigating subtle individual differences measures in parents can help us better understand conversational practices that relate to children's science understanding and interests.

I.85

CULTURE AND THE DEVELOPMENT OF SOCIAL ESSENTIALISM: HOW CHILDREN REASON ABOUT RELIGIOUS CATEGORIES

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As early as age 5, children apply essentialist beliefs to a range of social categories, but across childhood, substantial cultural variation emerges in which categories are essentialized. The present study aims to characterize the relationship between children's bias toward social essentialism and the cultural input that they receive. In one study, 5-year-old (N = 15) and 9- and 10-year-old (N = 12) children of low and high religiousity were asked to predict the future religious identity of a child who had been born to parents observing one religion, but raised by parents observing another. For 5-year-olds, nonreligious children were more likely than religious children to predict that the child's religious identity would remain stable, whereas for 9- and 10-year-olds, religious children were more likely than nonreligious children to do so. Implications for the role of cultural input in the development of social essentialism are discussed.

II.73

TEACHING DEVELOPMENTAL PSYCHOLOGY AND RESEARCH METHODS THROUGH MUSEUM EXHIBIT DESIGN

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Undergraduate developmental psychology students at a Liberal Arts College partnered with the Children's Museum of Southern Minnesota. Students worked with museum representatives to create exhibits and in the most recent version of the project video recorded children participating in these activities in order to answer a student-generated research question. Similar to

previous service learning projects (e.g., Conway, Amel, and Gerwien, 2009; Hardy & Schaen, 2000; Kretchmar, 2001; Sharon, 2012), during this partnership students applied course knowledge to real-life social problems while serving and interacting with community members, leading to greater course knowledge, a deeper understanding of developmental research methods, and more appreciation for the challenges faced by developmental researchers.

I.40

ENUMERATION OF SMALL VERSUS LARGE NUMBERS OF ITEMS UNDER HIGH WORKING-MEMORY LOAD

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There is evidence that two systems support non-symbolic representation and processing of numbers in humans: A parallel individuation system for exact and small numbers, which underlies subitizing, and an approximate number system (ANS) for relatively larger numbers, which underlies ratio-dependent discrimination. The ANS acuity improves with age, whereas the subitizing range remains developmentally stable. Recent issues have focused on the relationship between subitizing, the ANS, and visuospatial working memory (VWM) whose capacity also increases with age. We report a study using the dual-task paradigm in which adults enumerated sets of 1-9 items under varied VWM loads incurred by same-different judgments over displays of 0-8 items. We found that, even at the highest load level, enumeration within the small-number range remained more precise than enumeration of large numbers, suggesting that subitizing drew on attentional resources independent of the VWM without modulation from the ANS. Developmental implications will be discussed.

II.49

INFANTS' QUANTITY DISCRIMINATION OF NON-SOLID SUBSTANCES

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Infants' quantity discrimination of solid objects has been well-documented (Feigenson et al., 2002; Feigenson, 2005; Wynn, 1992). However, previous findings on non-solid substances are mixed (Huntley-Fenner et al., 2002; Hespos et al., 2012). In four habituation-dishabituation experiments on 10-month-old infants, we examined the relative contribution of different perceptual cues: size of the larger quantity, total quantity, difference between piles, and number of piles to infants' quantity discrimination across sets of sand piles. The results showed that infants can discriminate quantity differences of paired piles with multiple cues (Experiment 1 & 3). However, individual cues were not sufficient to support discrimination (Experiment 2 & 4). These findings characterize the nature of how infants quantify substances. We discuss our findings by comparing them to the way perceptual cues help infants discriminate solid objects.

IV.81

OPERATIONAL MOMENTUM IN SYMBOLIC SUBTRACTION: THE ROLE OF PROBLEM TYPE AND APPROXIMATE-NUMBER-SYSTEM ACUITY

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Previous studies have suggested that the approximate number system (ANS), which represents numerosities by analog magnitudes and operates from early infancy, is consistently activated when processing numerical symbols that have become well learned through schooling. Further evidence came from adults' responses in solving approximate addition/subtraction problems, with non-symbolic and symbolic numerical items, where they tend to generate a larger/smaller estimate of the outcome relative to the correct solution—the operational momentum (OM) effect. In the present study, we tested college students with an approximate subtraction-and-comparison task using sequences of 2-digit numbers, and found that: (a) The OM effect is evident with no-borrowing, but not borrowing, subtraction; (b) borrowing, but not no-borrowing, subtraction readily elicits calculation, as only accuracy of the former is correlated with the participants' working-memory capacity; (c) the above patterns are more pronounced for participants with relatively lower ANS-acuity (independently measured). Hypotheses for developmental changes will be discussed.

III.22

STOP! BUT HOW? MULTIPLE INHIBITORY PROCESSES IN 5- AND 6-YEAR-OLDS

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Inhibition is considered to be a critical executive function, but the single term can be broken down into multiple inhibitory processes. We examined such processes in 5- and 6-year-olds: overriding a pre-potent response ("task-switching"; sorting items by color after first sorting by shape); stopping a single action ("global stop"; pressing a button to claim a single banana, but withholding this response if the banana turned brown); and stopping only one action while continuing another ("selective stop"; only one of two bananas turned brown). Switchers showed better selective stopping but worse global stopping than perseverators, consistent with claims of distinct mechanisms for stopping all actions vs. stopping only some. However, children did

not show the expected selective-stop pattern of reduced interference in the still-going hand, demonstrating the need to consider developmental changes while evaluating inhibitory accounts.

II.62

A PLACE FOR EVERYTHING AND EVERYTHING IN ITS PLACE: THE ROLE OF EXECUTIVE FUNCTION IN CHILDREN'S ORGANIZATIONAL STRATEGY USE

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The first signs of strategy use appear as children develop executive function (EF) skills with large improvements occurring between 3 and 5 years. Towards the end of this period, children begin to demonstrate organizational strategies (e.g., clustering by category at recall). The current study examined how individual differences in EF predicted clustering in 4- to 6-year-olds. Children learned a 9-item list of words from 3 categories (i.e., animals, furniture, and food). Clustering was assessed by category pairs recalled together. A composite EF scored derived from performance on the Dimensional Change Card Sort and Backwards Digit Span was created. Children with high EF scores formed more clusters at recall, $\beta = 1.08$, $t = 4.54$, $p < .01$, $R2 = .23$, and recalled more words, $\beta = 1.62$, $t = 5.22$, $p < .01$, $R2 = .28$, indicating that organizational strategies require EF.

III.3

PRESCHOOLERS TRACK MULTIPLE MINDS

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In the traditional Sally-Anne change location task, children are required to report only Sally's belief (Baron-Cohen, et al., 1985), but do children also track Anne's belief? Wang and Leslie (2013) demonstrated that three- and four-year olds are able to track both Sally and Anne's false belief in a low-demand task. Low-demand as defined by Bartsch (1996) is the removal of the target object from the scene, which decreases cognitive processing demands. In the first experiment, we examined whether four- and five-year olds can also track two false beliefs in the traditional high-demand task. We found that both age groups successfully tracked both beliefs. In the second experiment, we find that three- and four-year olds can even track three minds in a low-demand task. As soon as children are able to solve a verbal false-belief task for a single protagonist, they are able to do so for multiple (2-3) agents.

III.11

SPACE AND MATH: EARLY EMERGENCE OF A RELATION BETWEEN ABILITIES

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The relation between spatial ability and mathematics is well-established among adults and adolescents, but its developmental course is largely unknown. We tested 300 kindergarten and 3rd grade students to see whether a significant relation was present in the early elementary grades and found a very strong correlation at both grade levels [3rd Grade, r2=.34(p<.001); Kindergarten, r2=.31(p=.006)], even controlling for overall ability/vocabulary. This finding builds on recent work showing a similar relation for 3- to 5-year-olds (Farmer et al., 2013), but extends this research by measuring performance on a broad spectrum of spatial and mathematics tasks. Taken together, our findings and previous work suggest a deep, foundational connection between spatial ability and mathematics.

III.33

WHAT'S IN A COLOR: THE INFLUENCE OF COLOR ON GENDER STEREOTYPING IN CHILDREN

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Children's toy preferences are sex-typed and influence their memory, attitudes, and behaviors. These sex-typed preferences may be based on gender roles, schemas, or other characteristics acquired through socialization. It is unclear, however, how the color of toys influences children's reasoning and gender stereotyping about toys. The present study examined the categorization of three- to five-year-old boys' and girls' sex-typed and ambiguously colored toys. Children were shown 40 pictures of sex-typed and neutral toys as well as 10 abstract objects that were used as a control. The color of the toys was changed to different hues. Preliminary findings showed a complex relationship between the child's desire to play with certain toys and gender stereotyping. Overall, older children and boys tended to have stronger gender stereotype preferences than younger children and girls. The children did not focus on color when they wanted to play with a toy.

II.5

PRESCHOOLERS INFER THEIR OWN PROSOCIALITY THROUGH STATISTICAL REASONING

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Children are prosocial, but the mechanisms driving their prosociality are not well understood. In this work, we explored the possibility that preschoolers infer their prosocial motivations through statistical reasoning.

Three and 4-year-olds were given the opportunity to undertake a prosocial action of giving 1 sticker to a puppet (Doggie). However, we varied the relative generosity of the action by varying the number of stickers children could also keep for themselves (0-3). Children were then given the opportunity to undertake a new prosocial action by being asked to share with a new puppet (Ellie). Children made equal splits as much as possible, but when unable to make equal splits, a significant linear trend emerged such that more generous original actions (to Doggie) led to more generous subsequent actions (to Ellie). Results suggest that preschoolers infer their own prosocial preferences by paying attention to the statistical likelihood of being prosocial.

III.77

COMPARISON PROCESSING: ARE CHILDREN VULNERABLE TO THE SAME ASYMMETRIES THAT INFLUENCE ADULTS?

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Logically symmetrical predicates are frequently interpreted, by adults, asymmetrically. Adults prefer to say, for example, "My brother met the President" over "The President met my brother". This is because directional syntax contains figure and ground thematic roles, requiring that the more prominent or important item be placed in the ground (second) position. To date, little is known about the development of this asymmetric interpretation. To address this, we asked whether children prefer to relate figures to grounds when expressing spatial relations ("The bicycle is near the building") and similarity ("A zebra is like a horse"). Children as young as five showed emergent preferences for this framing, suggesting that children may make inferences about items in a comparison based on syntactic positioning. This work may have implications for attempts to counter stereotypes: saying that girls do science as well as boys, for example, may actually imply that boys set the standard.

III.19

CHILDREN'S REASONING OF NUMEROSITY CHANGES REFLECTS ABSTRACT KNOWLEDGE OF NUMBER

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Two experiments explored whether children younger than 6 understand the conditions under which the numerosity of a set changes. In the visible-objects experiment, children were shown small sets (1-3) and large sets of objects (14-16). Then the experimenter performed two kinds of transformation in a randomized order: quantity-change (i.e., adding 1 object, removing 1 object) and no-quantity-change (moving 1 object, taking away 1 object and putting it back). By age 3, children can track quantity changes for small sets, but not until age 5 do they track quantity changes for large sets. In the hidden-objects experiment, objects were hidden in a box, and quantity-change and no-quantity-change transformations were performed. We found that 5-year-olds showed emergent understanding of when the numerosity of a set changes, corroborating findings in the visible-objects experiment. Implications for children's reasoning about particular numbers and the abstract concept number are discussed.

III.20

FACTORS THAT AFFECT THE DEVELOPMENT OF THE NUMERICAL MIDDLE CONCEPT

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The numerical midpoint is an important concept in mathematics, but it remains unclear how children acquire it. The current study tests two possible explanations of why 3-year-olds have difficulty identifying numerical midpoints: 1) comparisons involving multiple number pairs, and 2) a potential conflation between spatial and numerical senses of middle. To test the first possibility, 3-year-olds were asked to identify the smallest or largest numerosity in number triplets. They performed significantly above chance in both conditions, suggesting the failure in midpoint identification was not caused by multiple comparisons of a three item sequence. To test the second explanation, stimulus numbers were configured such that no stimulus took up a middle location, and 3- and 4-year-olds were asked to identify the numerical midpoint of these number triplets. Data collection is ongoing. These results will shed light on how spatial information affects the representations of numerical sequences and identification of numerical midpoints.

II.15

CHILDREN'S USE OF CROSS-SITUATIONAL INFORMATION TO LEARN NEW VERBS IN ENGLISH, KOREAN AND CHINESE

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Children acquiring verbs must be able to extend them to new contexts. Two studies ask how variation across events influences verb extensions. Children saw dynamic video events and heard novel verbs. In Study 1, actions were performed by a single actor or three actors, and English-speaking 3-year-olds in the US and Korean-speaking 3-year-olds in Seoul participated. Analyses show variability in actor affected the Korean-speaking children to a greater degree than English-speaking children. In a second study, the tool used across events varied or did not. English-speaking 2.5-

year-olds could not extend new verbs in any condition, while older children (3.5- and 4.5-year-olds) succeeded. Data collection in Chengdu, China in both studies will be completed this summer. Overall, these studies inform our understanding of how children learn and extend new verbs.

III.42

TEACHING TO LEARN: IMITATION IN THE CONTEXT OF PARENT-CHILD INTERACTION

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Despite recent research on children's imitation of instrumental tasks (Call et al., 2005; Lyons et al., 2007; Whiten et al., 2009), very little is known about imitation and the acquisition of conventional behavior. Legare and Whitehouse (2011) suggest that high fidelity imitation is due to affiliative goals (Nielsen & Blank, 2011; Over & Carpenter, 2012) and the assignment of normative conventions to tasks (Rakoczy et al., 2011). The current research examines children's and parents' reasoning about and subsequent levels of imitative fidelity for familiar, causally accessible instrumental tasks when presented with either conventional or instrumental verbal cues. Findings demonstrate that manipulating normative, affiliative goals increases imitative fidelity and social attention for both individual children and parent-child dyads. This work is one of the first empirical investigations of the role of the parent in the acquisition of cultural convention through imitation.

II.17

PRESCHOOLERS' USE OF TRUTH-VALUE AND BENEVOLENCE IN EVALUATING STATEMENTS AND SPEAKERS

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How do children weight the benevolence and the truth-value of a statement when both dimensions are presented simultaneously? We investigated 3-, 4-, and 5-year-olds' evaluations of statements and speakers. In study 1, children rated the niceness and truth-value of four types of statements: Nice-False, Mean-True, Nice-True, and Mean-False. All age groups were able to identify statements as nice or mean, but identification of truth-value increased with age. In study 2, children witnessed a speaker consistently make statements of each type, as well as a neutral speaker. Children were asked to evaluate the speakers on knowledge and behavior attribution trials. Preliminary findings suggest that children are more likely to differentiate these speakers in terms of future behavior rather than knowledge, and benevolence appears to be more salient than truth-value, especially among younger children. Thus when evaluating speakers and their statements, children may more readily attend to benevolence over accuracy.

II.54

RELATIONS BETWEEN INTUITIVE BIOLOGY AND EVOLUTIONARY UNDERSTANDING IN MIDDLE SCHOOL

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Adult research suggests that essentialist thinking—a hallmark of intuitive biological thought—predicts weaker understanding of evolution and more misconceptions by rendering critical components of evolutionary theory deeply counter-intuitive. To explore these relations among children initially encountering evolution in the science curriculum, 322 8th graders were given a survey combining measures of intuitive biological thought and open-ended questions about evolution. Open-ended responses were coded for key evolutionary concepts and common misconceptions. Analyses revealed marked individual differences in all measures; regression analyses showed that in some cases, essentialist thinking was associated with less sophisticated evolutionary understanding. Surprisingly, in other cases, essentialist thinking predicted richer evolutionary understanding. By revealing strong albeit complex linkages between intuitive biological thought and emerging understanding of biological science in middle school, these results hint that relations between intuitive biological thought and understanding scientific biology might change with development; essentialist thinking might help initially but interfere later on.

II.35

PATTERNING IN PRESCHOOL: COGNITIVE PREDICTORS OF PATTERNING KNOWLEDGE AND INTERVENTION EFFICACY

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Though patterns have long been part of early educational curricula, we know little about the development of patterning abilities and the usefulness of interventions to support patterning knowledge in young children. The present study explores patterning knowledge in preschool children and investigates the relation between domain-general cognitive abilities (visuospatial working memory, verbal working memory, and inhibitory control) and patterning performance. Additionally, the study tests three interventions to support patterning knowledge ("No Gesture," "Point Gesture" and "Chunk Gesture") and asks whether intervention efficacy depends on the cognitive profiles of the children. Results show that visuospatial working memory, but not verbal working memory or inhibitory control, is predictive of patterning performance. Furthermore, although all interventions led to gains in performance, intervention efficacy varied

depending on the cognitive characteristics of the child. Implications of the findings for educational interventions are discussed.

IV.75

LEARNING ABOUT UNITS OF LINEAR MEASUREMENT FROM ACTION TO ABSTRACTION: DO CHILDREN BENEFIT FROM STEPWISE INSTRUCTION?

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There are two incorrect strategies that young children use to solve a linear measurement problem in which the object to be measured is shifted away from the start point of the ruler. The hash-mark strategy is when children count the lines on a ruler and provide an answer that is one greater than the correct answer. The read-off strategy is when children simply read the number under the right-hand end of the object. Previous work shows that children who use the hash-mark strategy benefit from training with either discrete plastic unit chips or a thumb and forefinger gesture. Children in the read-off group benefit only from the plastic unit chips. The current study aims to investigate whether children in the read-off group might benefit most from a within-subjects stepwise instruction in which they start with the concrete unit chips and transition to the more abstract gestural representation of a unit.

III.50

RELATIONS BETWEEN ANTHROPOMORPHISM, PREDICTABILITY, AND PATTERNED OUTCOMES

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Randomness is typically associated with lack of order, thus when we do detect patterns, we often assume that an intentional agent produced them. When dealing with nonhuman entities, this can lead to anthropomorphism. The current project explores relations between anthropomorphism, predictability, and the expectation of patterns in a game of chance. Children ages 5 to 8 will play a guessing game in which they drop a marble into a box and predict from which of two doors the marble will exit. In one condition, anthropomorphism will be primed (e.g., by placing eyes on the box), and we will measure the extent to which children expect outcomes to be patterned compared to a baseline group with no prime. In another condition, we will manipulate perceived predictability (e.g., establishing a clear pattern) and measure the extent to which children attribute humanlike agency to some aspect of the game.

IV.30

SELF-CONCEPT AND PROJECTION TO THE FUTURE

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Self-concept has been connected with the emergence and development of autobiographical memory. This study investigates whether similar connections may be drawn for episodic future thinking given that remembering one's past may be functionally related to envisioning one's future (Tulving, 1985). We hypothesize that the development and disposition of self-concept relates to the ability to engage in both past and future mental time travel. Our sample includes 5-, 7-, 9-, and 11-year-olds, as well as young adults (current N=96, projected N=115). Self-concept is measured using a novel instrument, the Self-Concept Assessment for Children. Participants provide narratives and phenomenological ratings of past and future events. Narratives are being coded for episodicity using a scheme adapted from Piolino and colleagues (2007). Preliminary analyses support a relationship between aspects of self-concept and the phenomenological experience of future projection. Subsequent analyses will examine the relationship between self-concept and the episodicity of past and future events.

I.49

THE ROLE OF OUTCOME IN REASONING ABOUT FOOD ALLERGY

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In to understand the reasoning strategies that health behaviors are based on, we investigated the effect of outcome on hypothesis testing in a food allergy context. Previous research demonstrates that hypothesis-testing strategies are affected by whether participants seek to reproduce a positive outcome (e.g., good health) or eliminate an unwanted outcome (e.g., bad health). Children aged 7 to 10 years (n=15), 11 to 14 years (n=15), and adults (n=168) were asked to choose which patterns of food consumption could be used to test hypotheses about causes of allergic reactions. Logically appropriate tests were selected more frequently for a bad outcome than a good outcome. Although the potential severity of making an incorrect choice in a food allergy context is both greater and more proximal than in an oral health context, the same bias in reasoning strategy was found. Logically appropriate hypothesis-testing behavior may not, therefore, underpin real-world decision making.

III.82

COMPOUNDING AND DERIVATION WORD FORMATION STRATEGIES IN CHILDREN

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Decades of research have shown that children are effective word learners. Less is known, however, about how the nuances of a child's language, or languages, affect this process. For example, English and Polish differ greatly in the extent to which they exploit compounding (English) and derivation (Polish) as word-formation devices. The purpose of the present research is to examine how input language, parts of speech, and familiarity of words affect this process. To date, 37 bilingual children have been tested in English or Polish, with preliminary results showing that, at a minimum, input language affects bilingual children's preference for word-formation devices. Once bilingual data collection is complete, bilingual children's results will be compared with data obtained from monolingual children.

II.81

SHIFTING THE SPATIAL REPRESENTATION OF NUMBER ACROSS DEVELOPMENT

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There is a fundamental link between number representation and the perception of space (Dehaene, 2007). Currently, there is a debate on how numbers are spatially represented and changes across development. Opfer and Siegler (2007) propose a radical representational change from a logarithmic to a linear representation, with the help of formal education. We studied how shifting the numerical range on a conventional number line (0-500) to an unconventional number line (37-537) changed the representation of an integers spatial location on a number line across development in adults and children (ages 6-11). Results show that accuracy improves, with responses becoming more linear, as age increases. In participants 10 years of age or older, shifting the number line to an unconventional range resulted in nonlinear responses. Our results suggest that the dominant spatial representation of number is logarithmic when numbers are unfamiliar.

IV.1

THE IMPACT OF SOCIAL GROUP INFORMATION ON CHILDREN'S REASONING ABOUT CONTAMINATION

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Recent scholarship has emphasized the role of pathogen avoidance in shaping human social behavior, including social exclusion and xenophobia (Fincher & Thornhill, 2012; Kurzban & Leary, 2001; Oaten et al., 2011). The present research tests whether information about social group membership influences young children's sensitivity to contamination. Three- and 4-year-old monolingual English-speaking children watched video presentations of two actors who ate applesauce. One actor placed a new spoon into her bowl after she ate; the other sneezed and placed her licked spoon into her bowl. Actors either spoken in English or a foreign language. Children were given the opportunity to taste what appeared to be the same foods from the videos and to evaluate each food. We measured children's food choices, consumption, and evaluations. Preliminary results suggest that young children avoid contaminated foods when foreign speakers engaged in contaminating behaviors.

I.84

EFFECTS OF TRAINING ON CATEGORY LEARNING: DEVELOPMENTAL DIFFERENCES BETWEEN ADULTS AND CHILDREN

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What information do people extract in the course of category learning? And how does this process change in the course of development? The current study addressed these questions by examining the effects of training on the outcome of category learning in 4- to 5-year-olds and adults. Participants learned categories that included deterministic and probabilistic features and were trained with either a classification task or an inference task and then tested with categorization and recognition tasks. The categorical information (i.e., deterministic and probabilistic features) was explicitly given to participants. Classification and inference training resulted in different patterns of representation and memory accuracy in adults (rule-based representation and high accuracy in the former case and similarity-based representation and low accuracy in the latter case). In contrast, regardless of the type of training, young children exhibited high memory accuracy and formed similarity-based representation.

I.43

EIGHT-MONTH-OLD INFANTS CAN INTEGRATE PHYSICAL CONSTRAINTS IN PROBABILISTIC INFERENCE

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11- and 12-month-old infants can integrate physical knowledge in probabilistic inference. Two experiments examined whether 8-month-olds can make similar inferences, using looking-time. All infants saw that red balls get stuck inside boxes but green and yellow balls move freely. Infants also saw that random samples were

being drawn from a box with a large population of balls in a 5 red : 4 green : 1 yellow ratio. In Experiment 1, infants looked longer at an improbable sample of 4 yellow and 1 green balls being drawn from the box than a probable sample of 4 green and 1 yellow balls. In Experiment 2, infants looked longer at an impossible but perceptually representative sample of 2 red, 2 green, and 1 yellow balls than a probable sample of 4 green and 1 yellow balls. These results suggest that infants can integrate physical knowledge in probabilistic inference at 8 months.

IV.47

INFANTS' UNDERSTANDING OF OTHERS' GOAL-DIRECTED ACTIONS COVARIES WITH SPEED OF ENCODING

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Woodward (2003) reported that twelve-month-old infants interpret another's gaze and head shift (single fixation) as goal-directed. Johnson and colleagues (2007) reported that nine-month-old infants are also able to, if they observe equifinal action-paths (multiple fixations). The current study investigated how infants' encoding speed relates to this comprehension. We tested fifty-nine 10-12 month old infants in a habituation paradigm similar to Woodward (2003), but stimuli were prerecorded videos of an actor performing a single or multiple fixations. We categorized infants' encoding speed as slow or fast based on a median split of total habituation time. Encoding speed interacted with fixation condition, in that the multiple fixations stimuli helped fast-encoders interpret the action as goal-directed but the slow-encoders only interpreted the single fixation as goal-directed. These results indicate that encoding speed is a relevant factor of infant's understanding of goal-directed actions.

IV.9

DOES AUTISM AFFECT THE TYPES OF GESTURE AND THEIR RELATION TO SPEECH?

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At the early ages, typically developing (TD) children routinely use gesture to reinforce, clarify or extend what they convey in speech. Children with autism spectrum disorders (ASD), on the other hand, show difficulties in early gesture use, particularly in pointing. Here we ask whether the difficulty in early pointing extends to other gesture types and whether gesture serves similar functions in relation to speech in children with ASD. We explored these questions by studying the speech and gestures produced by 23 children with ASD (Mage=1;6) in comparison to 23 TD children (Mage=2;7), matched for language ability. As expected, children with ASD gestured significantly less (p=.01) than TD children. However, the relative distribution of gesture types (pointing, emblems, iconics) and the functions they served in relation to speech (reinforcing, clarifying, extending) did not differ by group, suggesting a similar role for gesture in ASD and in typical development.

III.9

EXAMINING PARENTAL ROLE IN CHILDREN'S CONCEPTS OF CHOICE

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Current research suggests that children understand choice by age four to five. Additionally, one important way children learn is from conversations with parents. This study investigated how parents talk about choice with their children and what differences exist in how parents talk about different types of choices. A total of 32 parent-child dyads completed a storybook task in which they discussed three types of choices: moral, conventional, and personal. Results indicated that parents conveyed relevant motivations for making different types of choices to their children. Parents spoke for longer about moral choices and used more evaluative and emotion language when discussing those situations; whereas, desires and talk of choice were most significant for personal and occasionally conventional choices. Future research should explore these trends in a cross-cultural sample, as well as examine if parental discussions reflect children's own view of these specific types of choices.

IV.17

THE ROLES OF RATIONALITY, CULTURE, AND CONSENSUS IN THE IMITATION OF QUESTIONABLE ACTIONS

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Asian-American preschoolers were more likely to imitate a questionable action (e.g., cookie-crushing with a fuzzy object) when 3 models performed it than when 1 did, and they were more influenced by consensus than their Caucasian-American peers (DiYanni, Nasrini, Nini, Kurkul, & Corriveau, in revision). In the current study, the only tool available to the models was the inefficient option, and so children could have viewed the use of that tool as more rational. We expected that children—who themselves had both tool options available—would imitate at lower rates under these circumstances. Preliminary results suggest that imitation rates remained highest among Asian-Americans in the consensus condition, and that rationality did not impact children's tool choices. Additionally, we found that children who saw models use an inefficient tool to complete a task were significantly more likely to teach a puppet to use the same tool than those who witnessed no modeling.

I.32

SEARCHING FOR A BILINGUAL ADVANTAGE IN EXECUTIVE FUNCTION: A LATENT VARIABLE APPROACH

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A great deal of recent research has shown that bilinguals outperform monolinguals on tasks of executive function--often in switching but sometimes in inhibition (Bialystok, 2011) . However, sometimes these results have been inconsistent (Kousie & Phillips, 2011; Kousie & Phillips, 2012). One possible explanation for this discrepancy is that the majority of extant studies have used single measures of each EF construct. In this study, we compare bilingual and monolingual college and graduate students on latent variables of Inhibition, Switching and Updating. Data collection is ongoing. We currently have 30 participants and hope to have 100 by the conference.

IV.18

KNOWING HOW TO LOOK PREDICTS THE ABILITY TO DRAW REALISTICALLY

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Some young children are able to create stunningly realistic drawings resembling those of adult artists. What perceptual abilities underlie this talent? This study examined two candidate skills on which adult artists excel the ability to: mentally segment a complex form (measured by the Block Design Task) and see hidden forms (measured by the Group Embedded Figures Test). Sixty-seven 6-12 year olds with a wide range of drawing abilities completed these tasks as well as an IQ test and an observational drawing task. While children who scored high on drawing realism outperformed those who scored low in drawing realism on both perceptual tasks, only detection of embedded figures predicted drawing realism. This occurred independently of age, years of training, and verbal and nonverbal IQ. There are certainly many contributors to this complex ability, but one component appears to be the tendency to see things more as they really are.

IV.68

CAPUCHIN MONKEYS (CEBUS APELLA) USE GOAL INFORMATION WHEN DECIDING HOW TO HELP A RECIPIENT

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From an early age, children demonstrate that they are sensitive to others' goals when deciding how to provide help. Although several species of nonhuman primate have also demonstrated that they will help others in some contexts, the cognitive mechanisms underlying these helping behaviors remain poorly understood. To explore whether representations of others' goals guide helping in others species, we tested whether one primate species – the capuchin monkey– would provide an experimenter with a desired out-of-reach object more often than an alternative object when the experimenter attempted to obtain the former object only. We found that capuchins reliably helped by providing the experimenter's goal object ($p = .005$; Experiment 1) and that explanations based on the use of several less sophisticated strategies did not account for the overall pattern of data (Experiments 2-4). Results are thus consistent with the hypothesis that capuchins help others based on an understanding of their goals.

III.40

ARE ALL APOLOGIES CREATED EQUAL? MAKING AMENDS AND RESTORING TRUST FOLLOWING AN ACCIDENTAL TRANSGRESSION

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Are prompted apologies as effective as unprompted apologies at making children feel better and restoring their trust in a transgressor? In this study, 6- and 7-year-olds engaged in a building activity alongside an adult confederate who unintentionally knocked over each child's structure. The confederate either provided an apology (unprompted condition), was prompted by the experimenter to apologize (prompted condition), or did not offer an apology (no apology condition).

Later, children were asked to rate how both they and the confederate felt about the event. They also took part in a distribution of resources task and reported whether they would like to interact with the confederate again in a novel task. Preliminary results suggest that —for most measures—a prompted apology is not as effective as an unprompted apology at ameliorating hurt feelings or restoring trust in a transgressor.

III.58

DEVELOPMENTAL DIFFERENCES IN PARTIAL-SOURCE MEMORY

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Source refers to the origins of memories; it is difficult to distinguish among highly similar sources (Johnson et al., 1993) such as which of two men, rather than a man or woman, spoke a word (Dodson et al., 1998), particularly for children (Lindsay et al., 1991). Sometimes partial-source information is recalled, as when we remember who told us something but not when (Johnson et al., 1993). There is a lack of research examining children's partial-source memory. This study will examine developmental differences in the likelihood that participants will select the correct gender of the speaker when specific recall of the speaker fails. Five-8-year-olds

and undergraduates will watch a video of puppets (2 male, 2 female) uttering nouns, then make judgments about who said each word and failing specific recall, to identify the speaker's gender. The results of this study would provide novel information about developmental differences in partial-source recall.

IV.60

THE SOCIAL FACILITATIVE EFFECTS OF IMITATION: A DEVELOPMENTAL INVESTIGATION

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Existing research with adults reveals consistent relations between body mimicry in a laboratory setting and social facilitation (Ashton-James et al., 2007; Stet et al., 2012). However, very little empirical work has investigated the role of imitation style in affording this facilitation, and none has investigated its early developmental trajectory. This study analyzed data from adults and preschoolers to test the following hypotheses: (1) taking part in a collaborative (compared to a competitive) game with a partner will increase participants' rate of mirror-style imitation, (2) being spontaneously imitated in the mirror- versus transposed style will increase participants' collaborative overtures in a partner task and (3) the relation between style of imitation and social facilitation will strengthen with age.

I.77

INFANT-DIRECTED SPEECH AS STATISTICALLY OPTIMAL INPUT

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The benefit of vowel hyperarticulation---the expansion of the vowel space---in infant-directed speech (IDS) is a matter of controversy. Some argue that hyperarticulation should make phonemes easier to discriminate and thus to learn. However, recent analyses demonstrate that not all phoneme pairs are hyperarticulated and some pairs are hypoarticulated, calling into question the utility of IDS for phonetic learning. We investigate which data will be most informative in helping ideal learners acquire phonetic categories using a Bayesian phonetic acquisition model that recovers the number of categories, the mean and covariance of each category, and the category label for each datapoint. We find that the optimal data exhibit many of IDS's phonetic properties including hyperarticulated corner vowels and other vowel pairs that are hypoarticulated or not hyperarticulated, suggesting that these properties of IDS are consistent with those of statistically optimal input for learner

II.16

THE ROLE OF EXPLANATION IN CHILDREN'S THEORY CHANGE: DO 6- TO 8-YEAR-OLDS UPDATE BELIEFS ABOUT BALANCE?

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Explaining may highlight abstract principles and support generalization, thus promoting belief revision more effectively than other strategies. We present 6- to 8-year-old children who possess incorrect theories of balance with two "anomalous" instances of blocks balancing (e.g., showing a child who believes that all blocks balance at the geometric center two unevenly weighted blocks, each balancing at their center of mass). We manipulate (1) whether children are asked to explain or describe the anomalous data and (2) whether the two blocks are perceptually similar to one another. We predict that (1) explaining anomalies will lead to greater belief revision because it prompts children to find the (correct) principle that accounts for the anomalies, and (2) belief revision will be greater when the blocks are perceptually dissimilar because anomalous evidence will be harder to explain away when the anomalies span a greater number of properties.

I.14

UNCOVERING THE EXTENT OF YOUNG ADULTS' SOCIAL ESSENTIALISM

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Although previous research (e.g., Taylor et al, 2009) has generally found that essentialism for social categories decreases into adolescence and beyond, recent findings by Eidson and Coley (in press) suggest that for the social category of gender, essentialism increases under time pressure and thus may simply be buried beneath explicit reasoning processes . The current work examined the generality of this finding in young adults using the same speeded switched-at-birth methodology to examine reasoning about behavioral and physical properties for a wider range of social categories: gender, race, religion, and political affiliation. Results show increased essentialist reasoning about behavioral properties for all social categories under time pressure, extending Eidson and Coley's findings. Individual difference measures predicted this change for some categories (e.g., liberals show greater change when reasoning about political groups). This reinforces the proposal that essentialism for a range of social categories may covertly persist into adulthood.

I.72

CHILDREN'S REASONING ABOUT THE CAPACITIES OF PLANTS, ANIMALS, HUMANOIDS, AND SPIRITS: A CROSS-CULTURAL INVESTIGATION

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Two studies investigated UK (n = 95) and Ecuadorian (n = 151) children's reasoning about the mental, physiological, physical, and animate capacities of plants, animals, humanoids, and spirits. The two studies further examined reasoning about the sensory abilities of spirits. Children from 4-12 years of age were read a story wherein a humanoid interacts with a plant, dog, and spirit on the humanoid's planet; they were then asked a series of questions about the capacities of each entity. Results showed that while animals and plants were viewed as possessing all capacities, spirits were viewed as possessing only mental and animate capacities. Spirits were also viewed as unable to see through walls despite being represented as non-physical and non-physiological entities. Plants were viewed as possessing only physiological and physical capacities. These results provide cross-cultural evidence that while spirits are viewed as non-physical entities, they are nevertheless ascribed limited human-like sensory capacities.

III.39

ADAPTATION TO A NOVEL LEXICAL STRESS PATTERN: EVIDENCE FOR CONSISTENCY IN STATISTICAL LEARNING ACROSS THE LIFESPAN

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To master their native language, infants must discover strategies for segmenting speech. For English-speaking adults, one such strategy is treating stressed syllables as word onsets, because most content words in English follow a strong-weak stress pattern (Cutler, 1990). English-exposed infants acquire this strategy somewhere between 7 and 9 months (e.g., Thiessen & Saffran, 2003). Listeners often apply these native-language appropriate comprehension strategies even when they are inappropriate, suggesting that adaptation to phonological patterns may be relatively enduring and inflexible (e.g., Cutler & Otake, 1994). This is consistent with perspectives suggesting that these adaptations reflect domain-specific and maturationally constrained learning mechanisms (Yang, 2004). We propose that these adaptations result from domain-general learning (Thiessen & Erickson, 2012; Thiessen & Saffran, 2003). Using infant and adult data, we provide evidence that suggests this adaptation is acquired rapidly via distributional regularities, and remains malleable even in early adulthood.

III.41

KINDERGARTNERS' ADDITION STRATEGIES ON MULTIDIGIT PROBLEMS AND THEIR RELATION TO BASE-TEN UNDERSTANDING

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Socio-economically matched kindergartners from the US, Russia and Taiwan (N=182) were asked to represent 5 two-digit numbers with counting blocks and solve 20 addition problems, 8 of which involved two-digit numbers. Kindergartners attempted solving 93% of the mixed-digit problems and solved 62% of them correctly. This shows that children are able to add two-digit numbers even before formal instruction. Participants relied on base-ten addition strategies on 13% of the trials for which they could have used them. Though kindergartners most frequently relied on counting to add numbers, their use of base-ten number representation positively predicted reliance on base-ten decomposition strategy in addition ($p < .001$, $R^2 = .14$), even when controlling for accuracy on single-digit addition problems ($p < .001$, $R^2 = .09$), that we used as a measure of participants' general computational ability. This appears to be a context-independent relation as there was no significant effect of country.

I.19

LEARNING BEGETS LEARNING: INFANTS USE NATIVE LANGUAGE STATISTICS TO SEGMENT AND LEARN WORDS

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Throughout development, learning new information is shaped by prior knowledge. The present research investigates how infants apply precocious development in speech perception to meet a key challenge in language acquisition, associating sounds with meanings during word learning. Fourteen-month-olds listened to fluent speech passages containing cues that facilitated word segmentation: target words were embedded in sound sequences that typically occur across word boundaries in the infants' native language (English). A separate group heard the target words embedded in sequences whose statistical characteristics obscured word boundaries. Infants then participated in an object-labeling task using the target words. When infants experienced opportunities to use native-language statistics to segment the words, they subsequently learned them as labels. When prior experience did not promote segmentation, infants failed to learn labels. Thus, young word learners apply knowledge of native-language sound structure to support further linguistic processing. The findings illustrate how learning begets learning in language acquisition.

II.61

SPEECH AND GESTURE IN CHILDREN WHO DO AND DO NOT STUTTER

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The gestures that accompany speech are widely assumed to support communication, although the nature of that support is vigorously debated. In the current study, we used a story narration task to investigate the relationship between gesture and speech in preschool-aged children who do and do not stutter. Both groups of children viewed a cartoon and then recounted what they saw to their parent who could not see the TV. Children's spontaneous speech and gestures were coded for frequency, duration, timing, and semantic content. Preliminary results indicate that while children who stutter produce more speech disfluencies than those who do not stutter, the type and amount of gesturing and its synchrony to speech are comparable. These findings contradict those that were previously reported within the literature. Implications for theoretical models of speech and gesture production will be discussed.

IV.33

THE STATUS OF MORAL REASONING IN CHILDREN'S UNDERSTANDING OF THE PRETENSE-REALITY DISTINCTION

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Theories of pretense argue that pretense and reality must remain separate (e.g., Leslie, 1987). However, children maintain real-world representations of physical properties for objects in pretense (e.g., Harris & Kavanaugh, 1993), indicating that children consider the boundary between pretend and reality somewhat permissible. The current experiment examined whether preschoolers extend abstract principles of morality from reality into pretense. Preschoolers (N = 42, range = 3-5 years) heard pretend or non-pretend versions of stories involving antisocial behaviors. Results show that children found antisocial behaviors to be equally unacceptable in both pretend and non-pretend situations, but correlations with false belief performance suggest that children with advanced theory of mind understanding have more certainty about the moral status of pretend antisocial behaviors. These results imply that children maintain their real-world representations of morality in pretense, even when their understanding of the relation between behavior and mental states is more advanced.

III.56

THE RELATIONSHIP BETWEEN ADHD AND THEORY OF MIND IN SCHOOL-AGED CHILDREN

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ADHD in children is associated with increased social difficulties, but there are mixed findings regarding delays in the development of theory of mind (ToM). One difficulty with this research is the inadequacy of advanced ToM measures. The current study examined the relation between ToM and social difficulties in children (N = 19; ages = 6;8 – 11;6), half of whom had ADHD (n = 8). ToM was assessed using the Flexibility and Automaticity of Social Cognition (FASC), a new measure (Hayward et al., 2013). Compared to controls, children with ADHD performed poorer on the FASC in producing typical explanation for social situations, but were not impaired in the speed of production or number of mental state explanations generated. Furthermore, performance on the FASC predicted social skills as indicated by parent rating scales (i.e., BASC-2 and Connors-3). The results support an inhibitory deficit explanation for social skills deficits in children with ADHD.

I.2

SELECTIVE ATTENTION IN YOUNG INFANTS: GAZE SHIFTS AND STIMULUS ATTENTION-GETTING FEATURES

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Selective attention was studied to understand how stimulus features affect goal-directed selection at age 4 months. Although adults are adept at focusing their attention, young infants are still learning how to attend to the world around them. Previous work indicated that infants readily adjust look duration during the first 6 months, but that they shift gaze only when extraneous events capture their attention. During familiarity-novelty tasks for example, young infants look longer at novel events than at events previously seen. Gaze shifts however are not preferentially directed toward novel events; they appear to occur randomly. To study selective attention during infancy, looking behavior was measured during a series of studies using a continuous-looking paradigm. Two stimuli were presented during each trial, with attention-getting features varied across studies. Preferential gaze shifts were analyzed along with gaze duration, and differed as expected when stimuli with different attention-getting features simultaneously appeared.

IV.80

THE IMPACT OF NATURE AND URBAN WALKS ON CHILDREN'S EXECUTIVE FUNCTIONS

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Previous research found that after exposure to natural environments ADHD diagnosed children showed improvement in their focused attention and motor skills (Grahn, Martensson, Lindblad, Nilsson, & Ekman, 1997), and displayed a reduction in symptoms (Kuo & Fabor Taylor, 2004, Wells, 2000). The current study examined the influence of a nature or urban walk on attention, as measured by a continuous performance task, inhibition, as measured by a go-no go task, and spatial memory in typically developing 4- to 5-year-olds and 7- to 8-year-olds. Four-to 5-year-olds spatial memory responses were more accurate following the nature walk than the urban walk. The 7-to 8-year-olds responded significantly faster on the measure of attention following the nature walk than the urban walk. There were no significant effects of walk in the other measures. Thus, the nature walk had a positive effect on some aspects of executive function for both age groups.

I.7

ACUTE EFFECTS OF PHYSICALLY ACTIVE VERSUS INACTIVE VIDEO GAME PLAY ON CHILDREN'S EXECUTIVE FUNCTIONING

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The current study examines the impact of exergame play on executive function (EF) for 160 7- to 11-year-old children. Participants were assigned one of 4 conditions: a non-playing control, an exercise condition, an exergame condition, and a video game condition. Participants in both the video game and exergame conditions play Dance Dance Revolution (DDR) for 20 minutes. Participants in the video game condition play sitting down with a hand-held controller while participants in the exergame play by dancing on a motion-sensor mat. Go/No-Go and Flanker tasks measuring EF are conducted before and after game play. Analysis will examine accuracy and response times for all tasks. Research on the potential cognitive benefits of interactive media and exercise can inform the implementation of fun cost-effective interventions in schools or community settings.

III.46

SPECIFIC NUMBER SENSE SKILLS MEDIATE THE ASSOCIATION BETWEEN INHIBITORY CONTROL AND MATHEMATICS ACHIEVEMENT

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Executive functioning—and inhibitory control in particular—is an important predictor of children's mathematics achievement (Blair & Razza, 2007). However, the mechanisms involved in this association are unclear. One mechanism may be the facilitation of "number sense" skills that require children to attend to relevant information in the face of conflicting or irrelevant information. We examined children's (141 kindergarteners) inhibitory control and number sense skills, as well as performance on a normed mathematics achievement test. We tested for direct and indirect effects using multiple mediation path analysis in Mplus. After establishing an association between inhibitory control and mathematics achievement controlling for IQ and age, we found that only number sense skills requiring inhibition were mediators of this association. Results suggest high levels of inhibitory control may facilitate children's acquisition of specific number sense skills, such as the ability to process and manipulate number sets, which in turn facilitate mathematics achievement.

II.40

INHIBITORY CONTROL DURING VISUAL RELATIONAL PROCESSING IN YOUNG WOMEN

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Analogy is useful in everyday and formal learning and is particularly important for STEM learning and discovery, an area where women are frequently underrepresented. We have previously argued that inhibitory control can help to explain analogy developmental patterns observed in young children. In this study, we asked 9 to 29 year old young women to perform a relational processing task asking them to either identify pairs of complex objects similar in shape or texture, or to solve visual analogies based on shape or texture relational similarity. We analyzed task performance based on whether problems required ignoring a distracting feature or relation. Our results suggest that preadolescent girls struggle with both featural and relational distraction while adolescent girls show improvement in featural distraction. Performance continues to improve on the analogy task into young adulthood. Our results suggest that inhibitory control during relational processing may continue to develop throughout childhood.

I.29

TODDLERS' INTERACTIVE BEHAVIOR DURING VIDEO-CHAT PREDICTS LEARNING

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Can toddlers learn from people on video-chat, or do they show the video deficit? We investigated whether 12-24-month-olds' interactive behavior during FaceTime sessions impacted their learning of novel information from a partner on the screen. Children experienced either real-time FaceTime conversations (contingent), or pre-recorded videos (non-contingent) with a person they had never met. The non-contingent videos were designed to allow children to respond (e.g., question and pause) to maximize similarity between conditions. We coded interactive attempts with the partner, such as responding to questions and imitating actions. Results showed that interactive behavior was frequent and did not differ between conditions, but it differentially predicted learning from the partner. Interactivity was more strongly associated with memory for novel information learned in the non-contingent condition than in the contingent condition. These results suggest that individual differences in sensitivity and responsiveness to social cues impacted children's learning in addition to the experimental manipulation.

IV.15 - *Withdrawn*

DOES LANGUAGE BACKGROUND INFLUENCE BELIEFS ON NATIVE LANGUAGE ACQUISITION?

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Previous research has indicated that young children believe that some learned traits such as one's native language are innate (Hirschfeld & Gelman, 1997). We asked whether early experience with multiple languages could influence such beliefs. In an adopted at birth task, children were asked which language a child would grow up to speak if he/she was born to a family that spoke one language and then was immediately adopted by a family that spoke a different language. Monolingual children and simultaneous bilingual children responded consistently with a view that native language is innate, but bilingual learners (children who had learned a second language since age 3) were significantly less likely to show this pattern. However, in another task, bilingual learners overextended this belief to animal vocalizations. These findings suggest that the recent experience of learning a second language, and not simply knowing two languages, influences children's essentialist beliefs.

IV.32

DO WE BEHAVE MORALLY TOWARDS ROBOTS? SELF-GENERATED, GOAL-DIRECTED MOVEMENT PREDICTS CHILDREN'S MORAL REGARD FOR A SOCIAL ROBOT

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One critical developmental achievement is determining who is and isn't worthy of moral regard. We explore one potential mechanism that drives this: intentionality. Five- and seven-year-olds interacted with a social robot dog that either appeared to engage in self-generated intentional movement, or appeared to be remotely controlled, while displaying identical surface behaviors. In an interview, we assessed children's attributions of emotional and perceptual capacities and moral standing to the robot, as well as children's willingness to engage in prosocial behaviors towards the robot. Children who saw self-generated movement endorsed higher emotional capacities than those who saw remotely controlled movement. Self-generated movement was also positively associated with higher prosocial behavior scores. Results suggest a relationship between our beliefs about others' intentionality and our prosocial behaviors towards them, and raise the question of how apparent intentionality may drive children's behavior towards various "smart" technologies as they emerge in our daily lives.

II.83

THE EFFECTS OF DAILY ANIMAL EXPOSURE ON CHILDREN'S BIOLOGICAL CONCEPTS

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The current research focused on how young children's experiences with pets impact their biological knowledge development. In Study 1, we observed 24 preschool-aged children with their pets and asked parents about their children's daily involvement with the pet. We found that most of young children's observed and reported interactions with their pets are reciprocal, social interactions. Study 2 investigated the impact on children's biological knowledge. Both 3- and 5-year-old children with pets demonstrated more accurate, elaborated biological knowledge than those without pets. Additionally, younger children with pets showed less anthropocentric patterns of extension of novel biological information. Pets thus facilitate the development of a more sophisticated, human-inclusive representation of animals. Although children treat their pets as social partners, the experience of having a pet fosters the acquisition of biological knowledge. Ongoing research in our lab is investigating the impact of other common experiences on biological knowledge development.

I.67

THE EFFECTS OF SMALL AND LARGE NUMBER TALK ON CHILDREN'S NUMBER KNOWLEDGE

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Parents' number talk involving large sets (4-10) is more predictive of children's later number knowledge than number talk involving small sets (1-3) (Gunderson & Levine, 2011). The present study seeks causal evidence of the effect of parental number talk on children's understanding of number and aims to measure the specific and possibly differential effects of small vs. large number talk on children at different stages of numerical development. We tested children's number knowledge before and after a 4 week period during which parents were asked to read experimenter-created picture books with their child. Families were randomly placed in one of three conditions: "small" numbers (books depicting sets of 1-3 items), "large" numbers (books depicting sets of 4-6 items) or a control condition (books describing items using non-numerical adjectives). Analyses will measure whether the effectiveness of each type of book varies based on children's starting level of number knowledge.

II.14

CHILDREN'S BELIEFS ABOUT THE VALUE OF IDEA CONTENT

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Previous research on children's concepts of idea ownership pits a person's idea against another's labor. This research examines, holding labor constant, if children's beliefs on ownership of a final creation is based on who had the original idea, the final idea, or the content of the idea. Three-, 4- and 5-year-olds and adults (N = 71) were presented four short videos, in which Person A has a first idea to create animals out of play dough (physical property) or create songs (intellectual property) and Person B has a second idea that either completely changes or superficially changes the original idea. Results revealed that the ability to assign ownership of a creation based on idea content develops with age. Overall, 3- and 4-year-olds assigned ownership to the person with the original idea for both property types, while 5-year-olds did this more frequently for intellectual property.

I.37

HO! HO! WHO? CHILDREN'S UNDERSTANDING OF "REAL LIVE" SANTA CLAUSES

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Each year starting in Mid-November children are faced with a strange dilemma. They have been told about Santa Claus by their parents and peers, and now they get a chance to meet him, in the flesh, at local malls and museums. We investigated for the first time how children reconcile this 'real' Santa with their understanding of how Santa Claus works, and how parents keep the Santa myth alive in the face of a real person enacting a fictional character. Almost all children between the ages of 3 and 10 believed the live Santa either was the real Santa, or shared at least some characteristics with the Santa who visits their houses, and parents were found to go to considerable lengths to keep the Santa myth alive, even in the face of multiple live Santas.

II.79

OBJECT IMITATION IN TODDLERS WITH AND WITHOUT AUTISM

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We investigate what action features young children with Autism Spectrum Disorders (ASD) fail to spontaneously imitate in comparison to typically-developing (TD) and developmentally delayed (DD) children. Participants (N = 38; 27 males; M = 29.1 months, SD = 6.9) had an opportunity to imitate target acts on six objects. There were three target manner acts (e.g., pressing a button) and one target outcome act (e.g., opening the box) per object. Completion of the manner acts was not essential to completion of the outcome act. Analyses revealed differences between the ASD and TD groups on manner act scores; $F(2,35) = 9.11$, $p = .001$, with intermediate performance by the DD group. There were no significant differences in outcome imitation scores. Our results indicate that toddlers with ASD are relatively proficient in imitating outcomes, but may not prioritize the imitation of strategies or preceding steps.

IV.70

FOUR YEAR-OLD'S PERFORMANCE ON THREE-ALTERNATIVE FALSE BELIEF TASKS: EVIDENCE FOR PERCEPTUAL ACCESS REASONING

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There is a confound within the traditional measures of false belief, allowing children to pass without understanding beliefs by using perceptual access reasoning (Fabricius et al, 2010); i.e., reasoning that the ignorant protagonist will chose the wrong alternative, which is confounded with the false belief alternative. Perceptual access reasoning will lead children to choose randomly between a third, irrelevant, and also incorrect alternative and the false belief alternative. Using several 3-option tasks (location, Smarties, neutral box), we found that 4 ½ year-olds indeed chose randomly between the false-belief and irrelevant alternatives, while many nevertheless passed a traditional 2-option

false belief task. This is in support of this age group using perceptual access reasoning and not yet understanding belief. Previous studies (Perner & Horn, 2003) found the opposite but were plagued by poor control question performance and unexplained findings.

I.86

PRESCHOOLERS' TRAIT ATTRIBUTIONS: THE ROLES OF THEORY OF MIND AND BEHAVIORAL AND AFFECTIVE CUES

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The present study examined whether: 1) behavioral and/or affective cues influence children's trait attributions; 2) such judgments change across episodes; and, 3) theory of mind (ToM) understanding accounts for age differences in trait attributions. Seventy-two 3- to 5-year-olds completed language, ToM, and trait attribution measures. The trait attributions task involved two story sets (one helpful, one unhelpful), each with five episodes. Half of the children saw photos of facial expressions consistent with and half viewed expressions inconsistent with the valence of the behavior. After each episode, children rated the character on certain characteristics. Not until 4 years of age did behavioral cues affect children's character ratings. ToM understanding accounted for differences in ratings across conditions. Facial expression only affected ratings for the helpful scenarios. These findings suggest that as children perceive individuals as having different mental states, they begin to infer that behaviors reflect something about one's internal states.

II.69

THE DEVELOPMENT OF A CONCEPT OF OMNISCIENCE AMONG MUSLIM CHILDREN AND ADULTS

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Omniscience is a widespread yet counter-intuitive concept. Prior research, conducted with participants who were predominately Christian, indicates that preschoolers understand some extraordinary mental capacities, but typically consider the knowledge of an omniscient being to be human-like and limited. Older children and adults gradually demonstrate an understanding of a less limited, fully omniscient mind. Using identical procedures, we examined the knowledge that Muslim children (4-11 years) and adults attributed to a novel omniscient being--Ms. Smart. When asked to reason whether Ms. Smart or experts possess more knowledge within those experts' domains, children across the age range consistently attributed greater knowledge to the experts than to Ms. Smart; adults attributed more knowledge to Ms. Smart. Whereas children attributed Ms. Smart knowledge in several domains including the past, present, and future, adults attributed knowledge only of the present. The influence of socio-cultural and cognitive factors in this developmental pattern will be discussed.

II.4

THE EFFECTS OF PARENT SPEECH ON CHILDREN'S LANGUAGE DEVELOPMENT

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The current study sought to find a connection between parent speech and children's language acquisition using 3 to 5 year-old at-risk children. A parent-child play dyad was analyzed using Systematic Analysis of Language Transcripts-8 (SALT-8). In the first analysis, parent responsiveness was used to predict child language. Children whose parents had low responsiveness scores spoke using a significantly higher number in amount of interrupted utterances ($t(183)=2.45$, $p=.015$) and in number of utterances in overlapping speech ($t(183)=2.82$, $p=.005$). Additionally they used significantly fewer root words ($t(183)=-2.16$, $p=.032$). Parent responsiveness and parent syntax was also used to predict child receptive language scores using Clinical Evaluation of Language Fundamentals-Preschool (2nd, CELF-P2). Parent responsiveness explained a significant amount of variance in child receptive language scores ($R2=.16$, $F(1, 58)=11.08$, $p=.002$) while parent syntax did not ($R2=.017$, $F(1, 58)=.98$, n.s.). Event-related potentials of a subset of these subjects are currently being examined.

IV.58

DEVELOPMENTAL CHANGE IN DISTRIBUTION OF ATTENTION ORIENTING IN NATURAL SCENES WITH FACES

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Bottom-up attention is driven by visually 'salient' events in the world. Perceptual information is processed in parallel over the entire visual field, giving rise to multiple visual feature maps which are then combined into a single topographically organized 'saliency map' for attention priority. We eye tracked 224 participants age 4 months to 30 years as they freely scanned sixteen color photographs. In six images, the face was identified as the 'winner-take-all' most visually salient location. In the remaining images, a non-face AOI was the 'winner-take-all' location. We found no developmental difference for orienting to Salient relative to Non-Salient Faces with age. However, attention orienting to visually salient AOIs competing with Salient Faces decreased, while attention orienting to visually salient AOIs competing with Non-Salient Faces increased across development. As such, differences in distribution of attention in natural scenes depend on the scene dynamics.

Specifically, the perceptual pull of the face influences visual exploration of the remainder of the scene.

IV.8

PLACING NUMEROSITIES ON NONSYMBOLIC NUMBER LINE IN PRESCHOOLERS

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One of the important aspects of number representation is its linear organization. However up to date there were only two studies of linear aspects of non-symbolic numerosity representation, and none of them involved pre-counting children. In this study we assess 4-y-olds knowledge of verbal count list and counting principles (give-a-number task) and then we test them with non-symbolic number line task: children are asked to place sets of rectangles (controlled for total area and contour) on a line with the ends defined by the sets of 1 and 4 elements (small number range), 1 and 7 (cross-range), and 5 and 20 (large number range). The left and right position of the lower end is counterballanced. The dependent measure is the deviation of the indicated position from the position expected from the linear model. Study in progress, results expected soon.

IV.43

THE ROLE OF QUIZZING IN CHILDREN'S LEARNING ON IPAD

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The current study examines how quizzing can promote children's learning when they learn new material using iPad. Twelve 30-month-olds were read a story on the iPad and were subsequently quizzed about story elements across multiple testing blocks. Children showed better performance in the 2nd testing block (M=0.83) than in the first testing block (M=0.58). It is possible that subjects were successful because quizzing promoted children's learning. A second study, looking at how children perform with retraining instead of the first quizzing block is being conducted. These findings indicate that children may learn more when they were asked questions about new material than from re-study.

II.52

CHILDREN'S AND ADULTS' DIFFERING EVALUATIONS OF RELIGIOUSLY- AND SECULARLY-MOTIVATED BEHAVIORS

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Across development, moral judgments depend on information about actor's mental states. The present studies investigated how religion—a belief system associated with morality—influenced evaluations of actors. In Study 1, 5-10 year old children and adults from religious backgrounds showed a slight tendency to evaluate religiously-motivated characters more favorably than secularly-motivated characters who performed identical behaviors. Participants from secular backgrounds demonstrated a sharper developmental change; with age, they became increasingly likely to prefer secularly-motivated characters. Study 2 served as a conceptual replication and also extended these findings by using a different paradigm (a continuous preference scale rather than a forced-choice paradigm), testing multiple secular motivations, and including primes designed to influence perceptions of the prevalence of atheism. Together, these studies provide support for the theory of intuitive theism, which argues that young children may find theistic ideas intuitively compelling. Future work will test the potential contributions of intuitive theism directly.

III.88

PRESCHOOLERS' AWARENESS OF THEIR MEMORY STATES: THE EMERGENCE OF METAMEMORY MONITORING

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Although there is broad consensus that elementary-aged children monitor the strength of their memories, it is less clear when and how this ability emerges. Recent evidence demonstrates that 3-year-olds monitor their uncertainty about perceptual decisions, but it remains unknown whether young children can introspect on their uncertainty in a memory task, as memory representations may be more difficult to assess. In the present study, 3- to 5-year-olds (n=77) encoded line drawings with some items presented twice to increase memory strength. During a retrieval test, children provided confidence judgments on each trial. Four- and 5-year-olds' confidence judgments were calibrated to their accuracy and memory strength, while 3-year-olds were equally confident for all trial types. Thus, introspection on memory processes may emerge later than introspection on perceptual processes. Study 2 is ongoing and it is aimed at comparing memory and perceptual monitoring directly within-subjects among 3-year-olds.

III.78

OBJECT OF MY DESIRE: A FIRST LOOK INTO ECONOMIC VALUATION IN PRESCHOOLERS

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Object valuation is an important component of economic exchange, and key to assessing the fairness with which resources are distributed or favors reciprocated. There is evidence that children use heuristics such as quantity and size in object valuation. Here we ask whether preschoolers consider their own preferences in this

process, by assigning higher values to the things they prefer. Three tasks were designed to test whether 3-year-old children differentially distribute their favorite of two stickers to: 1) someone who gave a gift versus did not, 2) a puppet who cleaned up blocks versus one who did not, and 3) a puppet who helped someone achieve a goal versus one who hindered it. Preliminary data from Task 1 (N=14) shows that children (71%) give their favorite sticker to the gift giver. This suggests children assign greater value to favored objects and use that valuation in distributing resources. Further data collection is in progress.

I.88

EYE-TRACKING YOUR ATTENTION: THE DEVELOPMENT OF EMOTIONAL MEMORY AND ENCODING PROCESSES

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Enhanced memory for emotional information is a phenomenon that has been studied in a variety of contexts. However, the developmental trajectory of emotional memory is still unclear. This study evaluates the development of emotional memory and encoding processes. Specifically, we used eye-tracking technology to examine emotional arousal and the allocation of attention during the encoding of emotional stimuli. Adults and nine year-olds viewed a set of emotional images from the International Affective Picture System (IAPS) while eye-movements and pupil dilation were recorded. Participants completed a recognition task one week later as a measure of subsequent memory. We hypothesize that (1) adults' recognition performance will exceed children's performance; (2) adults' successful encoding will be related to the focusing of eye-gaze on images' emotional information, but this relation will be weaker in children; (3) children will show higher arousal to emotional images than adults, which will be reflected in pupil dilation.

II.23

CULTURE'S INFLUENCE ON PARENTAL HEALTH BELIEFS: AN EXPLORATION OF BEHAVIORAL ENDORSEMENTS

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The purpose of this study was to investigate how culture influences parents' health and illness beliefs, and how these beliefs are transmitted to their children. European-American (N=19), Mexican (N=20), and Malaysian (N=20) parents of children between ages 3 to 8 participated in semi-structured interviews. Results suggest that parents across these cultures endorsed a variety of health and illness practices. When asked to supply the top two practices that they promote, differences were found between the cultures. For example, Mexican and Malaysian parents endorsed consuming liquids (e.g., drinking tea) more often for illness prevention, while European-American parents did not. However, when asked about illness recovery, parents of all three cultures endorsed consuming liquids as an important health practice. Our results suggest that the endorsement of health beliefs vary somewhat by culture. Further research should be conducted to examine how health beliefs interact with health outcomes.

I.12

TWO-YEAR-OLDS' UNDERSTANDING OF SELF-SYMBOLS

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The present study investigated 48 2.5-year-olds' ability to map from their own body to a self-representation and examined the role of parent-child conversations about body-representations in participants' understanding of self-symbols. Children participated in two dual-representation tasks in which they were asked to match body parts between a symbol and referent. In one task they used a self-symbol and in the other they used a symbol for a doll. Participants were also read a book about body parts by a parent. As a group, participants found the self-symbol task more difficult than the doll task. However, children whose parents explicitly pointed out the relation between their children's bodies and the symbols in the book performed better on the self-symbol task. The findings demonstrate that two-year-old children have difficulty comprehending self-symbols, and suggest that parent-child talk about self-symbols may facilitate their understanding.

III.83

THE DEVELOPMENT OF EARLY THEORY OF MIND AND LANGUAGE

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Research has demonstrated a strong relationship between language and Theory of Mind (ToM) reasoning in the preschool years, but less is known about whether earlier-developing ToM abilities are similarly tied to language. Experiment 1, with 96 typically hearing children (17-27mos), found no relationship between vocabulary size (M-CDI short form) and performance on three ToM tasks (Buttelmann et al., 2009; Camaioni et al., 2004; Meltzoff, 1998) ($ps>0.25$). Experiment 2 used the same tasks with 13 language-delayed deaf toddlers (19-27mos) and 13 age- and SES-matched typically hearing toddlers. Despite knowing significantly fewer vocabulary words ($ps<0.05$), the deaf toddlers' ToM performance was equivalent to that of their hearing matches ($ps>0.40$). Early ToM abilities such as understanding intentions and communicative pointing

likely develop independently of language, and may be the very abilities upon which language acquisition is built, which in turn may guide the development of later and more complex ToM skills.

III.62

RELATIONAL MATCH-TO-SAMPLE IN CHILDREN

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While human infants and many animal species, from chimpanzees to bees, have the cognitive capacities to pass an object match-to-sample (MTS), only a handful of animals, who received a special symbolic training, have been shown to succeed in a relational match-to-sample (rMTS). In addition to the ability to judge SAME/DIFFERENT relations, rMTS requires judging relations between relations (i.e., matching SAME to SAME, and DIFFERENT to DIFFERENT). This task may become simpler once symbols for SAME and DIFFERENT have been acquired, allowing to match symbols instead of relations. We asked whether children's understanding of the words same and different predicts success in a rMTS. Results suggest that understanding the meaning of these words is not sufficient. Three-year-olds understand the words, but fail in the rMTS. Four-year-olds succeed in matching SAME to SAME, but not DIFFERENT to DIFFERENT, while 5- and 6-year-olds fully passed the rMTS.

III.72

SELECTIVE TRUST AND THEORY OF MIND IN BRAZILIAN CHILDREN: EFFECTS OF CULTURE AND SOCIOECONOMIC BACKGROUND

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The present study was the first to investigate the ability to selectively trust reliable informants in a sample of Brazilian preschool children from two different socioeconomic backgrounds. Sixty-four children, equally distributed in two age groups (3- and 4-year-olds), participated. A standard selective trust task (Corriveau, Meints & Harris, 2009) was used. Participants were administered the Scale of Theory-of Mind Tasks and a vocabulary test (PPVT). A significant difference was found between the two SES groups with regard to theory of mind and performance on the vocabulary test. Additionally, results suggest a trend towards an interaction between SES, age and condition. In contrast to previous data with North American children, even the 4-year-olds in our study did not present a preference for the more accurate informant in the accurate x neutral condition. Moreover, only 25% of the 4-year-olds showed preference for the neutral informant in the inaccurate x neutral condition.

II.48

WEIRD BABIES: A PRELIMINARY ANALYSIS OF RACE, ETHNICITY, AND SES DIFFERENCES IN INFANT COGNITION

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In considering the nature of individual differences in infant looking time and patterns that converge from sets of data with various populations, we wonder: can these differences be mediated by factors such as race, ethnicity, and parents' level of education? Less than 1% of 1,000 presentations used participants from disadvantaged backgrounds at the International Conference on Infant Studies in 2010 (Wight, Chau, & Aratani, 2010). In our current sample we had more than ten times the diversity. Looking time data for 267 infants were analyzed. Results suggest that there is no significant effect of race, ethnicity, or parents' education on infant looking behavior in our studies. Our null effect for infants' knowledge about physical events is a stark contrast to language acquisition studies showing SES differences as early as 18 months. Further research should continue to address the possible roles of demographic factors in mitigating effects of infant behavior.

II.44

THE EFFECTS OF LANGUAGE, EXECUTIVE FUNCTIONS AND BILINGUALISM ON YOUNG CHILDREN'S SYMBOLIC UNDERSTANDING

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Previous research has found that language is a factor that predicts performance on symbolic understanding tasks and that bilingual children show improved symbolic understanding (Homer & Nelson, 2009; Homer et al., 2013). The current study furthered this work by examining language skills and executive functions as predictors of performance on a symbolic understanding task in bilingual and monolingual children (N = 25; ages 2;6-3;6). Preliminary analyses indicates no significant difference between bilingual and monolingual participants on either EF scores or or the symbolic retrieval task. EF performance was significantly correlated with performance on the symbolic retrieval task ($r = .42$, $p = .03$). Additional data is being collected and language scores (for L1 and L2) are being coded and will be analyzed. The results of this ongoing study will provide insight into factors that support young children's development of symbolic competencies.

IV.55

GENDER DIFFERENCES IN THE DEVELOPMENT OF ADVANCED TOM AS ASSESSED BY THE FLEXIBILITY AND AUTOMATICITY OF SOCIAL COGNITION (FASC)

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Gender differences in children's development of Theory of Mind (ToM) was investigated using the newly developed Flexibility and Automaticity of Social Cognition (FASC) task (Hayward, Homer, Pace, & Bromley, 2013). The FASC consists of eight cartoon stories that vary along two factors: language and social scripts. A total of 101 children ages 7;8 to 17;7 were administered the FASC. Gender interacted with age such that girls provided more mental state explanations with age ($p < .001$, $\eta p2 = .30$) but boys did not ($p = .214$). Similarly, on the number of common explanations provided, the effect of age for females ($p < .001$, $\eta p2 = .41$) was significantly more pronounced than for males ($p = .015$, $\eta p2 = .17$). Results suggest that some aspects of advanced ToM develop at a faster rate for females relative to males over later childhood into adolescence.

IV.79

THE EFFECT OF STORY FRAMING ON ANALOGICAL TRANSFER FROM FANTASY

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Many children's books, even educational ones, include elements of fantasy. However, some research indicates that children are less likely to learn from narratives that have fantasy elements (Richert & Smith, 2011; Richert et al., 2009). Here we systematically varied degree of fantasy in stories to check its influence on analogical transfer from the story to a real problem. The same story was framed, for 1/3 of our sample of 60 5-year-olds, as either true, fictional, or taking place on Twin Earth. Interestingly, story frame did not matter: roughly 50% of children transferred in each story condition. However, better memory for story events and higher fantasy orientation did significantly predict transfer. We are currently investigating whether increasing the degree of fantasy in the source stories in three additional fantasy conditions--physical dissimilarity to the real world, presence of unreal creatures, and causal violations--influences children's ability to transfer a problem solution.

IV.19

AGENCY AFFECTS MEMORY IN 9-MONTH-OLD INFANTS

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Research has demonstrated that both adults (see Foss & Bower, 1986; Trabasso, Stein, Rodkin, & Munger, 1992) and older children (Anderson & Conway, 1997; Howard & Woodward, under review) privilege agents and their goals when recalling events. However, little is known concerning the importance of agents on event memory in infancy. In the current study, 9-month-old infants were familiarized to a video of either a hand or claw building a simple block tower. At test, infants viewed a side-by-side picture of the familiar block tower and a novel block tower. Preliminary results suggest that infants in the hand condition, but not in the claw condition, looked significantly longer to the novel (M=2.57 sec, SD=.85) versus the familiar (M=1.76 sec, SD=1.28) block tower at test ($t(1,9)=2.81$, $p<.05$). These findings suggest that infants as young as 9 months of age are affected by the inclusion of an agent in an event.

III.74

THE ROLE OF COMPARISON PROCESSES IN FALSE BELIEF UNDERSTANDING

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Previous work has established that children during their fourth year begin to pass elicited-response false-belief tasks. Several accounts have proposed different reasons for why this critical change occurs (e.g., Perner & Roessler, 2012; Baillargeon, Scott, & He, 2010). One process that has yet to be evaluated with regards to false-belief reasoning is comparison. Comparison has been shown to be a powerful learning tool across many contexts (see Alfieri, Nokes-Malach, & Schunn, 2013 for a review). In a set of studies, we investigate the extent to which children can gain insight into false beliefs after engaging in comparison across multiple contexts. Four-year-olds were asked to make comparisons between true-belief and false-belief mental states. Results so far indicate an improvement in false-belief understanding from pre- to post-training. This line of work can expand existing theories of false-belief reasoning by providing a domain-general learning mechanism through which children can gain this insight.

II.58

DYNAMIC NEURAL FIELDS MODELS OF INFANT THEORY OF MIND

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Theory of mind (ToM) describes the ability to reason about the mental states of others. This study assessed how cognitive mechanisms support ToM during infancy. Infants completed a ToM task at 6- and 8-months of age. Vignettes presented an actress learning about a hidden object. When the object is revealed, the actress reacted with emotions congruent or incongruent with the object identity (e.g., appropriately excited to receive the target). Computational models were generated using dynamic neural fields to simulate real-time patterns of activation during the ToM task. Specifically, these models tested how memory, object perception, and social perception integrate to represent ToM. Parameters of the typical "mature" ToM system were adjusted to account for immature ToM representation (i.e., lack of distinction between Incongruent and Congruent conditions). Qualitative model fit using looking behavior data assessed which model (immature or mature) best accounted for ToM abilities at 6- and 8-months of age.

I.54

PREFERENCE FOR POSITIVE EVALUATIONS ABOUT COMPETENCE: CHILDREN DISREGARD EXPERTISE AND CONSENSUS INFORMATION

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Young children understand that some individuals provide more accurate information than others due to expertise within a field (Danovitch & Keil, 2004). This study investigated whether 4- to 8-year-olds would trust the opinion of experts in cases where it conflicted with the opinion of either one or three laypersons concerning the competence of a target character in the domain of art or music. Participants heard competing testimony from a layperson vs. an expert that varied by consensus level (one expert/one layperson vs. one expert/three laypersons), and valence of expert testimony (positive vs. negative performance). Irrespective of informant type, participants were more likely to accept positive than negative assessments of performance, $F(1, 38) = 98.9$, $p < .0001$. However, older children displayed sensitivity to expertise in stating that they would prefer to learn about the relevant domain from the expert character, $F(1, 45) = 7.45$, $p < .05$.

I.27

LONGITUDINAL PREDICTORS OF SUCCESS IN MATHEMATICS: UNDERSTANDING THE ROLE OF SPATIAL MEMORY, SUSTAINED ATTENTION, AND INHIBITORY CONTROL

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Understanding factors that predict math success is important. Our purpose was to specify the causal links between executive functioning and mathematics performance using a longitudinal design. One hundred three 3- to 6-year-old children completed measures of inhibitory control (Whisper, Bear/Dragon, Day/Night, Gift Delay), sustained attention (Picture Deletion Task for Preschoolers-Revised), and spatial working memory (Object Replacement) at Time 1. At Time 2, 53 children returned when they were 6 to 10 years old to complete measures of mathematics performance (WIAT-III Numerical Operations, Math Problem Solving, Math Fluency) and intelligence (WISC-IV Matrix Reasoning). As expected, inhibitory control, sustained attention, and spatial working memory at Time 1 predicted math performance at Time 2. The predictive relation held for spatial working memory and sustained attention even after controlling for matrix reasoning. These longitudinal findings provide important support for the causal relation between executive functioning and math performance, which has implications for STEM education.

II.56

UNDERSTANDING TEMPERAMENT IN MIDDLE CHILDHOOD

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Although much is known about temperament during infancy and early childhood, relatively little is known about middle childhood. The goal of this project was to understand temperament in middle childhood. Ninety-three mothers completed the parent-report version of the Temperament in Middle Childhood Questionnaire (TMCQ, Simonds, Kieras, Rueda, & Rothbart, 2007), and their 6- to 10-year-old children completed a Color Word Stoop task. Three key results are reported. First, all 17 TMCQ subscales evinced adequate internal consistency, further establishing the psychometric properties of this new scale. Second, longitudinal findings revealed strong positive correlations between all 12 common dimensions of the Child Behavior Questionnaire completed four years earlier (CBQ, Rothbart, Ahadi, Hershey, & Fisher, 2001) and the TMCQ. Third, there was a strong positive correlation between inhibitory control measured by the TMCQ and by the Color Word Stroop task. Together, these findings provide important details about temperament during middle childhood.

II.53

COMPARISON AND CHILDREN'S EXTENSION OF FAMILIAR CATEGORIES AND PROPERTIES

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Comparing multiple exemplars has been shown to help young children categorize by relational properties (e.g., taxonomic information) rather than perceptual information (e.g., shape). However, it is not clear whether comparison aids children when extending familiar categories to novel objects or when extending relational properties to novel category instances. This experiment investigated whether comparing two familiar exemplars and their relational properties (e.g. "This one helps you grow big and strong.") would aid children in correctly extending those properties to novel objects. Our study involved 48 three-year-old participants in 3 conditions: No Exemplar, One Exemplar/No Comparison, and Two Exemplars/Comparison. Preliminary data show that children seem to benefit from comparison in extending category membership to novel objects; however, comparison does not seem to aide them in extending relational properties to novel objects.

I.26

THE DEVELOPMENT OF A COLLECTIVE BIAS IN SENTENCE INTERPRETATION IN PRESCHOOLERS

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Sentences such as "Two girls read a book" can lead to multiple interpretations: two girls reading the same book (collective interpretation) or two girls each reading their own book (distributive interpretation). Previous research has shown that 4-year-olds show a slight bias for a distributive interpretation whereas adults show a strong collective interpretation. The current research investigates these biases through the preschool years (4- and 5-year-olds) and how the properties of the set (2 versus 4 actors in the scene) affect this bias in both preschoolers and adults. Preliminary results suggest that both children and adults vary their interpretation of the sentences based on properties of the set and that these biases change across development.

II.31

AN INTEGRATED RATIONAL NUMBER SYSTEM AND ITS RELATIONSHIP TO ALGEBRA ABILITY

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While fractions have garnered much attention in the field, less work has investigated our understanding of decimal notation, and further, whether rational number magnitude understanding can predict advanced math ability. In two experiments, adults completed a symbolic number comparison task involving decimals, fractions, and whole numbers in which they made both within-type (e.g. fraction vs. fraction) and between-type (e.g. fraction vs. decimal) comparisons. They also completed an Algebra math test. Analyses reveal ratio effects in all between type comparisons, suggestive of an integrated rational number mental continuum. Additionally, ratio effects for decimal comparisons were the strongest predictors of Algebra ability. Thus, results indicate adults have a fully integrated rational number system, but it appears that more research should focus on our understanding of decimal magnitudes in order to shed light on advanced math achievement.

II.85

MALLEABILITY OF CHILDREN'S LANGUAGE-BASED PREFERENCES

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Previous research has established that children show a preference for speakers of their native language and accent (Kinzler et al. 2009). In two studies, we examined the malleability of these initial biases. In Study 1, 5- to 7-year-olds heard native-accented speakers who made speech errors against foreign-accented speakers who made no errors. Seven-year-olds preferred foreign- over native-accented speakers ($t(17)=2.983$, $p<.05$), but 5- and 6-year-olds did not ($t(20)=1.120$, p=ns). Children's friendship choices are also influenced by shared preferences, such as liking the same food or toys (Fawcett & Markson, 2010). In Study 2, 3-year-olds watched video clips of foreign-language speakers who shared the child's preferences against native-language speakers with opposing preferences. Three-year-old children were biased toward the native language speaker in the baseline condition ($t(15)=-2.076$, $p=.055$), but when speaker's preferences were introduced, this bias shifted toward the foreign speaker ($t(15)=2.148$, $p<.05$). These findings suggest flexibility in children's language-based preferences.

I.35

EFFECTS OF DEVELOPMENTS IN ABSTRACT THINKING, WORLD KNOWLEDGE, LANGUAGE & METAMEMORY ON CATEGORY DEVELOPMENT IN 3 - 8 YEAR OLDS

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This research investigated how developments in abstract thinking, world knowledge, language, and metacognition affect the thematic-to-taxonomic shift, particularly in terms of intermediate category development. Although the development of superordinate categories (ANIMAL) and basic categories (DOG) is well studied, the development of intermediary categories (PET) is not, even though

intermediate categories are necessary for making sophisticated inferences and efficiently retrieving items from memory. In this experiment, 83 three-to-eight year olds categorized items at different levels (superordinate, intermediate, basic) and in different ways (perceptual, taxonomic, thematic) and completed several other cognitive tasks. Younger children typically gave thematic or perceptual justifications for their groupings, whereas older children typically gave taxonomic justifications. Multiple logistic regression analyses revealed that only children's metamemorial awareness and world knowledge were significant independent predictors of their ability to group items at the intermediate level. These results suggest a strong link between metacognition and development of an abstract categorical hierarchy.

II.46

CHILDREN'S STEM LEARNING AND TRANSFER IN A CHILDREN'S MUSEUM EXHIBIT

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The focus of this project is on young children's early learning and STEM experiences in the Chicago Children's Museum Skyline exhibit. In this exhibit, families can construct skyscrapers and bridges using a variety of tools and materials. In work that is ongoing, we examine how interacting with the building related objects in the museum functions with parent-child conversation to determine what children are learning and remembering. Importantly, we are studying the conditions that might promote transfer of information from one context to another, for instance, from the museum to a different but related task done in the home. The data set of 200+ families targets visitor groups with children ages 4 - 8 and their parents. Additionally, we plan to address the question of how hands on engagement, specific object manipulation, and conversation predicts children's ability to generalize and transfer what they are learning during direct experience with the exhibit objects.

II.50

CROSS-CULTURAL DIFFERENCES IN PERCEPTION AND MEMORY

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Prior studies suggest that American adults and children use information about absolute size more accurately than Japanese adults and children, due to their different attentional strategies – focal versus divided attention. The present study examined whether this cross-cultural difference exists between American children and other East Asian countries and whether their developmental patterns are general across various kinds of absolute size tasks. Four- and six-year-old American and Korean children received perception and memory tasks on absolute sizes. Our preliminary results suggest that cross-cultural differences emerge by 6 years of age. However, there was an interaction effect of Culture and Task, indicating American children's superior performance on the Perception task and Korean children's superior performance on the Memory task. These findings indicate that Korean children have disadvantage in perceiving absolute size compared with American children but can overcome the disadvantage by using their other cognitive abilities or strategies.

IV.83

YOUNG KOREAN CHILDREN'S UNDERSTANDING OF TEACHING BASED ON KNOWLEDGE DIFFERENCE AND BELIEF ABOUT IT

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This study investigated twenty-eight 3-, twenty-eight 4- and thirty-four 5-year-old-Korean children's understanding of teaching based on knowledge difference and belief about it. Even 3-year-olds understood a knowledgeable party should teach ignorant one, but the deeper understanding that teaching occurs when there is a 'belief' about the knowledge difference was shown only for 5-year-olds. This finding seems to be consistent with the previous result with western children that showed young children's development of recognition of teaching. However, Korean children who might be influenced by Confucian value had more difficulty understanding that even a teacher can be taught by a child based on the knowledge difference and the pattern of correlation between theory of mind and understanding of teaching was different from the western counterparts. The present result indicates the possible cultural influence on children's recognition of teaching as well as the general developmental progress during preschool ages.

I.56

EXAMINING CONSISTENCY OF YOUNG CHILDREN'S EXPLORATORY BEHAVIOR

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Children's exploratory behavior is a prevalent topic in many areas of developmental research (e.g., causal reasoning, curiosity, science learning). However, previous work has focused on physical exploration of a single stimulus (e.g., Bonawitz, et al., 2011; Jirout & Klahr, 2012), begging the question of whether children's exploratory behavior varies across different stimuli. In this study, 102 four to seven year olds explored two different toys to test if their behavior was consistent

across the different stimuli. Children were asked to explore "what [the toy] is, what it does, and how to play with it." Exploration of the two toys was significantly related, but weak, for physical exploration alone (r= .255, p= .010). Verbal observations, questions asked, and a combination of verbal and physical exploration had higher correlations between the two toys (r values= .585, .574, and .548, respectively, p values <.001). Implications for future research on exploratory behavior are discussed.

III.2

MAPPING THE ROLE OF REPRESENTATIONS IN SPATIAL GAME PLAY

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Research on the development of children's use of representations such as maps and models suggests that even young children (i.e., 3-5 years) understand their representational functions. They can use maps for a variety of simple tasks, including locating an object in a model or large-scale space (DeLoache, 1989; Huttenlocher, Newcombe & Vasilyeva, 1999). However, children struggle with more complex map tasks, and even some adults struggle with effective use of maps (Liben & Downs, 1991). This study investigates children's performance on a battery of spatial game tasks using scaled representations (e.g., puzzles, search task, mazes with maps). We present data on children's use of scaled representations, factors that influence both the use of the representations and performance on the tasks, and the relationships among tasks. Children use scaled representations effectively, but factors, such as scale, influence the use of representations and the effectiveness with which they are used.

II.76

DEVELOPING NOTIONS OF CAUSAL EXPLANATORY RELEVANCE

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How does the ability to discriminate between relevant and irrelevant explanations develop? In two experiments, 120 4-year-olds, Kindergarteners, and 2nd graders were presented with statements in three categories: true-relevant ("Cars have engines that turn gasoline into power"), true-irrelevant ("Cars have radios that play music"), and false ("Cars have rockets that speed them up"). Participants were asked whether each statement was helpful or not helpful for understanding what makes cars go. Experiment 1 showed that when children younger than 2nd grade are presented with explanations one-by-one, they reject false explanations but endorse both true-relevant and true-irrelevant explanations as helpful. In contrast, Experiment 2 showed that when true-relevant and true-irrelevant explanations are directly contrasted, children as young as 4 identify the relevant explanations as more helpful. Ongoing studies examine which kinds of contrasts are most helpful and whether there are ways to encourage children to create these contrasts on their own.

I.82

LOCATION IS THE KEY: THE RELATIONSHIP BETWEEN LOCATION AND NARRATIVE COHERENCE IN EARLY MEMORIES

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The importance of place information in autobiographical memories is clear given that it is a defining characteristic of this type of memory. Yet few studies have investigated the role of location in autobiographical memory. In the present study we investigated whether the use of location information would predict narrative coherence. We examined adults' written narratives of 5 memories: earliest memory, transition to school, birth of a child, child's transition to school, and a recent memory. Each narrative was coded for coherence (context, chronology, and theme) and location (type, and referent). Ordinal regression modeling was used to determine whether the frequency and type of location information would predict narrative coherence. Geographic location was associated with narrative coherence in earlier memories. The implications of the findings will be discussed.

III.31

FITTING OBJECTS WITH AND WITHOUT HANDLES

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Handles are a common feature of many human tools, but handles pose potential challenges for the tool user. Actors must treat handles as extensions of objects and gear their actions to the tool's functional end. Sixty toddlers between 17-36 months of age were presented a fitting task in which they reached for a rod or a handled-rod and transported it to a slot located at the midpoint of the table. A 3-D motion capture system (Qualysis) was used to measure the angle between the rod and slot. The results indicate older but not younger toddlers show anticipatory adjustments when fitting objects into slots, however they prospectively align non-handled objects before handled-objects. The results suggest a dissociation in the development of the ability to align objects with handles compared to objects without handles.

II.27

YOUNG CHILDREN'S ABILITY TO DETERMINE POTENTIAL TOOL FUNCTION THROUGH HAPTIC EXPLORATION

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Mature tool use requires the accurate perception of a tool's properties when determining its potential function. The present study extends the work of Klatzky, Lederman, and Maniknen (2005). Specifically, it asks if children can determine tool use function when object exploration is restricted to haptic exploration. Three-, 4-, and 5- year old children (to date, N=27) verbally judged whether spoons of varying sizes could carry small and large candies and whether sticks of varying rigidities could be used to stir stones and sugar (separately). Preliminary results suggest that 4- and 5-year-old children were more likely to say that the object was a functional tool when the perceptual properties of the tool were ideal for the specific target action. Three-year-old children did not respond in a systematic manner. Additional analyses are currently underway to determine if children use adult-like haptic exploratory procedures while making judgments.

II.82

THE VISUAL/ANALYTIC SHIFT IN THE DEVELOPMENT OF GEOMETRICAL KNOWLEDGE

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We argue that the conceptual change approach and particularly the framework theory can be fruitful in explaining the development and learning of geometrical knowledge. Contrary to stage theories which dominate current thinking about geometrical development, we argue that (i) there is a visuo-analytic shift related to acquisition of expertise in geometry, (ii) intuitive forms of geometrical thinking based on visuo-spatial reasoning co-exist with the analytical modes of thinking even in experts. Thirty eight 10th graders and 9 mathematics teachers were administered the Visual/Analytic Shift Test (VAST) which consisted of tasks could be solved by relying either on spatial or analytic strategies and tasks that required going against visual information and relying on analytical geometrical knowledge alone. The results supported our hypotheses, showing that there is a visual/analytic shift, which depends on the development of geometrical knowledge.

I.25

COMPLEMENT SYNTAX, MENTAL VERBS, AND THEORY OF MIND IN CHILDREN WHO ARE DEAF

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The present study analyzed theory of mind (ToM) development in children who are deaf in relation to mental verb and complement syntax understanding. In Part 1, direct positive relationships were seen between ToM development and vocabulary, complement syntax mastery, and mental verb understanding. In Part 2, participants saw a significant increase in complement syntax understanding after book-reading sessions, whereas mental verb and ToM understanding were not significantly changed. However, after administration of discussion sessions, mental verb and ToM understanding were also increased. In Part 3, two groups using differing communication modalities (i.e., spoken English and Signing Exact English) were compared. Both groups showed significant improvement in false belief pass rates after participating in the book-reading and discussion sessions. Whereas signers began the program with significantly lower passing rates than speakers on the false belief measure, these signers exhibited overall slightly higher false belief pass rates compared to their speaking peers.

IV.78

A CHANGE OVER DEVELOPMENT IN THE INFLUENCE OF DISTRACTORS ON MAINTENANCE IN SPATIAL WORKING MEMORY

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Work with adults has found that spatial selective attention influences maintenance of a location in spatial working memory (SWM). Awh and Jonides (1998) proposed that adults use spatial attention as a "rehearsal mechanism" for SWM, because when attention is manipulated during the delay of a SWM task, adults make larger memory errors. The relationship between attention and maintenance in SWM has not been studied in children. Across three experiments children's attention during the delay of a simple SWM task was taxed by presenting a distractor during the delay. In each experiment the distance and direction of the distractor from the target location varied. Results of the experiments revealed that memory responses of young children (3 and 4 years) were biased toward distractors when distractors were near the remembered location while responses of older children (6 – 8 years) were biased away from distractors close to the remembered location.

I.4

RECODING AND DECODING IN TODDLER WORKING MEMORY

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Adults can increase working memory by chunking individual items together, assigning a meaningful label to the chunk, then using that label to retrieve the individual items from long-term memory. We asked whether this recoding/decoding process was present in 2.5-3-year-olds. We taught toddlers novel names for sets of 2 and 3 identical blocks (e.g., "daxer" for 2 blocks; "blicker" for 3). We then peered into an opaque box, and said, "I see a daxer/blicker!" We allowed toddlers to reach in and retrieve either 2 or 3 blocks. Toddlers successfully kept searching for the remaining block on trials where the word referring to a 3-object chunk had been used and only 2 blocks had been retrieved, even though they had not seen what was hidden. This offers the first evidence that toddlers can recode chunked representations with a label, then use that label to retrieve the number of objects in the chunk.

III.53

USED THEN LOST: INFANTS USE FEATURES TO CHUNK OBJECTS, BUT DO NOT STORE THE FEATURES IN MEMORY

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Previous work shows that by chunking objects together, infants can exceed the typically observed capacity limit of working memory. These past studies tested infants' chunking by asking how many objects infants recalled. Here, we asked what infants remembered about the featural identities of the chunked objects. We tested infants in two series of experiments. In one, 7-month old infants chunked using a conjunction of spatiotemporal and featural grouping cues (after Moher, Tuerk, & Feigenson, 2012). In the other, 13-month infants chunked using co-occurrences between objects with particular features (after Kibbe & Feigenson, under review). In both series, infants successfully used the featural information to chunk, thereby remembering more total objects than they could without chunking. However, infants of both ages failed to recall featural information, even though the featural information was required to form the chunks. Our results suggest that chunking helps infants remember 'how many' but not 'what'.

I.51

EXPERIMENTALLY INDUCED INVOLUNTARY MEMORIES IN YOUNG CHILDREN

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Involuntary memories are common in adults. However, very little is known about involuntary memories in children. The sparse existing evidence is primarily from observational studies and anecdotes (e.g., Eisenberg, 1985; Hudson, 1990; Nelson, 1989; Nelson & Ross, 1980). In order to surmount the control problems inherently bound to observational studies, we, in the present study, attempted to induce involuntary memories in the lab. Children (3-year-olds), who previously had participated in a memory study in our lab involving highly unique props, were brought back to the same lab. The children's spontaneous verbalizations about the previous experiment were compared to naïve controls. We hypothesized that the experienced group spontaneously would produce more correct and relevant references to the original experiment than controls, thus indicating involuntary memory. The results confirmed that children in the experimental group produced significantly more references to the previously experienced unique event than the children in the control group.

I.83

SMALL CHILDREN'S VERBAL AND NONVERBAL LONG-TERM MEMORY FOR SHORT MOVIES

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Small children's long-term memory is typically investigated by either non-verbal/implicit memory tests or by explicit/verbal tests. This study investigated 33- and 39-month-old's (N=140) verbal and nonverbal memory for short movies with a simple narrative after 6 months retention. Memory was tested by both eye-tracking (in the visual paired comparison paradigm) and by explicit verbal questioning. In addition, data was collected on the children's productive vocabulary at both encoding and test. The oldest children remembered the familiar movie both during visual paired comparison and in response to explicit questioning. In contrast, the youngest children only remembered the familiar movie in response to explicit questioning. Vocabulary at test was associated with both verbal and nonverbal memory but only for the youngest group of children. However, vocabulary was generally a better predictor of memory performance than age. These results are discussed in relation to memory development and different expressions of memory.

III.17

BEHAVIORAL VARIABILITY AND VOCALIZATIONS IN TASKS OF INHIBITION IN EARLY CHILDHOOD

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16 preschoolers (M=4.1 years) and three 5-8 year-olds participated in the Day-Night Stroop and DCCS tasks. Trials were scored traditionally for accuracy of last response. We also coded response switches, looks toward the experimenter during the response period, and vocalizations. Children self-corrected on 15.5% of Stroop and 21% of DCCS trials. Participants vacillated 3 times more often on Stroop test cards than on control cards, $t(11)=2.54$, $p=.032$. 40% of preschoolers, and all 3 older children, commented on task context and task structure. Ongoing analyses examine the relationship between vocalization content and self-correction and accuracy Alternative outcome measures and coding schemes reveal behavioral variability in inhibition, suggesting that inhibition is a graded capacity, and that children's understanding of task requirements may impact performance. This work encourages a view of behavioral and cognitive control that is dynamic and situated in-the-moment.

II.77

13-MONTH-OLDS MAP NOVEL LABELS TO EVENT CATEGORIES

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Infants learn words for relations later than words for objects, suggesting that relational language acquisition is particularly difficult. Yet there is evidence that infants perceive physical events in terms of abstract "event categories" (occlusion, containment). If event categories are highly salient representations for infants, words that map onto these categories may be easier to acquire. We showed 13-month-olds an occlusion or a containment event, paired with a novel label ("dakking"). Infants then saw perceptually novel event-label pairings, consistent (Match condition) or inconsistent (Mismatch condition) with their prior experience. Infants in the Mismatch condition looked longer at the new events, suggesting that they detected the change in label-event pairings. A control group of 13-month-olds did not look reliably longer at the Mismatch condition when the events were paired with the phrase "Look, watch this!". These results suggest that even young infants can rapidly learn to associate novel labels with salient relations.

III.80

INTUITIVE CAUSAL COMPLEXITY IN THE ABSENCE OF CAUSAL UNDERSTANDING

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Previous work has found that even young children seek out mechanism information about systems they encounter in the world, but at the same time there is ample evidence that neither children nor adults retain a detailed causal understanding of these systems. In this study, we investigated what children and adults might extract from mechanism information. We demonstrate that adults and children older than seven years have a highly consistent sense of the causal complexity of various real-world systems, despite having little or no causal understanding of how those systems work. While this sense of complexity is consistent within each age group, children and adults differ in what they consider to be complicated. In particular, the judged complexity of biological systems seems to increase over development. Furthermore, we provide preliminary evidence that this sense of complexity is used to guide deference to experts, but only when internal mechanism is relevant.

III.25

CHILDREN SHOW HEIGHTENED MEMORY FOR SITUATIONS INVOLVING PHYSICAL OVER PSYCHOLOGICAL HARM

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Preschoolers are biased to recognize individuals who were "mean" than "nice" and for remembering what mean things they did (e.g., Baltazar et al., 2012). It may be important to remember who was mean in order to avoid that individual later, and to remember who deserves social consequences like exclusion or punishment (Cosmides & Tooby, 1992). But, some mean behaviors are worse than others. The prediction that children's memory is sharper for the most serious transgressions is tested in three studies. Study 1 shows that children judge physical harm (e.g., hitting) as worse than psychological harm (e.g., teasing). Study 2 shows that physically harmful stories were more memorable than psychologically harmful or nice stories. Study 3 shows that children recall more words representing physical aggression (e.g., hit) than psychological aggression (e.g., dumb) or niceness (e.g, hug). These results suggest that children allocate cognitive resources towards situations that seem the most threatening.

IV.69

EFFECT OF TYPE A/B BEHAVIOR AND VOCATIONAL MATURITY ON ANXIETY LEVEL, MENTAL HEALTH AND WAYS OF COPING OF ADOLESCENTS

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India gropes with the achievement of a target "Education for All", another set of problems concerning educationists in the country are issues related to academic stress, examination anxiety, and their effect on students' learning process and mental health. The purposive sampling technique was used to select a sample of 300 adolescent for study. A significant relationship was found between type A and anxiety. Significant and positive relationship was found in A and mental health. Significant and positive relationship was found in low vocational maturity and anxiety. Low vocationally mature adolescents were significantly but negatively related with self-control, seeking social support, accepting responsibility among three groups under study whereas high vocationally matured adolescents were found to be positively related with coping. Girls are found to be more anxious than boys in A/B. Low vocationally matured girls posess poor mental health and ways of coping as compared to boys.

I.17

GESTURES PROVIDES MORE THAN A HELPING HAND: GESTURES' IMPACT ON LEARNING

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A number of naturalistic studies have found that teachers often gesture during instructional discourse (Alibali & Nathan, 2011) but these studies do not examine whether gesturing, as part of instruction, improves learning. In this ongoing research, 50 children ages 7-10 were exposed to math instruction with and without gestures. We provide evidence that suggests that the mechanisms underlying the benefits of gestured instruction are due to the representational content of gesture: (1) children benefit more from gesture that conveys strategic and conceptual information about math than gesture that provides accompanying content-less gestural movement, (2) children are more likely to retain the benefits from speech + gesture instruction than speech only instruction, and (3) analysis of children's speech and gestured explanations of math solutions shows up-take of the gestured information expressed in instruction. Significance of this research to embodied cognition and principles of instruction will be discussed.

I.74

THE IMPACT OF EMOTIONAL INFORMATION ON EXECUTIVE FUNCTION IN CHILDREN AND ADULTS

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Lagattuta, Sayfan, and Monsour (2011) created a happy-sad inhibitory control task (say "sad" for "happy" pictures and vice versa) and documented that 4- to 11-year-olds and adults found happy-sad more difficult than day-night. The current study compares happy-sad against other types of emotional (boy-girl: looking sad or happy) and non-emotional (day-night, up-down) stimuli in 4- to 10-year-olds and adults (N=247). We further tested participants on a "name-game" version of each task, where participants named the pictures. For both the opposite-game and name-game measures, there was significant age-related improvement across childhood and between childhood and adulthood, with happy-sad eliciting more errors and longer response times for every age group compared to boy-girl, day-night, and up-down. Happy-sad name game even posed a greater challenge than some opposite games. These data provide insight into the impact of emotional information on cognitive processing, including implications for the development of "hot" versus "cool" executive function.

IV.82

DEVELOPMENTAL DIFFERENCES IN THE EMERGENCE OF ON-LINE ACTION PREDICTIONS

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Recent eye-tracking studies show that older infants generate action predictions based on their analysis of an agent's goals (Cannon & Woodward, 2012), yet it is unknown at what age this ability develops. Using a Tobii eye-tracker, 20 15-month-old and 20 8-month-old infants viewed a familiarization trial of an actress reaching for 1 of 2 objects. In 2 test trials, the objects switched locations, and the actress did not complete the reaching behavior. Predictive fixations to either the prior goal or prior location object were measured. By 15 months, infants predicted that the actress would continue to reach for the prior goal object at levels significantly higher than chance ($M=.75$, $SD=.38$), $t(19)=2.94$, $p<.01$, whereas, 8-month-olds responded at chance ($M=.50$, $SD=.46$). These results suggest that older infants engage their analysis of others' goal-directed actions to generate action predictions, but that younger infants may have difficulty recruiting that knowledge to predict others' actions.

I.9

CHILDREN'S PERCEPTIONS OF PROSOCIAL TEASING

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Prosocial teasing is a positive form of teasing where the speaker means to tease in a friendly way with humour (e.g., a sister commenting on her brother's drawing, "You didn't draw that, it's too nice"). We investigated 8- to 10-year-old children's understanding of prosocial teasing and if the relationship between the teaser and the addressee (i.e., parent-child, siblings, or friends) affected this understanding. Children were asked questions about their comprehension of the teaser's sincerity, belief, and intentions, as well as about the addressee's reactions to prosocial teases. Results showed that 8-10-year-olds had a minimal understanding of prosocial teasing. Although comprehension was low, relationship information aided in their understanding of the speaker's sincerity and intent, and how the addressee felt after hearing the tease, with prosocial teases best understood when made by a parent or sibling. These results have important implications about when it is acceptable to start prosocially teasing children.

IV.4

CHILDREN'S USE OF ARGUMENT COMPLEXITY TO SELECTIVELY LEARN FROM OTHERS: CIRCULAR VERSUS NON-CIRCULAR ARGUMENTS

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Across two experiments we explored 3- and 5-year-olds' evaluation of non-circular over circular explanations, and their use of such explanations to determine informant credibility. Whereas 5-year-olds demonstrated a selective preference for non-circular over circular explanations (Experiment 1: long explanations; Experiment 2: short explanations), 3-year-olds demonstrated no such preference. Children's evaluation of the explanations did extend to their evaluation of informant credibility. Both age groups demonstrated a selective preference for learning novel explanations from an informant who had previously provided non-circular explanations – although only 5-year-olds selectively preferred to learn novel labels from her. Thus, not only do children prefer to learn from an informant who uses non-circular arguments, but they also use circularity as a cue when determining an informant's credibility.

II.33

THE EFFECT OF RACE FAMILIARITY ON INFANTS' VISUAL ATTENTION: A VISUAL SEARCH TASK

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We studied the effect of race familiarity on infants' visual attention as they scanned arrays of faces. Hayden et al. (2012) observed that 3.5-month-old Caucasian infants looked longer at displays in which an Asian face was in an array of Caucasian faces than at displays in which a Caucasian face was in an array of Asian faces. To determine whether such preferences might reflect differences in how individual faces attract infants' attention, we recorded Caucasian 4- and 6-month-old infants' eye-movements as they scanned displays containing Asian and Caucasian faces. Six-month-old infants preferentially looked at a single Asian face in an array of Caucasian faces, but did not look preferentially at a single Caucasian face in an array of Asian faces. Preliminary results with 4-month-old infants suggest the opposite pattern. Thus, by 6 months, other-race faces capture infants' attention, a process that apparently develops between 4- and 6 months.

II.2

DEVELOPING EXPECTATIONS OF THE BOUNDARIES OF EXPERTISE

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Three experiments examined children's expectations of expert knowledge might be limited along two dimensions: depth (i.e., the specificity of knowledge: specific trivia and general principles) and breadth (i.e., the range of knowledge: generalists and specialists). Experiment 1 showed children think specialists know more than generalists, but there were some developmental and knowledge type differences. Experiment 2 showed children think generalists know less specific trivia than general principles. Finally, Experiment 3 showed children recognized when general principles knowledge can be generalized between topics closely related to the specialists' expertise (e.g., duck experts know about another bird), but when the topics were slightly less related (e.g., duck experts do not know about other egg-laying animals). Overall, these results suggest that determining where expertise is limited may be difficult, suggesting the importance of helping people recognize who has the most appropriate expertise when they seek information and evaluate claims.

II.80

CHILDREN'S AND ADULTS' UNDERSTANDING OF PRAYER AS A FORM OF COMMUNICATION

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Conceptualizing prayer often entails entertaining two counterintuitive notions about communication: (1) that we can communicate with another being remotely, without using technology, and (2) that we can communicate just by thinking. We examined children's developing understanding of prayer as communication with God. Children (3- to 10-year-olds) and adults were told stories where people were mildly injured while engaging in everyday activities (e.g., leg scraped after falling off a bicycle), and then requested help from God. Within subjects, we varied whether protagonists prayed aloud, prayed silently, asked aloud, or hoped silently for God's help. The youngest children (3-5 years) often reported that God would not hear or know about the requests in each situation, particularly in the case of silent prayer. Older children (6+ years) and adults typically reported that God would be aware of all four types of requests. Cultural influences and relations with other conceptual insights will be discussed.

III.34

WHO IS RIGHT? CHILDREN'S USE OF LOCAL AND GLOBAL INFORMATION IN DECISION MAKING

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The Local Dominance Effect (LDE) is a social comparison phenomenon in which local information (information about a small group) rather than global information (information about a larger group) influences performance perceptions (Zell & Alicke, 2009). Little work has examined the LDE in children mainly because it is unclear if children understand that global information is more diagnostic. The current study examined 4- to 8-year-olds' use of local/global information in non-performance situations. Participants were given information from two groups of children who played with novel toys (i.e., which toy was more fun). Then, participants decided which group was correct about the toy. Older children were more likely than younger children to select the global group, $t(47)=4.93$, $p < .05$ and children were less likely to select groups that provided negative information. The current findings elucidate children's use of local/global reasoning and provide information for future research on social comparison.

I.52

COMPETING CUES AND THE DEVELOPMENT OF LANDMARK USE

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This poster presents data from a computer-based study where participants learn to respond relative to the location of a moving landmark or the geometric properties of the figure. Test trials then put the two pieces of information in conflict. Initial results showed that adults prefer the landmark almost unanimously, five-year-olds are not statistically different from adults, and four-year-olds and three-year-olds are different from both the five-year-olds and adults [$F(2,63)=6.86$, $p<.01$]. The follow-up study is similar to the initial study except that the available choices are all the same color, removing the colors that may have distracted the youngest participants. Findings indicate that the youngest participants are making fewer errors in the first part of the study, but the pattern when the cues are in conflict holds.

III.18

REPRESENTATION OF NUMBERS AND OBJECTS IN VISUAL LONG-TERM MEMORY

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Nonsymbolic quantity is always presented by a set of objects. This overlap of quantity and object identity raises a question of how these inputs interact. Two studies were conducted to investigate the interaction and its change in the course of development. Four to five-year-olds and adults studied sets of objects of different numerosity and were later presented with a recognition task. Results indicated that both changing the object identity (while retaining the numerosity) and changing the numerosity (while retaining the object identity) resulted in attenuated recognition. However, the interference from object information was significantly stronger than the interference from quantity information. Specifically, when a studied quantity was presented with novel objects, the recognition of the studied quantity dropped to chance level. This pattern was stronger for adults than children. Furthermore, asking participants to focus on either objects or numerosity during the study phase did not affect the asymmetric interference pattern.

IV.51

LOOKING AHEAD: CHILDREN'S INFERENCES FROM PICTURE BOOKS

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The ability to create and update mental models of story events as they unfold is essential for narrative comprehension. Previous research shows that by 2.5 years of age, children can update their mental representations of object properties and location when given explicit verbal information. It is currently not known whether children of this age can update their mental models using implicit information, such as statements or images that afford predictive inferences. By manipulating picture-text encoding conditions, the present research investigates 23- to 30-month-old children's ability to update their mental representations by drawing inferences from a picture book. It is possible that the process of actively constructing a mental model via an inferencing process will facilitate children's performance. However, it is also possible that the cognitive processing costs of this process will hinder children's mental updating.

II.34

UNDERSTANDING SES DIFFERENCES IN PRESCHOOL CHILDREN'S SYNTACTIC DEVELOPMENT: THE ROLE OF VOCABULARY AND PROCESSING EFFICIENCY

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Differences in vocabulary size between children from lower and higher socioeconomic status (SES) backgrounds emerge even before kindergarten. Less is known, however, about how SES influences other domains of language such as syntax. One hypothesis is that SES affects syntactic development through vocabulary development. Another distinct, but not mutually exclusive possibility is that SES affects syntax through processing skills. Children from high SES backgrounds, on average, may have both better vocabulary and processing skills which may explain their better syntactic skills. The current study measured syntactic, vocabulary, and processing abilities of 41 five-year-olds from diverse SES backgrounds. Children from higher SES backgrounds performed significantly better on a standardized syntactic assessment than their peers from lower SES backgrounds. Critically, both vocabulary and processing ability independently predicted syntactic knowledge. These results suggest multiple pathways by which a child's SES background influences language development.

I.90

THE GOOD INTENTION PRIOR AND ITS ROLE IN THE DOCTRINE OF DOUBLE EFFECT

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It is well-established that adults and children integrate information about an agent's intention when rendering a moral judgment about the agent's action. We asked how children and adults evaluate moral scenarios with two effects – one good and one bad – in the absence of intention information. We argue for the presence of a good-intention prior. That is, without explicit information of an agent's intention, we assume that the agent intends good effects. Using a trolley-problem-like paradigm, we compared subjects' responses in three conditions, including: (1) explicit good intention condition, (2) explicit bad intention condition, (3) no explicit intention condition. The outcome of the agent's action was held constant. Adults' and 4- and 5-year old children's deontic judgments and intentionality assessments of the moral acts in conditions (1) and (3) were similar, whereas those of condition (2) differed dramatically. These findings confirm our hypothesis of a good-intention prior in preschoolers' and adults' moral evaluations.

I.60

REPETITION EFFECTS ON PASSIVE PRIMING IN ENGLISH LANGUAGE LEARNERS

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Spanish monolinguals show priming effects for the multiple passives in Spanish (Gamez et al., 2009). These results suggest children are sensitive to the discourse function of passives, not just to syntax. However, modeling of the rarest form (fue-passive) only increases usage of more commonly-used passives. This study investigates the conditions under which priming can be induced for the rarest form, and thus, provide evidence of syntactic priming. We ask whether functionally monolingual-Spanish-speakers' (5- to 6-year-olds) repetition of the modeled form results in its subsequent use. 32 English Language Learners (ELLs) heard fue-passive picture descriptions and subsequently described novel pictures. ELLs in the repeat condition repeated modeled fue-passives; the no-repeat condition did not. A logistic model revealed a significant effect of condition ($p<.05$). The repeat group demonstrated greater use of passives, particularly fue-passives, than the no-repeat group. Findings suggest children's own output, in addition to input, significantly impacts their language development.

IV.22

PARENTAL TALK ABOUT NUMBER AND ITS RELATION TO GROWTH IN LATINO PRESCHOOLERS' NUMERACY SKILLS

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The way that parents talk with their children about number is related to children's numeracy development. Most of this research, however, has been conducted with European American and middle-income families. In this study, we examined how low-income Spanish-speaking parents talked about number with their preschool children and whether the quantity and quality of this talk was associated with growth in children's numeracy skills. Two-hundred twelve parents and their preschoolers were videotaped playing the grocery-list task. Videos were transcribed verbatim. Parental utterances were coded as basic knowledge (e.g., counting) or higher-order knowledge (e.g., arithmetic). Children's numeracy skills were assessed at three time points (from the beginning of pre-K to the end of K) using the Woodcock-Munoz applied-problems subtest. Preliminary findings suggest that aspects of parental talk about number might be related to growth in children's numeracy skills. Findings highlight important cultural differences in the link between parent-child interaction and numeracy.

III.69

EFFECTS OF MANUAL ROTATION EXPERIENCE ON DEVELOPMENT OF MENTAL ROTATION STRATEGIES

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Previous research demonstrated that there is a shift in picture-planar mental rotation abilities between 4-6 years of age. Manual training has been shown to increase mental rotation abilities in 10-11-year-olds, which suggests that motor experience influences cognitive performance. To determine whether manual rotation aids younger children's use of mental rotation strategies, we asked four- and five-year-olds to identify pictures of animals rotated from the upright position and observed their spontaneous use of manual rotations. Preliminary results demonstrated a significant difference between age groups: 5-year-olds were significantly more successful and performed above chance. However, there was a significant interaction for Age x Self-produced rotational gesturing. Four-year-olds who naturally gestured the rotation during the task were significantly more successful, suggesting that manual rotation experience assisted their mental rotation strategies. Follow up testing focused on providing four-year-olds with specific manual rotation strategies to explore the effects of manual experience on mental transformations.

IV.41

CHILDREN'S UNDERSTANDING OF IDEAS

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Despite the prominence of ideas in our mental life, little is known about the emergence of the abstract concept of ideas. Ideas may be especially difficult for children to grasp because they require understanding that ideas can be unique and known only to their creator – a feature tested in the present experiment. An experimenter asked four, five, and six-year-olds to make up a story but not to say it aloud. Later, the experimenter asked participants if she knew the story. Five and 6-year-olds claimed the experimenter did not know their story, but 4-year-olds tended to claim the experimenter did know their story. However, at all ages children indicated the experimenter did not know the color of their house, ruling out 4-year-olds simply overestimating experimenter knowledge in all domains. Results suggest that before age 5 years children seem unaware that ideas are not known outside the mind that created them.

II.74

SHORT-TERM IMPACT OF TELEVISION ON PRESCHOOL CHILDREN'S EXECUTIVE FUNCTIONS: A FNIRS STUDY

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Pacing is an important formal feature in entertainment television. Fast-paced television has been shown to impair children's executive functions (Lillard & Peterson, 2011). Little research has addressed children's neural responses to television. Here, functional near-infrared spectroscopy (fNIRS) was used to record oxyhemoglobin in the orbitofrontal cortex (OFC), anatomically synonymous with the ventromedial prefrontal cortex and an important locus of executive function. Thirty-five preschoolers were randomly assigned to watch an entertaining or an educational cartoon, then completed three executive function tasks. The entertainment group performed significantly worse on the executive function tasks ($p < 0.05$). The fNIRS results showed that concentration of the oxyhemoglobin of both the left ($t = 2.92$, $p < 0.01$) and right OFC ($t = 2.07$, $p < 0.05$) hemispheres was significantly lower for the entertainment group than the education group. Entertainment cartoons might deplete processing resources in OFC, which then impairs executive function after viewing.

IV.35

INFANTS USE LANGUAGE TO PREDICT THIRD-PARTY AFFILIATION

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We investigated whether infants use language to predict third-party affiliation. Nine-month-olds were shown videos of two bilingual actors. Infants were randomly assigned to one of three conditions that differed in terms of the language each actor spoke: English-English, English-Spanish or Spanish-Spanish. Infants then watched the actors interact both positively and negatively on alternating test trials. In the English-Spanish condition, infants looked reliably longer at positive test events, suggesting that they expected actors who spoke different languages to interact negatively. However, in the shared language conditions (English-English and Spanish-Spanish) infants did not exhibit this pattern of results. In fact, infants in the English-English condition looked longer when the two actors interacted negatively. These findings suggest that infants make inferences about others' social relationships based on language: they expect two English speakers to affiliate, but they do not expect an English speaker to affiliate with someone who speaks another language.

III.51

THE ROLE OF WITHIN-CATEGORY VARIABILITY IN INDUCTIVE LEARNING ACROSS CHILDHOOD

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To gain knowledge about a category through induction, a learner must generalize information about a few category members to that category as a whole. In order to generalize appropriately, the learner must be sensitive to the variability within the category and the sample. For example, learning about three sparrows may not tell us much about all birds, whereas a more diverse sample should promote wider generalizations.

In this study, four to ten year olds learned a novel quality from a diverse or nondiverse sample of three birds. Children then estimated this quality's prevalence in the wider bird population. Results indicate that four to six year olds did not consider sample composition, while nine to ten year olds generalized more when provided with a more diverse sample set. Thus, the appreciation for sample diversity develops slowly across the elementary school years.

I.50

PATERNALISM IN CHILDREN: OVERRIDING DESIRES TO BETTER HELP OTHERS?

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Children are often motivated and able to help others when they are able to identify their goals, but the best way to help is not always by giving people what they want. As adults, we sometimes "paternalistically" restrict others' behavior if they want things that we think are bad for them. We investigated the origins of paternalism in children. Five-year-old participants were told they would choose a snack to send to another child, and learned that the snack the child had requested (chocolate) would have a negative consequence (making the child sick). We found that children denied the request when they could offer a similarly desirable alternative snack (gummy fruit snacks) but not when the only available alternative was a snack children find less desirable (carrots). By age 5 children are able to be paternalistic but may balance desires against consequences in their paternalistic behavior.

I.21

DOUBLE DISSOCIATION: INTEGRATING COLOR/SHAPE AIDS CONDITIONAL DISCRIMINATION BUT SEPARATING THEM AIDS CARD SORTING IN 3½-YR-OLDS

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We report here success on Conditional Discrimination (CD) in children younger than ever before reported (age 3½ years). We did that by integrating color into the stimuli (e.g., a truck would be red or blue), instead of color being a property of the border of the stimulus card as in past CD testing (Gollin & Liss, 1962). We previously demonstrated success on the Dimensional Change Card Sort (DCCS) in younger children than ever before reported (age 3½ years) by separating color and shape (instead of a stimulus being red or blue, the stimuli were black, but the background was red or blue; Last author et al., 2000.) This double dissociation was predicted because for DCCS, children should focus on only color or only shape, whereas for CD, children should integrate color and shape because the color tells them which shape is the correct choice.

IV.73

BOOKS AND BABY TIME: THE EFFECT OF EARLY EXPERIENCES ON DEFERRED IMITATION IN INFANCY

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Individual differences in deferred imitation -a behavioral measure of imitation and recall in preverbal infants- affords an opportunity to test how infants' different early experiences may contribute to individual

differences in cognitive development. One study indicated that experimentally-manipulated experiences, facilitated by different take-home toys and interactions with caregivers, can affect deferred imitation. The current study aimed to isolate the effect of parent-infant interactions from the effect of toy to see if this was responsible for the group differences. We assigned infants to instructive interactions, social interactions, or a no-interaction control group, all facilitated with the same baby book. In deferred imitation testing, infants produced more actions and pairs of actions for familiar versus novel toys, indicating recall over the delay. However, there was no effect of group, suggesting that interactions were not impacting deferred imitation performance. The importance of books in infants' early environments is discussed.

IV.37

PROMOTING MATHEMATICAL PROBLEM SOLVING AND EXPLANATION AT HOME

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Generating explanations, particularly for another person, is associated with greater learning (Teasley, 1995). In fact, Rittle-Johnson et al. (2008) found that students who explained correct solutions to their moms had greater problem-solving transfer compared to those who explained to themselves. Additionally, Van Voorhis (2011) found that family involvement in homework increased student motivation and achievement. To harness the benefits of both parent involvement and explanation, we investigated the effectiveness of second graders solving word problems and explaining their thinking to a family partner, compared to independently solving and explaining in writing. Requested family involvement improved accuracy and explanation quality on homework, and homework accuracy and explanation quality were predictive of performance on an in-class posttest. However, requested family involvement did not directly impact posttest performance, although it did increase attempts to provide an explanation. Overall, explaining homework to a parent shows some potential for improving aspects of student learning.

II.41

EXECUTIVE FUNCTION AND SUSTAINED ATTENTION AS JOINT OR DIFFERENTIAL PREDICTORS OF ACADEMIC ACHIEVEMENT IN 1ST AND 3RD GRADERS?

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The successful execution of enduring academic tasks requires the joint performance of executive functions (EF) and the ability to sustain the focus of attention. The child thus needs to inhibit irrelevant stimuli, maintain newly acquired memory contents and flexibly adapt the activity according to current task demands while sustaining the focus of attention (SA). Both EF and SA have repeatedly been proven to predict scholastic achievement and behavior which is related to successful learning independently. However, even though both EF and SA have showed to share underlying processes, the question of EF and SA showing joint or differential patterns of prediction of academic performance in the first primary school years is not answered yet. The present study aimed, on one hand, at evaluating the relationship between EF and SA. On the other hand, the prediction of interindividual differences in academic achievement by EF and SA both as joint and separate predictors was evaluated. Data collection is about to be completed. Small but significant associations between EF and SA are assumed, postulating shared underlying processes. Moreover, we expect differential patterns of performance predictions, varying as a function of grade and predictor (EF vs. SA).

I.41

MULTIMODAL INPUT IN JOINT BOOK-READING ACTIVITIES FACILITATES EARLY WORD LEARNING

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Children learn new words more effectively when they are embedded in a joint book-reading context. Children also learn new words better when they are taught as spoken labels paired with visual gestures (i.e., multimodal input). The current project examined whether multimodal input offers additional benefits for word learning when labels are embedded in a book-reading activit Sixty children (ages 4.5 - 5.5 years) were taught novel labels for objects in a wordless picture book. Children learned either multimodal labels ("blicket" + gesture) or auditory-only labels ("blicket") for the novel objects. Children's memory for the labels was tested. Preliminary results indicate that children who were given the multimodal input correctly remembered significantly more labels than children who were given only the auditory words. These findings suggest that using multimodal input during book-reading activities may facilitate children's early word learning. Implications of this research for parents and educators will also be discussed.

I.42

THE EFFECTS OF MINDFULNESS TRAINING DURING ADOLESCENCE

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Previous research suggests that, in adults, practicing mindfulness meditation improves cognitive control and emotion regulation. While a number of studies have

examined the feasibility of conducting such interventions with adolescents, to date, no study has empirically tested the efficacy of such interventions in adolescents using adequate control groups or objective outcome measures. In the current study, participants in three age groups (young adolescents, mid-adolescents, and adults) were assigned to a mindfulness meditation training group, a relaxation training group or a passive control group. Participants in the training groups completed 8 weeks of training consisting of a weekly class and daily home practice. All participants completed a battery of tests of cognitive control and emotion regulation prior to the start of training and once it was concluded. Preliminary results suggest that mindfulness training improves both cognitive control and emotion regulation in adolescents.

II.19

TWELVE-MONTH-OLD INFANTS INFER INTENTIONAL AGENTS FROM THE PERCEPTION OF AUDITORY REGULARITY

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The present study examines whether infants attribute agency to auditory regularity. Using the violation-of-expectation paradigm, we found that 12-month-olds expected a human hand, but not a mechanical tool (i.e., a claw) with similar affordances, to be the cause of regular, patterned sound sequences: they looked reliably longer when the claw – as compared to the hand – was revealed to be the cause of the sequences. When the sound sequences were random and did not exhibit any patterns, 12-month-olds' looking times did not differ significantly when they saw the claw versus the hand as the cause of the sequences. We found similar but weaker patterns of responses in 8-month-olds. These findings suggest that 12-month-olds infer the presence of an intentional agent from the perception of auditory regularity. This bias appears to emerge between the ages of 8 and 12 months.

I.53

A COAT OF NEEDLES WOULD BE FINE, IF I COULD BE A...PORCUPINE: PAUSING AND RHYME IN WORD LEARNING AND RETENTION

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Rhyme is ubiquitous in preschoolers' early storybook experience, yet it is overlooked in research on word learning and retention. Rhyme may be especially facilitative because it can support active predictions about upcoming words. Given how powerfully predictability aids children, our study tests whether rhyme, when used to set up expectations will make words easier to remember. In a natural setting, preschoolers heard one of two near-identical versions of a story, either rhyming or non-rhyming. The stories named nine animals each preceded by "clues" to their identity. Children were tasked with recalling as many animals as they could from the story, and showed greater performance in the Rhyme vs. Non-Rhyme condition. In addition, how often caregivers distinctly paused before target words allowing extra time to make predictions or deliberately asked children to guess the animals children differed by condition and enabled stronger recall performance for the rhymed story.

III.64

EARLY PREFERENCE FOR NATURAL VERSUS BUILT ENVIRONMENT TYPES

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The visual paired comparison paradigm has previously been used to investigate infants' preferences for attractive faces. This preferential looking test shows that infants spend more time looking at attractive faces than unattractive ones. However, many types of stimuli beyond faces may fit the category of attractive, such as environments. In response to documented preferences for viewing natural versus built environments in adults, researchers have posited an evolutionary root for these preferences. To test whether this preference is present early in development, we have begun to collect data using a visual paired comparison procedure in which infants (age 6 months – 1 year) are simultaneously shown photographs of natural and built scenes. Here, we compare looking times to these categories of natural and built environments. This study lays the groundwork for multiple future studies of childhood environmental cognition in our lab.

III.10

THESE PRETZELS ARE GOING TO MAKE ME THIRSTY TOMORROW: DIFFERENTIAL DEVELOPMENTAL TRAJECTORIES OF EPISODIC FUTURE THINKING TASKS

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The current study examined 3- and 7-year-olds' performance on two types of future thinking tasks: a task that required future thinking that could rely on knowledge scripts and potentially more semantic processes and one that required some episodic projection in order to overlook a current, salient physiological state. Results revealed an age effect in the more 'semantic' future thinking task but no impact of age on the more 'episodic' task. In fact, both 3- and 7-year-olds performed equally poorly on the 'episodic' task that required predicting a future physiological state that was in conflict with their current state. We discuss

the results in terms of age differences in different future thinking tasks and universal difficulties that individuals might have with predicting future states that conflict with current states.

IV.59

CONSCIOUS AWARENESS OF COGNITIVE PROCESSES DURING CHILDHOOD AND ITS RELATION TO COGNITIVE PERFORMANCE AND EXECUTIVE FUNCTION

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The aim of the study was to examine the relation that exists among conscious awareness (CA) of the cognitive processes used for the elaboration of different types of tasks, executive function (EF) and cognitive performance (CP). Ninety participants, aged from 10 to 12 years, were tested with 6 cognitive tasks requiring spatial, mathematical and verbal reasoning, being also asked, during the processing of the cognitive tasks, to describe verbally the way they followed for this processing. They were also tested with a set of tasks addressed to three aspects of executive function, namely, inhibition, shifting and working memory. The Structural Equation Model that had an excellent fit to the data showed that CP as well as CA of its type of tasks were regressed on the three EF factors. These findings go beyond the available theories regarding the relation between executive function and cognitive processing. The new directions are discussed.

I.5

JUDGMENTS OF PERSISTENCE THROUGH CHANGE FOR ARTIFACTS: DOES MODE OF REFERENCE MATTER?

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Artifacts (bicycles, watches) often undergo change as they are disassembled and reassembled or have their parts replaced. Philosophers have long wondered how people track identity through such changes. Do we judge artifacts to survive these transformations? What are the developmental origins of these judgments? Adults and 5/6-year-olds saw artifacts that underwent complete part-by-part transformations, resulting in two objects: one made of replacement parts and one made of reassembled original parts. When we labeled the original artifact with a proper name ("Charlie"), participants judged the reassembled object to be the same individual as the original, demonstrating a belief that artifacts survive disassembly and reassembly. When we used a possessive noun phrase ("my chair"), however, participants judged both objects to be the same persisting individual. Mode of reference thus affected judgments of persistence, indicating that adults and children distinguish the semantics of designators (proper names) from that of descriptors (possessive noun phrases)

IV.64

FOSTERING CHILDREN'S STEM MEMORIES AND TRANSFER ABILITIES THROUGH PARENT-CHILD CONVERSATIONS

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This project investigates how direct instruction and mother-child conversation influence children's STEM learning and transfer. A total of forty mothers and their children (M = 5.7 years) participated in this study. Using an experimental design, mother-child dyads were randomly assigned to one of two conditions: (a) Engineering Information condition or (b) No Engineering Information condition. Dyads were first recorded building a skyscraper out of plastic building materials in a science oriented museum. They were then asked to complete an in-home assessment of children's learning and transfer. Specifically, dyads were asked to record two conversations about the museum experience 1-day and 2-weeks later. They were also instructed to record their conversations while building another structure out of pasta and gumdrops 1-week after the museum visit. Preliminary findings suggest that dyads in the Engineering Information condition made more associations than dyads in the No Engineering Information condition.

IV.25

THE IMPACT OF DESCRIPTIVE INFORMATION ON THE REFERENTIAL COMPREHENSION OF WORDS AND PICTURES

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Pictures are symbolic means through which adults teach children words. Research has shown that young children understand that an image is a representation, connecting the image with its referent. In this sense some studies have illustrated that young children learn new words that refer to object categories (nouns) in picturebook reading contexts. However, learning words that refer to object properties (adjectives) have been much less explored. Our purpose was to study young children´s learning of a visual property in a picturebook reading interaction. We designed an experiment in which we varied the information given to the 30 month-old-children in: 1-with description of the property, and 2-with no description. We found that this age children can learn a word that refers to a property through a picture only if they receive precise descriptive information; the sole exposition to the visual property, even labeling it, is not enough.

II.65

SELECTIVE ATTENTION MODERATES 4-MONTH-OLDS' CATEGORY LEARNING

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Selective attention provides a powerful tool as infants extract information from a complex environment. The present study examined the role of attention in promoting category learning among 4-month-old infants. Infants completed a combined spatial-cueing and category-learning task. Targets consisted of cats/dogs, with one set of animals appearing in the cued/suppressed location and the other set appearing in the noncued/attended location. Test trials included: 1) Whole animal: novel cat vs. dog; 2) Head only: novel cat vs. dog heads; and 3) Body only: novel cat vs. dog bodies. Saccade latencies confirmed suppression at the cued location. At test, in the Head only condition, infants showed preferential looking to the animal in the cued/suppressed location during encoding. These results suggest that infants used head information to form a category for animals in the attended location but not for those in the suppressed location, despite equivalent familiarization time during encoding.

III.26

LEVELS OF PERSPECTIVE TAKING IN A NON-HUMAN PRIMATE

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Human theory of mind involves not only the ability to take the perspective of other individuals ("knowing what Sally sees"), but also understanding that other individuals can take others' perspective as well (knowing that Anne knows what Sally sees). We explored the phylogenetic origins of this third-party perspective-taking, testing whether rhesus macaques predict how one person will react to another's perspective. Experiment 1 found that macaques look longer when an actor reaches for an object that she can't see than when she reaches for an object that she can see. Experiment 2 tested whether monkeys expect a second actor to consider the first actor's perspective in a similar case. Monkeys did not show this expectation, looking equally when the second actor behaved expectedly and unexpectedly based on the first actor's perspective . Although macaques have some understanding of how perspectives guide behavior, they may lack an abstract understanding of perspective-taking.

II.39

PICK ON SOMEONE YOUR OWN SIZE: THE DETECTION OF THREATENING FACIAL EXPRESSIONS POSED BY BOTH CHILD AND ADULT MODELS

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Previous research demonstrates that both adults and children have an attentional bias for angry faces in detection. However, this work has typically relied on controlled stimulus sets of adults posing various facial expressions. Here we use the Child Affective Facial Expression set (CAFE)—a new stimulus set of facial expressions featuring 4- to 6-year-old children—to examine the detection of both adult and child models posing the various expressions. In two experiments we examined the detection of happy, angry and sad faces of both adult and child models using a touchscreen visual search procedure. Both adult and child participants were quicker to detect angry faces than happy or sad faces regardless of the age of the model, replicating previous work. Most importantly, detection did not differ as a function of age of the model for adult participants, but child participants were quicker overall to detect child faces than adult faces.

I.44

THE EFFECT OF LABELS ON HAPTIC MEMORY IN CHILDREN

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Recollection of events can be improved with the use of active strategies. In the current study, we look at whether something as simple as labeling could serve as mnemonic device for children. The task was to trace the outline of a shape that could only be felt but not seen. In one condition, 3 to 7 -year-olds were asked to label the shape as they touched it during the learning phase. In the control condition, children had to determine instead the likability of the shape. Shapes were either familiar geometric figures (e.g., rectangle), or they were unfamiliar objects obtained from combining two halves of two familiar objects (e.g., half of a rectangle plus half a heart). There was a 5 minutes delay between the learning and the recollection phase. During recollection, children were asked to continue to trace objects, half of them being the same ones that have been used during learning, and half of them being new. Independently of condition, children had to label all of the objects during recollection. Participants were asked if they traced the shape before and to give a name for that shape. Adults were included to determine the end point of development. We hypothesized that recollection would be better in the label condition than the control condition, both for children and adults. Results indeed supported this hypothesis, with no difference between

familiar and unfamiliar shapes. No difference was found between child and adult performance, suggesting that the benefit of labeling derives from a basic process of cognition.

IV.10

SPATIAL-NUMERICAL ASSOCIATIONS AND MOTOR MEMORY IN YOUNG CHILDREN

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In this study, 4-, 5-, and 6-year old children were given a task in which they repeated a series of spatial locations via touchscreen. These spatial locations "lit up" in either a left-to-right, right-to-left, or random fashion. The content of the panels was manipulated to examine whether spatial-numerical interactions were present at each age: in the all-cues condition, each panel contained arrays in which number and spatial extent increased from 1-5 units as each panel lit up; In the number-only condition, the arrays increased in number (but not spatial extent); In the space-only condition, the arrays were deleted entirely and only colors were shown in the panels. Overall, males performed better than females, and older children better than younger. Across each condition, 6-year-old children (but not 4- or 5-year-olds) showed increased performance for left-to-right presentation relative to right-to-left or random presentations. This effect was strongest in the number-only condition.

IV.72

"I TRUST YOU BECAUSE YOU'RE DRESSED NICER": YOUNG CHILDREN'S SELECTIVE LEARNING FROM OTHERS BASED ON HOW THEY DRESS

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Do young children expect people dressed professionally versus casually to differ in their knowledge about novel entities? The present study aimed to address this question, by examining whether children selectively seek novel information from speakers based on how they dress. Four- and 6-year-olds chose which of two speakers they would like to ask in order to find out what a novel object was called. The two speakers were matched in terms of ethnicity (Caucasian or Asian) and physical attractiveness, but differed in how they dressed (Professionally versus Casually). The results indicated that when both speakers were Caucasian, children preferred to seek novel information from the professionally dressed speaker rather than the casually dressed. They did not show such a preference when the two speakers were Asian. The findings will be discussed in terms of how speaker attire and ethnicity might interact to influence children's selective learning from others.

I.80

THE RELATION BETWEEN THEORY OF MIND AND EMPATHY IN PRESCHOOL: THE CASE OF FANTASY ORIENTATION

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The purpose of the present study is to explore the relations between theory of mind, empathy, and fantasy orientation in a typically developing preschool population. Theory of mind and empathy are separate, but related components of social understanding. Fantasy orientation has been shown to be associated with better theory of mind understanding. However, mixed results have been found regarding theory of mind as a prerequisite for affective empathy and very little is known about the relationship between fantasy orientation and empathy. The present study aims to clarify these relations by interviewing 82 children between the ages of 3 and 5 regarding their theory of mind and empathy understanding, as well as their fantasy orientation. Teacher reports are also being collected. Preliminary results will be presented, with feedback welcomed on theory and methodology.

II.36

INFANTS SELECTIVELY ATTEND TO SINGERS OF FAMILIAR LULLABIES

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Infants' social lives are saturated with music, but little is known about the information infants glean from musical exposure. Do infants, like adults, respond selectively to those who share their musical knowledge? We composed two lullabies and taught parents to sing one or the other. After one week of singing, infants viewed two novel individuals at a silent baseline. Then, one individual sang the now-familiar song and the other sang the unfamiliar song. At a silent test, infants attended significantly longer to the individual who sang the familiar song. Our findings show that infants recall parental songs even after minimal exposure, and they suggest that infants selectively attend to individuals with whom they share this cultural knowledge.

I.30

PRESCHOOL CHILDREN'S REPORTS OF FREQUENCY AND TEMPORAL INFORMATION FOR EXPERIENCED EVENTS

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This study examined preschool children's abilities to report frequency and temporal information about experienced events. Over two weeks, 9 children aged 38 to 48 months and 11 children aged 49 to 70 months participated in three scripted sessions with a research assistant. There were nine target activities with varying frequencies across the series of events (occurring one,

two, or three times). One day after the third session, the children were interviewed about the frequency and temporal details of the activities. In response to open-ended questions, the older children were more likely to spontaneously report frequency details than the younger children. There were no age differences in response to forced-choice questions about activity frequency; the children were more accurate in identifying the frequency of activities that happened one or three times versus those that occurred two times. Temporal information was more accurately reported by the older childre.

II.87

CHANGES IN PRESCHOOL CHILDREN'S REPORTING OF TEMPORAL INFORMATION

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Preschool children have considerable difficulty reporting temporal information. In this study, we employed some procedural modifications to the typical interviewing protocols used to examine preschoolers' abilities to report temporal aspects of experienced events. Children aged 35- to 47-months (n=23) and children aged 50- to 72-months (n=16) participated in two unique scripted events; the first event was 1-week before the interview and the second event was 1-day before the interview. The interview included open-ended questions about the events, prompts, and forced-choice questions to gauge the children's ability to report temporal aspects of the events. We used simple language and concrete representations of time to facilitate reporting. Overall, there were no age differences in the accuracy for reporting temporal information for the event that occurred 1-week ago, but the older children were more accurate in reporting temporal information for the event that occurred 1-day ago.

III.66

RELATIONS AMONG GENDER ESSENTIALISM, STEREOTYPING, AND BEHAVIOR

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One important facet of children's concepts of gender is the tendency to construe gender categories as innate, stable, and inductively rich, a tendency consistent with a way of viewing categories known as "psychological essentialism." The current study examined how 5- to 7-year-old children's gender essentialism (n =80) related to gender-typed play interests and endorsement of gender stereotypes. As a secondary focus, we also assessed parents on similar constructs. Results indicate that gender essentialism in children related to the tendency to endorse interest in own-gender-typed vs. other-gender-typed play ($r(78) = .31$, $p < .05$), whereas gender essentialism in parents related to gender stereotyping, ($r(78) = .35$, $p < .001$). Gender essentialism in parents and children did not relate. Results thus indicate that gender essentialism likely plays an important part in a network of gender-relevant constructs, and that its importance relative to other constructs in this network changes across development.

II.8

IMPORTANCE OF EXECUTIVE FUNCTION FOR LEARNING ABOUT PATTERNS

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Relational thinking is fundamental to children's knowledge of repeating patterns (e.g., ABBABB), a central component of early mathematics knowledge. We sought clarity between 3 competing theories (Relational Primacy, Relational Shift, Relational Complexity) differing on the importance of relational thinking and executive function (EF) to preschoolers' understanding of repeating patterns. 124 children between the ages of 4 and 5 years were administered a Match-to-Sample task (relational thinking), 3 EF tasks (working memory, inhibition, cognitive flexibility), and completed a repeating pattern assessment before and after a brief pattern intervention. Working memory and cognitive flexibility predicted preschoolers' pattern knowledge at pretest, controlling for age and relational thinking. Working memory also predicted improvements in pattern knowledge after instruction. Findings support the Relational Complexity theory, suggesting that greater EF capacity is beneficial to preschoolers' repeating pattern knowledge, and that working memory capacity plays a particularly important role over and above relational thinking.

IV.31

BACK TO THE TITANIC: A STUDY OF ARTIFACT AUTHENTICITY

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Developmental research demonstrates an early capacity to reason about authenticity. 300 participants attending a Titanic exhibit at a museum were asked about the objects in the exhibits, including which objects they liked best, and which types of objects stood out to them compared to others. Our goal was to determine how individuals valued authenticity within objects, and in what ways the authenticity of the objects mattered. Unlike previous research that has compared authentic and inauthentic objects, our research is unique in that it compares different types of authentic objects to each other. It is also the first authenticity study to be conducted within a museum. We hypothesize that

children and adults will differentially rate the authentic objects, and that children will be more rigid regarding what they consider authentic. We also hypothesize that all participants will favor objects that seem to have a link to individuals on board the Titanic.

IV.61

LANGUAGE FACILITATES 4-YEAR-OLDS USE OF INTRINSIC REFERENCE FRAME DURING RECALL

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Not until about 5- or 6-years of age are children able to effectively select and use an intrinsic reference frame when recalling object locations (Nardini, Burgess, Breckenridge & Atkinson, 2006; Simmering, Miller & Patterson, in preparation). Using an array of cups and landmarks on a rotating table, we investigate whether providing 4-year-olds with verbal cues that highlight the relationship between the hiding location and nearby landmark(s) facilitates performance. We found that providing verbal cues before each trial as well as in a separate task unrelated to recall improved performance relative to not providing verbal cues. In another study, we tested whether the same effect found with language would occur if we nonverbally highlighted the relationship between the landmarks and hiding locations and found no improvement in performance. These results suggest that language facilitates children's intrinsic reference frame usage and may be a reason for the developmental shift in this ability.

I.13

THE IMPACT OF WEALTH ON SHARING PREFERENCES IN CHILDREN

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Evidence suggests that human children are sensitive to the needs of others in sharing conditions. In such situations, the distribution of resources is often driven by a predilection for fairness (e.g., Paulus 2013; Blake & McAuliffe 2011). The present study investigated how children share based on the relative "wealth" of their partner in a dyadic sharing situation. Three- to five-year-old children were handed stickers one-by-one by an adult experimenter to place on either their own sticker page or on the sticker page of their sharing partner (the adult experimenter). In a between-subject experimental design, four different conditions were employed to study the effects of varying the overall wealth of the child (total number of stickers given) and the initial wealth of the experimenter (the number of stickers the experimenter started with). In condition 1, the child was given six stickers and the experimenter's page started with no stickers. In condition 2, the child was given six stickers, and the experimenter's page started with two stickers. In condition 3, the child was given two stickers and the experimenter's page started with no stickers. Finally, in condition 4, the child was given twelve stickers and the experimenter's page started with no stickers. Preliminary results suggest that children are most likely to share at greater rates than expected, when the experimenter is "poor", or had no stickers on his/her page ($n = 20$, $T = 3.52$, $p = .002$). Results suggest that resource distribution may be determined in part by children's understanding of abundance and wealth, which may be an important modulator of prosocial behavior.

I.15

INDIVIDUAL DIFFERENCES IN CHILDREN'S ABILITY TO SUCCESSFULLY GATHER INFORMATION FROM OTHERS TO SOLVE PROBLEMS

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This research examines individual differences in preschoolers' abilities to successfully gather information from various sources to solve problems. In this study, 4- and 5-year-olds (N = 196) were tasked with asking different puppet "sources" questions to figure out which of four pictures was inside of a box. Some puppets provided correct answers while others were not as helpful, either expressing doubt and providing inaccurate answers (the "Marked Ignorance" condition) or just providing incorrect answers (the "Inaccurate" condition). Children's accuracy at solving the problems from gathering information from these sources through asking questions was assessed. In addition, three individual difference measures were obtained: receptive vocabulary, working memory, and theory of mind. Results revealed that the best predictors varied by condition, supporting that the skills that matter most for problem solving depend on the characteristics of the problem at hand.

I.62

EXAMINING RECALL MEMORY IN YOUNG ADULTS: THE IMPORTANCE OF HABITUAL SLEEP QUALITY

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Previous studies demonstrate that sleep after learning enhances recall memory. The present study examined associations between sleep quality and recall memory in 70 university students. Students completed the Pittsburgh Sleep Quality Index before learning a list of 20 word pairs (A-B). After a 12-hour delay, students in the no-interference condition were asked to recall the presented word pairs, whereas students in the interference condition were presented with a new word list that contained some of the words shown previously

(A-C) before being asked to recall the words shown at the first session. Results indicated that participants recalled more correct words in the no-interference condition relative to the interference condition. Furthermore, participants with good sleep quality recalled more words correctly in the interference condition relative to participants with poor sleep quality. The findings highlight the importance of habitual sleep quality on recall memory in university students.

III.55

LEARNING SELF-REGULATORY STRATEGIES: THE ROLE OF CONTENT AND CONTEXT

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Successful self-regulation is a critical milestone in early childhood. However, little is known on how effective self-regulatory strategies can be learned. Here, we examine the effect of conflictual information and social group status on the acquisition of self-regulatory behaviors. Twenty Caucasian-American and 20 African-American 4-year-olds performed a delay-of-gratification task after watching a model complete the same task. The model either verbally expressed that she would or would not self-regulate (Positive vs. Negative Instruction), modeled two self-regulatory strategies, and either successfully or unsuccessfully completed the task (Positive vs. Negative Behavior). Whereas 60% of children imitated in the Negative Instruction-Positive Behavior condition, only 27% imitated in the Positive Instruction-Negative Behavior condition. African-American participants were significantly less likely to imitate than their Caucasian counterparts – especially when viewing an outgroup model. In sum, these results reveal differences in strategy acquisition by the consistency of verbal and behavior information and model social group status.

IV.6

INSTRUCTIONS INFLUENCE CHILDREN'S USE OF BODY PART AS OBJECT AND IMAGINARY OBJECT PANTOMIMES: A REPLICATION

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Children pretending to use imaginary objects typically pantomime by using a body part as the object (BPO), or acting as if they are using an imaginary object (IO). This study examined whether or not instructions children receive influence frequencies of their IO and BPO pantomimes. Forty-three children (3.5- to 6.5-years-old) were asked to pretend to use 8 objects (4 self-directed actions, 4 externally directed actions) in one of three ways: simply requesting, requesting after an adult models its use, or requesting within an imaginary context. Children simply asked to pretend performed more BPO pantomimes than either children with an adult model or in an imaginary context, and performed fewer IO pantomimes than children with an adult model. Older children produced more IO and fewer BPO pantomimes than younger children, but action direction showed no influence. The instructions children receive influence the frequencies of their BPO and IO pantomimes.

III.79

SEVENTEEN-MONTH-OLDS REASON BY EXCLUSION WHEN SEARCHING

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Reasoning by exclusion is a fundamental aspect of everyday and scientific reasoning. It has also been hypothesized to underlie the phenomenon of mutual exclusivity: starting around 17 months, infants will map a new name to a new referent, rejecting referents whose names are already known (Halberda, 2003). In this study, we asked whether infants would also reason by exclusion in a search task. Infants watched as an experimenter hid a toy in one of two buckets, and were then shown that one bucket was empty. In Experiment 1, we found that 23-month-olds, but not 17-month-olds, successfully approached the non-empty bucket ($p < .001$). In Experiment 2, we modified the procedure to lower inhibition demands, and found that 17-month-olds, but not 15-month-olds, successfully approached the non-empty bucket ($p < .001$). This developmental trajectory mirrors the emergence of mutual exclusivity, hinting that a single domain-general mechanism may underlie both tasks.

II.84

THREE-YEAR-OLDS EXPRESS TENSION AND SUSPENSE WHEN OBSERVING THE ACTIONS OF A MISINFORMED AGENT

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While classic tests suggest that an understanding of false belief does not emerge before the age of 4 or 5 (e.g. Wimmer & Perner, 1983), recent research indicates that even 7-month-olds are sensitive to others' epistemic states (Kovács, Téglás, & Endress, 2010). The present study bridges this gap by investigating 3-year-olds' facial expressions in belief-involving scenarios. Children were presented with a puppet show in which an agent either witnessed (True Belief Condition) or failed to witness (False Belief Condition) how an object (food or a toy) underwent a salient change. Expressions were recorded as the puppet approached a box containing the object. Preliminary results indicate that children

expressed more tension or suspense (e.g., lip biting, furrowed brow) in the False Belief than in the True Belief Condition, $p < .05$. These findings capture a previously unacknowledged mid-level understanding of belief.

II.28

STATISTICAL LEARNING OF ACTION SEQUENCES IN ADULTS AND INFANTS

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How are humans able to extract information about distinct, goal-directed actions from diverse, continuous sequences of movements? Statistical learning is a robust mechanism that enables infants to segment environmental input into discrete events. We use an eye-tracking paradigm to test whether infants and adults can learn statistical regularities within uninterrupted action streams, and whether this ability depends upon the occurrence of an action effect. Participants observe videos of action sequences with an underlying statistical structure, in which certain sequences cause an action-effect. We measure predictive eye movements to the location of the final action step within each sequence to assess whether participants can detect the structure and anticipate what will happen next. We then investigate whether and how they use this information when performing actions themselves. Preliminary results indicate that adults rapidly learn action sequences and consistently anticipate the next action, but are unable to subsequently reproduce these sequences themselves.

III.23 - *Withdrawn*

THEMATIC ANCHORS: REALISM'S ROLE IN PARENT-CHILD SOCIODRAMATIC PLAY

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For young children, the social-cognitive benefit of toy play may be largely dependent on how closely the toys resemble real objects. Toys with details that clearly define their intended use may provide children with a thematic anchor for their dramatic play, which would consequently influence their imaginative, language and social skills. While realistic-looking toys appear to promote dramatic play during preschoolers' play with peers, realism's potential to promote dramatic play during parent-child interactions has not been investigated. The present study explores children's play with their parents, using toys varying in structure, to determine the impact of realism on parent-child sociodramatic play. Toys that facilitate parental engagement and foster sociodramatic play during parent-child interactions are discussed.

III.21

HOW DO CHILDREN LEARN BEST? CONNECTING PARENT BELIEFS WITH TEACHING STRATEGIES AND CHILDREN'S LEARNING

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Previous research describes the preschool years as a time of significant knowledge-building, with parents providing verbal teaching and testimony on many topics. However, across cultures and contexts, parents differ in their beliefs about the efficacy of various teaching methods and the methods they employ, utilizing not just verbal strategies for teaching, but also non-verbal techniques. In our research, parents completed two teaching tasks: in one task, parents were instructed to use only verbal methods to teach their 4-year-olds a rule for matching novel foods with novel animals, and in the other task, they were instructed to use only non-verbal methods to teach the rule. Post-tests given after each task measured if children could correctly sort novel cards and explain the sorting rule. Finally, parental beliefs were measured with the Beliefs about Development questionnaire and questions about the efficacy of verbal versus non-verbal teaching methods across domains (e.g., safety, science, rules).

IV.26

SOCIAL AND NON-SOCIAL FORMS OF DIVERGENT THINKING IN MIDDLE CHILDHOOD

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Divergent thinking tasks (DTTs), used to measure creativity, generally focus on non-social content. In this study, we examined DTTs that varied in social content to identify their relations to other experiences. 50 8- to 12-year-old children completed 2 DTTs: a task (with non-social content) in which children were asked to generate uses for a milk carton, and a new task (with social content) in which children were asked to generate ways the world would be different if people had tails. Children were also interviewed about imaginary companions and parents completed a questionnaire about child characteristics. Higher creativity on the social DTT was significantly related to having an imaginary companion and marginally related to parent reported social skills (with age and verbal ability controlled); while creativity on the non-social DTT was not related to either. These findings suggest that DTTs might differentially identify creative activities and related behaviors in different domains.

III.37

CAUSAL DETERMINISM IN TODDLERS

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By the age of five, children expect physical events to have causes (Bullock, Gelman, & Baillargeon, 1982). We investigated the developmental origins of this belief. We showed toddlers (24 months) a toy that appeared to light up either spontaneously or upon contact by an experimenter. We then introduced a button as a plausible cause for the light's activation but did not present any predictive information. Across three dependent measures (predictive looking, intervention, exploration), we found that when (and only when) the event appeared to occur spontaneously, toddlers represented the button as the cause of the light. We also found that even in the absence of a plausible cause, toddlers selectively explored the familiar light-up toy when the light appeared to occur spontaneously. These results suggest that toddlers, like older children, believe physical events have causes, and that this belief supports exploration and discovery.

IV.84

PRESCHOOLERS SELECTIVELY INFER HISTORY TO EXPLAIN OUTCOMES

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To explain many day-to-day outcomes we must make inferences about unseen past events or history. In two experiments, we examine young children's ability to infer history when explaining outcomes. In Experiment 1, we asked 33 three-year-olds and 36 four-year-olds to explain why a character owns or likes three objects. In Experiment 2, we asked 34 four-year-olds and 36 five-year-olds to explain why a character owns or is using two objects. In both experiments, we only told children the outcome to be explained. Our findings reveal that 4- and 5-year-olds, but not 3-year-olds, readily infer history when explaining ownership of an object but not when explaining preference or use. This indicates that preschoolers' understand when historical inferences are relevant for explaining an outcome and when they are not. These findings are also informative about the children's understanding of ownership, and show that preschoolers appreciate the various ways objects become owned.

II.86

THE EFFECT OF INFANT PERCEPTUAL SKILLS AND MATERNAL INPUT ON 2-YEAR-OLD VOCABULARY OUTCOMES

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Previously, we showed that 2-year-olds with larger vocabularies were, as infants, more likely to succeed at segmenting fluent speech into individual words (Newman et al., 2006). In the current longitudinal study, we evaluated infant segmentation skills and maternal input to children at 7.5 months, statistical learning at 11 months, and vocabulary outcomes at age 2 years (based on parental report and objective assessments of expressive and receptive vocabulary, all strongly intercorrelated ($r>.50$)). Children in the top third of 2-year vocabulary (1) were significantly more likely to show an infant novelty preference on the segmentation task than those in the bottom third; (2) tended to show a novelty preference in an auditory (but not visual) statistical learning task; and (3) had mothers who repeated words more often at 7.5 months (lower type-token ratio). These results suggest that language outcomes may be affected both by infant perceptual skills and maternal language input.

IV.48

PROPERTY RIGHTS: YOU GET WHAT YOU NEED

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In two experiments, 4-year-olds and adults were presented with vignettes in order to investigate their understanding of the relationship between ownership and need. Each vignette depicted two characters and one object. The object fulfilled a need for one character (e.g., drawing a picture), but ownership cues indicated that the object belonged to the other character (proximity in Experiment 1; proximity and control of permission in Experiment 2), and subjects were asked to make an ownership attribution. Adults consistently used ownership cues to identify owners across both experiments, on 84% and 100% of trials for Experiments 1 and 2, respectively. In contrast, children only used proximity to guide their ownership judgments on 7% of trials in Experiment 1 and on 57% of trials in Experiment 2. Even when presented with strong ownership cues, children privileged need in their attempts to identify owners.

I.79

USING ACTION AND GESTURE TO IMPROVE MENTAL ROTATION

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Mental rotation skills have been linked to success in math and the sciences (e.g. Hegarty et al., 2010; Gunderson et al., 2012), and recent research has shown that spatial skills, including mental rotation, can be improved through training (Uttal et al., 2012). We set out to test the effects of training mental rotation using tools that range from Action to Abstraction. Specifically, we compared the effects of asking children to practice physically rotating objects, gesturing rotating objects, or just imagining rotating objects. Study 1 found that children who gestured about rotation, but not those who physically rotated them or imagined rotating them, improved from pretest to posttest. Study 2 will test whether action practice never helps train mental rotation, or whether it only helps improve very closely matched tasks.

III.29

IMAGINED SPACES: 7-YEAR-OLDS' ABILITY TO CONSTRUCT SPATIAL REPRESENTATIONS FROM NARRATIVE AND NON-NARRATIVE PASSAGES

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Contrary to the subjective experience of most readers and listeners of narratives, there is little experimental evidence that individuals construct representations of narrative settings. In the present study, we compared 7-year-olds' and adults' ability to construct spatial representations from narratives and non-narrative descriptions. Participants heard either a short narrative about a character traveling between 5 locations in her neighbourhood or a non-narrative, survey description of the same 5 locations. Those in the narrative condition significantly outperformed those in the description condition. Performance on the narrative task was significantly correlated with narrative comprehension, whereas performance on the description task was significantly correlated with working memory, suggesting the two types of tasks may engage different cognitive resources. On neither task was performance correlated with spatial ability (mental rotation). Data is currently being collected to investigate the specific features of narratives that led to an increased ability to represent space over non-narratives.

I.87

PRE-KINDERGARTENERS' NUMERACY AND SPATIAL DEVELOPMENT: THE INFLUENCE OF EDUCATORS LANGUAGE

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Children's numeracy/spatial skills are predictive of success in Science, Technology, Engineering and Mathematics (STEM) careers. Previous research suggests that the amount of numeracy/spatial language used in the home predicts pre-kindergartners' numeracy/spatial skills (Gunderson & Levine, 2011; Pruden, Levine & Huttenlocher, 2011). The present study seeks to understand the role of educators' numeracy/spatial language use on pre-kindergarten children's numeracy/spatial skills. We recorded 14 pre-kindergarten educators interacting naturally with children in their classroom. Interactions between educators and children were recorded using a Digital Language Processor (DLP; LENA Foundation) for a total of 4 classroom hours. Transcriptions of educator talk were coded for use of numeracy/spatial language. Ninety children completed a numeracy and spatial assessment battery, and a vocabulary assessmen. Our prediction is that educators who utilize more numeracy and spatial talk when teaching math and science curriculum will see increased growth in children's numeracy and spatial skills.

I.8

EFFECTS OF CHOICE AND STRATEGY USE ON TASK SWITCHING IN CHILDREN AND ADULTS

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The development of top-down control was examined via voluntary task switching procedure. Five-year-olds and adults were presented with a switching paradigm and were either given a choice whether to stay or switch or were instructed what to do. Although staying with the same task makes the task easier, few participants chose to do so. Therefore, the majority failed to use a strategy that could optimize their task performance. Thus, we compared the few participants (both children and adults) who exhibited fewer switches with the rest of the participants. These more strategic participants performed significantly better than their counterparts who were instructed to switch, but had been yoked to complete an identical task sequence. No dfferences between the groups were found for the less strategic participants. Because we compared individuals who had completed the exact same task sequence, our results indicate that choice coupled with a metacognitive optimization strategy improved performance.

II.20

MOTHER-CHILD CONVERSATIONS ABOUT SAFETY: IMPLICATIONS FOR CHILDREN'S CAUSAL UNDERSTANDING

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This study examined how mothers use conversation to socialize safe behavior in their children. We elicited mother-child conversations about safety by having mother-child dyads rate and discuss the safety of 12 photographs depicting a gender-matched child engaged in various physical activities. Conversations usually unfolded with children giving the first rating or rationale, followed by additional discussion between the dyad. When disagreements arose, mothers typically guided children to adopt their own rating rather than the child's rating. Mothers and children relied on two main types of reasoning to justify their ratings: potential outcomes of the activity and specific features of the situation. Mothers more often pointed out dangerous features than outcomes, whereas children's references to dangerous features and outcomes did not differ. Mothers' focus on dangerous features appears to reflect their efforts to help children make causal connections between dangerous elements of the situation and adverse outcomes that might result.

I.78

CREATURE FEATURE: LEARNING ABOUT NOVEL ANIMALS BASED ON VERBAL DESCRIPTIONS

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Language is a powerful source of information about the world. Initial representations formed on the basis of verbal descriptions may be either fleeting and relatively weak or robust enough to support identification of referents. We investigate these two possibilities in the current studies. 2.5 and 3.5 year olds were read first verbal descriptions of novel animals and were then asked to choose the described animal from a pair of novel animals. Sometimes the features (color, location) presented in the story were distinctive (only present for the target); sometimes one of the features was present for both animals (both were yellow or on leaves). Both age groups were best able to identify the described animal when all of the features were distinctive and 3.5 year olds (but not 2.5 year olds) could also identify the target when color was distinctive.

I.58

WHEN LESS IS MORE AND MORE IS EVEN WORSE: MAGNITUDE INFLUENCES PRESCHOOLERS' PERFORMANCE ON A REVERSE REWARD TASK

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Executive functions (EF) are related to math readiness, which is an important precursor to later school success. Little is known, however, about how developing knowledge of magnitudes interacts with EF skills. The current study used a reverse reward (Less is More) task to examine how different magnitudes (1 vs. 2; 1 vs 20; and 10 vs 20) impact performance for 3- and 4-year-olds. Results revealed a main effect of age ($p < .001$) and an interaction between age and magnitude size ($p = .04$). The 3.5-year-olds performed worst on the 1 vs. 20 contrast ($p = .07$) while 4.5-year-olds performed best on the same contrast, and worst on the large (10 vs. 20) pairing ($p = .09$). These results suggest that a larger magnitude contrast improves performance for 4-year-olds but worsens performance for 3.5-year-olds indicating that different factors support children's ability to inhibit a response as function of age.

II.71

THE EFFECTS OF CHILD- AND ADULT-DIRECTED DISTRACTORS ON PRESCHOOLERS' DISTRACTIBILITY, INATTENTION, AND RECALL

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The characteristics of a televised distractor influence distractibility and inattention in preschoolers (Kannass & Colombo, 2007). Additionally, adult-directed TV (game show, Jeopardy) impedes toy play in 1-, 2-, and 3-year-olds (Schmidt et al., 2008), but little is known about how child- and adult-directed TV affects preschoolers' distractibility, inattention, and recall of information from distractors. This was the goal of the current work. Twenty-two 3-year-olds and forty-six 4-year-olds completed tasks during four 3-minute trials. Participants were assigned to a no distraction, adult-directed, or child-directed condition. In distraction conditions, an adult- or child-directed TV show played continuously in the child's periphery. After the session, participants were asked open-ended question about the program's content. Participants were more distractible in the child- than the adult-direct condition, and 3-year-olds were more inattentive than 4-year-olds. Only 4-year-olds' answers to content questions were analyzed; those in the child-directed condition recalled more than those in the adult-directed condition.

I.65

THEE, UHH, ROLE OF DISCOURSE STATUS AND OBJECT NOVELTY IN THREE-YEAR-OLDS' UNDERSTANDING OF DISFLUENT UTTERANCES

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Filled pauses (e.g., uhh or umm) are a common occurrence in language, and are systematically produced before words that are new to a discourse (Arnold & Tanenhaus, 2011) and in situations characterized by uncertainty (Brennan & Williams, 1995). Across two studies using an eye-tracking paradigm, we investigated whether 42-month-old children interpret disfluencies as a signal that a speaker is (1) about to introduce a new topic to the discourse, or (2) refer to a novel object. The results of Study 1 revealed a significant interaction between discourse status and fluency ($p < .05$): during initial processing children looked more to the discourse-new object during disfluent trials, but did not show this bias during fluent trials. These results indicate that hearing "thee uhh" led children to anticipate reference to discourse-new objects. Study 2 is currently underway investigating whether children demonstrate similar expectations about disfluencies in the context of object novelty.

II.18

INDIVIDUAL DIFFERENCES IN VERBAL UPDATING AMONG 2-YEAR-OLD CHILDREN

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Much of children's knowledge about the world comes from others' verbal input. There is evidence that 22-month-olds update their mental representation of an absent object when told about a change to a property (e.g., It got wet.) but not when told about a change in location (e.g., The puppy is now in the box.). Thirty-month-olds can update their representation based on location information. Twenty-month-olds' ability to update is more fragile as shown by their more variable performance. The present study explores whether individual differences in working memory, inhibition and language account for this variability. Children (from 22-to-30 months) are administered two versions of verbal updating tasks: property and location change. Working memory, inhibition and receptive vocabulary are also measured. It is predicted that children who succeed in using language to update mental representations will have higher working memory capacity, inhibitory control and language competence.

I.64

IGNORING THE POINT: PRESCHOOLERS PREFER TO LEARN FROM SPEAKERS OVER POINTERS

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Children make inferences about other people based on how they have behaved in the past. They do so by monitoring information quality: preschoolers are more likely to infer future accuracy from a previously accurate informant than a previously inaccurate one (Koenig, Clement, & Harris, 2004). Preschoolers also make inferences by monitoring kinds of information: they are more likely to make inferences about the knowledge state of an informant who has provided accurate semantic information over one who has provided accurate episodic information (Stephens & Koenig, in prep). The current series of studies explored whether children also make inferences based on the form information takes. Preliminary results suggest that 4-year-olds are more likely to make inferences about speakers than they are about pointers. Only when quality and form were pitted against one another were children more likely to make inferences about an accurate pointer than they were an inaccurate speaker.

III.36

STUDENTS WHO BELIEVE IN THE MALLEABILITY OF INTELLIGENCE SHOW A PRONOUNCED NEGATIVE RELATION BETWEEN ANXIETY AND PERFORMANCE

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Some individuals believe that intelligence is fixed and cannot change (entity theorists); others believe that intelligence is malleable (incremental theorists). Although holding an incremental theory is thought to be positively related to academic achievement, little is known about how one's theory of intelligence interacts with situational factors, such as academic anxiety (e.g., math, reading anxiety), to impact performance – especially early in schooling. We examined the relations between lay theories of intelligence, anxiety, and academic performance among first- and second-graders. Not surprisingly, we find a negative relation between anxiety and performance (the higher students' math/reading anxiety, the lower their math/reading performance, respectively). More surprisingly, this relation is significantly more pronounced among children who hold an incremental theory. Such children may feel a greater sense of responsibility for their academic achievement than children who hold an entity theory. When coupled with anxiety, this sense of responsibility may manifest as worries that consume

attentional control resources important for optimal performance.

IV.46

THE DEVELOPMENT OF EPISODIC MEMORY: A VOYAGE THROUGH TIME AND SPACE

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Memory for the times and locations of past events is critical for episodic memory. However little is known about the developmental trajectories of temporal and spatial context, and how they compare. Temporal and spatial memory may be different event features that show parallel development. Alternatively, given evidence that temporal memory requires additional cognitive processing, temporal memory may develop more slowly than spatial memory. In the present investigation we tested 7-year-olds', 9-year-olds', 11-year-olds and adults' memories for temporal and spatial context using multiple approaches. This investigation contributes to the charting of developmental trajectories of spatial and temporal context memory, allows for an examination of how they relate and the factors that support each. Together this data will provide insight into the development of episodic memory.

IV.28

THE ROLE OF EXPERIENCE IN LINKING SOUNDS AND MEANING IN LANGUAGE ACQUISITION

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Human language is a unique evolutionary adaptation within the animal kingdom, and it is the most powerful means of shaping human thought and communication. By three months, infants prefer human speech and are beginning to establish a link between language and object categorization (Ferry, Hespos & Waxman, 2010). At this early age, non-human primate vocalizations (Madagascar, blue-eyed lemur: Eulemur macaco flavifrons) also facilitate this link. Within only a few months, infants' broad response to these primate calls is tuned to become specialized for human speech (Ferry, Hespos & Waxman, in press). Here we investigated the role of experience in this tuning process. We exposed infants between five and six months—the age at which infants normally "tune out" lemur vocalizations—to these vocalizations for several weeks at home. Preliminary results indicate that this extended exposure enables infants to remain "open" to non-human primate vocalizations in linking sound with meaning.

I.68

PRESCHOOLERS CONSIDER OWNERSHIP WHEN PREDICTING EMOTIONS

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Ownership influences emotions. People are sad when their property is lost, happy when it is found, and angry when it is used without permission. In two experiments, we provide evidence that preschoolers grasp basic relations between ownership and emotions. Experiment 1 (N = 85) investigated young children's ability to predict the feelings of an individual whose ownership rights are violated. Children aged three to five predicted that a person would feel sad or mad after discovering that someone else had used the person's property. Experiment 2 (N = 36) examined 3-year-olds predictions of how a person would feel when that person's property was lost and found. Again, 3-year-olds demonstrated an understanding of the consequences of ownership on emotions. These findings reveal that young children understand the influence of ownership on emotion, and use ownership to make social predictions.

III.52

DO LIFE STORIES BEGIN WITH MEMORIES FOR REPEATED AS WELL AS UNIQUE EXPERIENCES?

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Despite the extent to which repeated episodes constitute lived experience, they are not encompassed by most definitions of autobiographical memory. Should they be? To address this question, we asked 42 college students to report their five earliest memories for both unique and repeated events and to rate characteristics of each memory on 7-point scales. Reports of repeated events occurring or continuing after age 6 ½ (48.3%) were excluded. Multi-level modeling confirmed that repeated and unique memories did not differ in rated public biographical importance (4.25 vs. 4.58) or personal meaning (3.91 to 4.08), although unique memories were rated as more vivid (5.13 vs. 4.69). In addition, the mean age at encoding of the unique memories (4.57 years) was equivalent to the age at the midpoint of the duration of the repeated events (4.41). The results indicate that reports of repeated events should be included in research on autobiographical memory development.

IV.49 - *Withdrawn*

RELATIONAL CONCEPTS: THE DEVELOPMENT OF THE CONCEPT OF ANTONYMY

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Understanding antonymy (the opposite meaning relationship between words) is an important conceptual development that likely supports, and is itself supported by, the acquisition of other skills. Using a novel opposite task we investigated when young children understand the concept of antonymy, whether young children show a latent understanding of this concept via their eye gaze behaviour, and whether this understanding develops gradually or through sudden insight. Four- and 5-year-old children, but not 3-year-old children, performed above chance on the opposite task, demonstrating that older children have an appreciation for the antonymy relationship. In addition, children's appreciation generalized to a number of different antonym pairs. Results of behavioural and eye gaze data analyses suggested that 3-year-old children do not possess a latent understanding of the concept of antonymy and that the appreciation does not develop gradually but rather is better characterized as developing through insight.

IV.67

ADULT SUPPORTIVE LANGUAGE USE AND CHILD LANGUAGE COMPREHENSION: EXAMINING ASSOCIATIONS WITH DELAYED GENERALIZATION ACROSS CUES

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Supportive adult language use has been widely associated with enhanced recall memory in verbal children (McGuigan and Salmon, 2004; Murachver, 2002). However, there is only a limited literature examining these relations in preverbal children. The goal of the present study was to chart associations between adult language use, child language comprehension, and delayed generalization across cues in 20-month-olds. Children were presented with six novel event sequences that varied in terms of the supportiveness of adult-provided language during modeling. Delayed generalization across cues was assessed after one week, and child language comprehension was measured using a standardized language questionnaire (Fenson et al., 1994). The findings suggest that children with better comprehension abilities were more able to use the language cues provided at encoding, resulting in enhanced delayed generalization across cues. As such, child language comprehension and adult language use interact in meaningful ways to support mnemonic flexibility in preverbal children.

III.8

CHANGES IN CHILDREN'S THINKING ON A NUMBER-LINE ESTIMATION TASK

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Number-line estimation, an important everyday math skill, is highly correlated with later mathematical learning and is useful for understanding mathematical and cognitive development. With age or exposure to numerical ranges, accuracy on number-line estimation improves and the pattern of estimates changes from being less to more linear. What psychological changes underlie these improvements? Self-report and observational data were collected from 24 students in each of Grades 2, 4, and 6, as they estimated numbers on both conventional (e.g., 0-100 and 0-1000) and unconventional (e.g., 0-80 and 0-531) number lines. A task-analysis of number-line estimation was developed and used to reliably code 98% of the data. Analyses reveal age-related changes in the solution processes, including anchoring and adjusting, that children used to solve estimation problems. Preliminary analyses also demonstrate age-related differences in the solution processes used in conventional as compared with unconventional number lines.

II.64

INFANTS GIVE TO LARGER SOCIAL SETS: DECISION RULES ARE YOKED TO THE PSYCHOPHYSICS OF LARGER SOCIAL SETS EARLY IN DEVELOPMENT

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The present studies examine the impact of cues of group size on infants' decision-making. In particular, if toddlers will be more likely to confer a benefit to a larger social set than a smaller set. Toddlers entered a room with two plates. Next to one plate were 11 entities (either objects or social agents), next to the other, only one. Toddlers were then either asked to take one banana, or to give one banana. Toddlers overwhelmingly chose to give the banana to the larger social set. The effect disappeared when giving to non-social stimuli. This demonstrates that toddlers were not simply choosing the plate surrounded by more entities. When faced with choosing to take a banana from one of the plates, toddlers' responses were mixed, with a negligible trend towards taking from the smaller social set, which did not differ from responses in the non-social control.

I.46

INVESTIGATING RELATIONSHIPS BETWEEN EXECUTIVE FUNCTIONS AND CONCEPTUAL CHANGE PROCESSES

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Many science and math concepts that are taught to children are counter-intuitive and require the inhibition of empirically supported everyday intuitive knowledge, and the shifting between different modes of thinking. We argue that the considerable conceptual changes in science and math domains that occur during childhood as a result of development and learning implicate Executive Functions (EFs). In this study we examined this hypothesis by looking at relationships between children's performance in a set of EFs tasks, namely inhibition, shifting and updating, and the Re-Categoriztion Task (RECAT) developed by Vosniadou, Chountala, Lepenioti & Eikospentaki (in preparation). One hundred and thirty children, 10 to 12 year-olds, participated in the study. The Structural Equation Model according to which the three EF factors explain the reaction time in the categorization process had an excellent fit to the data, suggesting that EFs is a good predictor of conceptual change in science and mathematics.

III.76

CHILDREN'S PROPENSITY TO GIVE IN RESPONSE TO INCREASED NEED AND RESOURCES

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Are there specific contexts that may promote prosocial tendencies (e.g., sharing) in children? Three to ten year olds participated in an adapted version of the Dictator Game, in which children were made "poor" or "rich" in stickers, and were then presented with situations in which there was either "less" or "more" need. Results reveal that children responded to increased need by increasing the amount of resources that they gave away, specifically when they were "rich" in that resource. Interestingly, data indicate that a child's sharing behavior was related to the number of siblings they had, such that children with multiple siblings shared significantly less of their resource than both only-children and single-sibling children. Together, findings suggest that the context under which children are encouraged to share, as well as the quantity of which they are allowed to share, may interact to promote altruism across childhood.

IV.23

CHILDREN'S USE OF COUNTING YIELDS A BETTER UNDERSTANDING OF CARDINALITY

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Can children be taught that counting determines the cardinality of a set? Preschoolers participated in a short training session where explicit counting was modeled and encouraged. Following training, children were significantly better at identifying set sizes outside of their range of mastery on a cardinality task and were more likely to improve on a secondary Give-N task (Wynn, 1990, 1992), compared to non-trained controls. Additionally, a greater proportion of trained children overtly counted while performing in the cardinality task, a strategy that yielded better performance overall compared to non-counters. Together, results reveal that even 5-10 minutes of counting training increases the likelihood that a child will engage in counting behavior and result in marked improvements in cardinality judgments in two distinct numerical tasks.

III.38

UNFAMILIAR ACCENTS AND FOREIGN LANGUAGES: HOW GROWING UP BILINGUAL INFLUENCES CHILDREN'S IN-GROUP BIASES

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Language-based social preferences start early in life. Children as young as 6 months old prefer to play with peers who speak their native language and who do not have a foreign accent (Kinzler et al., 2007; 2009; 2011). Although it is known that early bilingualism alter some aspects of development (Akhtar & Menjivar, 2012), little is known about how early it affects social preferences. To investigate this question, we compared 11 English or French monolingual and 21 English-French bilingual 5-year-old children. Even though neither group showed an overall preference towards individuals who spoke their native/dominant language, bilinguals' preference for English speakers was significantly correlated with their relative exposure to English. Additionally, both groups preferred to be friends with speakers with no foreign accent. The results confirm the idea that children use language as an identity marker, but bilingualism might attenuate in-group biases related to foreign languages.

IV.66

YOUNG INFANTS USE IMITATION TO INFER THE SOCIAL PREFERENCES OF IMITATORS BUT NOT THOSE OF THEIR TARGETS

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Imitation and conformity are key components of human social behavior. We asked whether infants use observed imitation to infer the social preferences of those involved. Four-month-olds saw events in which either an individual copied the sound or action produced by one group and not that produced by another, or one group copied the sound produced by an individual but a second group did not. These sequences were followed by test trials where either imitators alternated approaching those they had or hadn't imitated or target(s) of imitation alternated approaching those who had or hadn't imitated them. Looking time differed for trials where targets were approached by imitator(s) as opposed to non-imitator(s), but did not differ for trials where targets approached imitator(s) versus non-imitators. These findings suggest that young infants may use imitation to infer the social preferences of imitators, but do not infer that targets will prefer imitators in return.

II.26

PRESCHOOLER'S ABILITY TO CONSTRUCT FUTURE EPISODES

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Can children use a past experience to plan a future event? We present an experiment that examined children's competencies in re-creating a past episode and constructing a future one. Ten minutes after learning to play a game on a Nexus pad, children selected game items and placed them in spatial locations to re-create their past experience (i.e., how they played the game before) or to achieve a future goal (i.e., playing the game tomorrow).

Both 3- and 4-year-olds were able to remember the items they had seen in the past. Only 4-year-olds were able to select the correct items to construct a future scenario. When children correctly bound the items to their spatial locations, they were better able to recall how they played the game before and determine how to play the game tomorrow. Results are discussed in terms of children's ability to use the past to inform the future.

IV.40

PRESCHOOLERS REDUCE HARM WHEN MORAL OBLIGATIONS ARE SALIENT

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Can preschoolers evaluate outcomes of hypothetical moral dilemmas? Subjects (N=44) were shown, on an iPad, an angry dog that will bark at 5 kids and make them sad. They could act to minimize harm (save 5 kids and harm 1) through a side effect (indirectly causes harm) or main effect (directly causes harm) action. As a third alternative, children could do nothing, thereby allowing the dog to harm 5 kids. Preschoolers were either asked what they will do or should do. They also judged the outcome on a 5-point Likert scale from really bad to really good, with just okay in the middle. Children chose to do nothing more often when asked what they will do than should do. Further, children who were asked what they should do judged the outcome of doing nothing more negatively. These results suggest that making the moral obligation salient affects children's moral decisions/judgments.

III.48

NUMERICAL DISCRIMINATION DEPENDS ON RATIO DIFFERENCE AND ABSOLUTE VALUE

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Discrimination of perceptual magnitudes, such as numerosity, primarily depends on the proportional differences between magnitudes. Children's performance in number comparison is commonly used to determine their Weber fraction, the relative acuity of the approximate number system (ANS). Individual ANS acuity is linked to long-term educational and economic outcomes. Number discrimination performance is thought to depend solely on ratio differences and be independent of absolute value. We show that for some stimuli both ratio difference and absolute value contribute to comparison difficulty. We address the possible mechanism via computational modeling of neural population codes associated with the perception of number.

III.6

PRESCHOOLERS USE OF RHYMING FEATURES TO LEARN THE NAMES OF NOVEL CREATURES: RHYME, PAUSING AND PREDICTION IN VOCABULARY ACQUISITION

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Rhyme is ubiquitous in preschoolers' early storybook experiences, yet it is often overlooked in research on word learning. Rhyme may be especially facilitative because of how it can support active predictions about upcoming words. Given how powerfully predictability

aids children, our current study tests whether rhyme, when used to set up new words will make them easier to learn. In two experiments, preschoolers heard rhyming stanzas naming novel monsters under three conditions: (1)Predictive Rhyme, where the monster came after description of distinguishing features that rhymed with its name; (2)Non-Predictive Rhyme, where the name came in the first line, and (3)Non-Rhyme. In tests of comprehension and production, children showed not only greater name learning in the Predictive Rhyme vs. Non-Rhyme condition, but also compared to Non-Predictive rhymes. Additionally, when caregivers distinctly paused before target words allowing children extra time to make predictions, a stronger Predictive Rhyme advantage surfaced.

II.24

EFFECTS OF SELF-INTEREST CUES ON CHILDREN'S TRUST AND TRUSTWORTHINESS

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Can children, like adults, flexibly align their trust and trustworthiness with self-interests? The current study confirmed this possibility. Half of the time, 7-year-old, 9-year-old, and adult participants (N = 106) guessed the location of hidden prizes, in coordination with a partner who witnessed the hiding. After each hiding event the partner sent participants messages about the prize's potential location. Participants earned prizes only if they guessed correctly whereas the partner, depending on the condition, earned prizes from participants' correct (common interests) or incorrect (conflicting interests) guesses. Participants of all ages trusted their partner more often during common versus conflicting trials. In the study's other phase, participants assisted their partner find prizes they witnessed being hidden. Participants strategically shared truthful information more often when interests were common. Our findings help fill important gaps in the literature regarding children's motive-based inferences, own trustworthiness, and trust decisions based exclusively on reward rules.

III.12

VARIED THEORY OF MIND MEASURES DO NOT FORM A UNITARY CONSTRUCT IN EARLY CHILDHOOD OR ADULTHOOD

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The study of theory of mind (ToM) is often conceptualized as a binary distinction (e.g., when do infants develop a theory of mind). However, ToM is a broad construct, and robust individual differences are present from infancy through adulthood on tasks including face-based mentalizing and faux pas understanding. The relation between these varied measures, however, is largely unexplored. The present study aimed to address the coherence of ToM by testing a sample of 41 (22 females) typically-developing 4- and 6-year-olds and a sample of 79 (54 females) adults. All participants completed an age-appropriate battery of ToM tasks, with multiple questions tapping into each facet of ToM. For both children and adults, ToM tasks were not systematically related to each other – though some relations were present. Further, even on specific tasks, ToM did not emerge as a binary construct; participants had inconsistent and partial mastery of ToM concepts.

I.34

A LONGITUDINAL FMRI STUDY EXAMINING THEORY OF MIND DEVELOPMENT

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Longitudinal neuroimaging studies provide the opportunity to obtain sensitive measurements of developmental change within an individual. We measured neural responses in brain regions supporting language and Theory of Mind (ToM) abilities in twenty children (originally aged 5-10) on two different occasions, 2-3 years apart. During both visits, each child also completed a battery of behavioral tasks assessing language, executive function, and ToM abilities. These data allow us to examine if late-developing ToM abilities (such as understanding sarcasm or complex moral scenarios) are predicted by or related to earlier developing ToM skills, language abilities, and/or executive function, and will help clarify the underlying neural signatures of ToM development.

IV.63

RULE MAKERS AND RULE FOLLOWERS: CHILDREN'S CREATION, LEARNING, AND ENFORCEMENT OF RULES IN A COLLABORATIVE GAME

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Do children treat self-created rules with the same prescriptive force as those learned authoritatively? In this study, dyads of preschool-aged children were shown rules ('top-down') or created rules ('bottom-up') for a novel instrumental board game. The game required children to move a ball through four squares, each containing a unique tool/door with two alternative uses. In the top-down condition, children observed a single use for each tool/door, presented with normative language. In the bottom-up condition, children observed both uses for each tool/door and were then asked to create rules with their partner (i.e., select a single use for each square). After practice, children watched videos of individuals violating tool/door uses and turn/path

norms. Preliminary results suggest children in both conditions readily protest violations, even when rules were created among peers. Ongoing analyses investigate children's tendency to protest violations of their partner's roles versus their own, as well as developmental trends.

III.75

PARENTAGE INFORMATION INCREASES THE LIKELIHOOD OF CATEGORIZING BLACK/WHITE BIRACIALS AS BIRACIAL

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Adults are susceptible to a racial categorization bias whereby black-white biracials are often considered to be "black" but not "white" (also known as the "one-drop rule"). However, few studies have examined this issue using actual pictures of biracial individuals (vs. morphed images or colored drawings) and little work has examined how this categorization bias develops from childhood. This ongoing study explores when children show evidence for the bias to categorize biracials as black and whether parentage information reduces this bias. Participants of four age groups (i.e., preschoolers, second graders, sixth graders, undergraduates) are randomly assigned to a Target-Only condition (perceptual information) or a Target-Plus Parent condition (parentage information). Data gathered from undergraduates reveals that the bias to categorize biracials as black is reduced in the context of parentage information, but also, that many adults continue to show a categorization bias despite parentage information. Data collection from younger samples is ongoing.

II.75

NEURAL CORRELATES OF MEMORY IN EARLY CHILDHOOD

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Early childhood (3-6 years) is a time of dramatic change in episodic memory abilities. Specifically, children's ability to recall details associated with items or events increases at an accelerated rate during this time. Current hypotheses suggest that age-related changes in neural circuitry supporting memory ability underlie these changes. Our research examines relations between measures of brain structure (MRI) and function (ERPs, fMRI) and memory behavior during this time of critical change. Our results suggest changes in the memory network (hippocampus and associated cortical regions such as prefrontal cortex) are indeed related to individual difference in memory ability and may account for the qualitative shift observed during this developmental period.

I.63

5- TO 9-YEAR OLD CHILDREN TAKE LONGER TO CORRECTLY ATTRIBUTE BELIEF BASED EMOTIONS THAN EMOTIONS NOT BASED ON A FALSE BELIEF

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Five to six-years-old children struggle to correctly attribute emotions to a character that holds a false belief. To test the hypothesis that the successful attribution of belief-based emotions requires children to override a rapid, outcome-based attribution of the protagonist's emotion, we asked 28 five- to nine-year old children to attribute emotion to a character in a no surprise condition and a surprise condition using a reaction time paradigm. We found that when children correctly attributed emotions to the protagonist in the surprise condition, their reaction times were significantly slower than their reaction times in the no surprise condition. The reaction times for children who did not correctly attribute emotions to the protagonist in the surprise condition did not differ from their reaction times in the no surprise condition. Thus, it appears that correctly attributing belief-based emotions calls for an extra processing step in addition to the rapid outcome-based attribution process.

II.60

YOUNG CHILDREN'S ABILITY TO TAILOR THEIR TEACHING TO A LEARNER'S MISTAKE

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Teachers monitor learners' mistakes to teach effectively. We examined four- and five-year-olds' teaching following a learner's mistakes. Children played a simple game where red pieces, but not black pieces, were placed inside a red square. Children observed three puppets that made three different types of mistakes: placing the wrong piece inside the square, placing the right piece outside the square, and placing the wrong piece outside the square. Both age groups correctly identified the puppet's mistake. However, when children taught the puppets, five-year-olds tended to demonstrate the correct move and to explicitly address the puppet's mistake verbally; e.g., "you have to put the red pieces in the middle, not here". In contrast, four-year-olds often demonstrated the correct move without any accompanying talk. We discuss the relationship between children's teaching and their developing theory-of-mind and executive functioning.

IV.42

THE ROLE OF AGE IN LOOKING-TIME PERFORMANCE: YOUNGER MONKEYS LOOK LONGER IN EXPECTANCY VIOLATION AND PREFERENTIAL LOOKING TASKS

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Looking time methods are common tools for studying cognition in human infant and nonhuman primate populations. These methods rest on the logic that amount of looking reflects underlying cognitive processes, either a violation of expectation or a preference for one stimulus over another. However, little work has addressed whether other subject characteristics, such as age or sex, might impact looking patterns. We compared rates of looking in large samples of rhesus macaques across three dissimilar tasks: a true-belief understanding expectancy violation task (n=278), a preferential looking task contrasting social versus nonsocial stimuli (n=252), and a preferential looking task contrasting ingroup versus outgroup faces (n=246). Across all tasks, juvenile monkeys exhibit longer looking at stimuli than older monkeys (belief expected: $p<0.001$; belief unexpected: $p<0.01$; social preference: $p< 0.01$; ingroup preference: $p<0.001$). There were no systematic differences in looking patterns across sexes. We discuss the implications of these results for developmental studies.

II.29

INFANTS' QUANTIFICATION OF COLLECTIONS IN AN ORDINAL CHOICE TASK: DOES CONTAINMENT MATTER?

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Recent evidence suggests infants may be unable to track portions of substances or collections as individuated entities, e.g. "one cup of cheerios." I first demonstrated that 10-12 month-old infants fail to choose a larger food reward after viewing 1 vs. 2, or 1 vs. 3 cups of cheerios poured into separate opaque buckets, despite their ability to do when the items to be tracked are individual crackers. Infants did, however, differentiate some cheerios vs. no cheerios, crawling to buckets containing one pour vs. no pours. Further evidence they may be tracking overall amount comes from their success at a fourth condition involving one vs. four pours, a ratio of substance infants of this age have been shown to differentiate. Current conditions ask whether leaving piles of cheerios in their containers when placed in the buckets results in infants' successful individuation of 2 or 3 portions of cheerios.

IV.11

VISUAL BIASED-COMPETITION IN INFANTS: EVIDENCE FOR MEMORY GUIDED ATTENTION

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Recent work with adults demonstrates facilitation of rapid onset saccades when the color of the probe items matched the contents of visual short-term memory (VSTM; Hollingworth, Matsukura & Luck, 2012). Importantly, these results obtain even in the absence of visual competition, indicating facilitation is likely the result of enhanced sensory processing, rather than impaired filtering or inhibition. Using a modified version of the task, we tested infants and adults in a biased competition task. Results from adults reveal expected facilitation for familiar probes, whereas results from infants reveal facilitation for novel probes. Results are discussed in the context of emerging connections between early visual areas and VSTM, the implications for infant visual behavior, and the time course of development.

IV.77

STORYBOOKS AND THE MALLEABILITY OF THE MORAL MIND

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The conflict between equality-based fairness and merit-based fairness has been prevalent throughout history. The present research explored whether and how these two ideas about fairness can be shaped during childhood. We investigated whether storybooks are effective tools for teaching children about fairness. Five- and 7-year-old participants' baseline ideas about fair distributions were assessed by asking them to divide stickers between two hypothetical children, one of whom produced more than the other, and the participants were then read one of the following illustrated books: (1) a narrative about equality, (2) a narrative about merit, (3) a didactic argument about equality, or (4) a didactic argument about merit. The impact of these picture books on children's ideas about fair distributions were then assessed in a post-test distribution task that was structurally matched to the pre-test task. Findings suggest that narratives may have milder influences on children's moral thinking than current theorizing predicts.

I.47

STRATEGIC MEMORY MONITORING: THE ROLE OF CONFIDENCE IN HELP SEEKING

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In our everyday lives, we ask people for help in remembering things—where we put our keys, the name of a restaurant that went out of business, and so on. Making effective use of another person's memory involves comparing how confident you are in the accuracy of your own memory with your confidence in the accuracy of the other person's. In the study here, we asked whether preschoolers would exploit another person's memory in a strategic manner. Specifically, we asked whether they would be more likely to seek out another person to respond to a memory question when that person was likely to have a better memory than when that person's memory was likely to be no better (or actually worse) than their own.

IV.62

ATTENTIONAL DISENGAGEMENT AND SENSORY RESPONSE PATTERNS OF CHILDREN WITH AUTISM, DEVELOPMENTAL DELAY, AND TYPICAL DEVELOPMENT

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Flexible attentional orienting develops in the first year of life (Colombo, 2001). Disengagement deficits are evident in autism throughout the lifespan (Wainwright-Sharp & Bryson, 1993; Zwaigenbaum et al., 2005), and in siblings of children with autism (Elsabbagh et al., 2009). Unusual sensory responses are also prevalent in autism across the lifespan (Kern et al., 2007). Associations between disengagement and sensory features are compared in children (Mean Age=8.2 years) with autism (AU) (N=18), developmental delay (DD) (N=13), and typical development (TD) (N=18). Sensory features are measured using the Sensory Experiences Questionnaire (Baranek et al., 2006). Saccadic latencies are recorded via an eye tracker while children view six toy images (static, dynamic-no auditory, dynamic-auditory) during gap, overlap, and baseline conditions. Preliminary analyses show that the AU group has slower disengagement from dynamic-auditory central stimuli during the overlap condition. We hypothesize that slower disengagement will be associated with more hyporesponsive sensory patterns.

III.54

THE RELATIONSHIP BETWEEN IMAGINARY COMPANION STATUS AND EXPOSURE TO FICTION

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This study explored the relation between having an imaginary companion (IC) and exposure to fiction in books and screen-based media. Seventy-one 5- and 8-year-olds (36 females; 35 5-year-olds: Mage=5 years, 8.2 months, SDage=2.4 months; 36 8-year-olds: Mage=8 years, 6.5 months, SDage=2.9 months) and their parents provided information about whether the children had ICs and parents completed a fiction-involvement questionnaire (Mar, Tackett, & Moore, 2010). Children with ICs were exposed to more fiction in books than children without ICs, $t(69)=2.42$, $p=.018$, as were their parents, $t(69)=2.25$, $p=.028$. However, there was no difference between children with and without ICs on their exposure to screen-based fiction, $t(69)=.756$, $p=.452$. These results suggest a relation between parental preferences for fiction in their own reading, exposure of their children to fictional storybooks, and children's inclination to create ICs.

II.13

DIFFERENCES IN YOUNG CHILDREN'S ABILITY TO CATEGORIZE RELATIONAL, SOCIAL, AND NON-SOCIAL CATEGORIES

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This research examined whether young children reason differently in different knowledge domains; in particular social versus non-social. Social information includes mental states such as thoughts and emotions. Here, non-social information involved information about physical activities that people engaged in. We examined the ability of 56 typically-developed children who ranged in age from three to five years to match stimuli based on relational (shape or color identity), common emotion, or activity categories to determine age and sex differences with regard to categorization on these tasks. Analysis indicated that children performed best on the relational task, worst on the social task, and somewhat intermediate on the non-social task. Analysis also indicated the expected age effect with the advantage for older children. There were no effects of sex and no interactions. Studying very young children in a non-verbal task indicated that children reason differently in different knowledge domains.

II.6

COMPARING EARLY MEASURES OF CHILD GESTURE AND JOINT ATTENTION IN RELATION TO LATER LANGUAGE DEVELOPMENT

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Child gesture and joint attention are early predictors of language development. Children who gesture more during parent-child interactions have greater vocabulary skills later on (Rowe & Goldin-Meadow, 2009), as do children who engage in more episodes of joint attention with an experimenter (Mundy et. al., 2007). Combining information about gesture and joint attention from different paradigms can contribute to our understanding of the role of the environment and the child in language development. At age 12-months, we measured joint attention via the experimenter-administered Early Social Communication Scales (ESCS; Mundy et al., 1996), and measured child gesture via coding parent-child interaction and also via parent report using the MacArthur-Bates Communicative Development Inventory (Fenson et al., 1994). Results show that: parent gesture relates to child gesture in interaction and not to joint attention; child gesture and joint attention are associated; and gesture and joint attention differentially predict to 24-month language skills.

III.86

THE INHERENCE HEURISTIC AS A FOUNDATION FOR PSYCHOLOGICAL ESSENTIALISM

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According to psychological essentialism, people believe that causally powerful "essences" are responsible for membership in natural and social kinds and for the properties associated with membership in these kinds. Although essentialism has received much attention, little is known about its cognitive antecedents. We argue that essentialism emerges from a broader, and earlier-developing, inherence heuristic—a tendency to explain patterns in the world in terms of the inherent properties of the entities involved (e.g., orange juice is consumed for breakfast [pattern] because citrus aromas wake us up [inherent feature]). We tested the hypothesized relationship between the inherence heuristic and essentialism using a newly developed scale. Reliance on inherence-based intuitions predicted essentialism both on its own and when a number of potentially confounding variables (cognitive style, cognitive ability, and system justifying tendencies) were controlled for. These results provide support for a promising theoretical perspective on the cognitive origins of psychological essentialism.

I.69

I SEE WHAT YOU'RE THINKING': EXAMINING HOW PICTURE BOOKS CAN PROMOTE FALSE-BELIEF UNDERSTANDING IN PRESCHOOL CHILDREN

Valerie San Juan & Yasmine Ghobrial
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Research has demonstrated that picture books are an effective means of teaching children perceptually-based concepts (Ganea, Ma, & DeLoache, 2011). It is less clear, however, whether picture books are as effective in promoting the development of internal state concepts, such as false-belief. An intervention study was therefore designed to examine the factors that would optimize children's learning of epistemic concepts via picture books. Three- and 4-year-old children, who initially fail explicit measures of false-belief understanding, will be randomly assigned to one of six picture book reading conditions. Across conditions, stories will vary by language (i.e., presence and number of mental state terms) and context (constant vs. different). Changes in false-belief understanding will then be assessed using both implicit and explicit measures. It is expected that exposure to mental state terms will lead to post-training improvements in false-belief understanding but these effects may be moderated by context and number of terms.

III.49

INTERVENTIONS TO IMPROVE PRESCHOOLERS' NUMBER KNOWLEDGE - WHAT WORKS?

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During the preschool years, children learn what numbers are. This is more than learning how to count; it means understanding number as a property of sets; understanding that each number is generated by adding one to the number before it; that any set of, e.g., "six" forms a one-to-one mapping with any other set of six, and so on. On these and other measures, children who fall behind during the preschool years enter kindergarten at a disadvantage. This poster will present preliminary results from two ongoing interventions aimed at improving preschoolers' number knowledge.

III.71

INFERRING THE CAUSES OF PATTERNED SOUNDS: WERE THOSE NOTES CAUSED BY AN AGENT, OR AN INANIMATE FORCE?

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Children expect that only animate agents can organize objects in a patterned, orderly fashion (Newman et al. 2010). We asked whether this is due to children's understanding of the unique capacities of agents (i.e.

self-propelled motion) and of physical causality. We also asked if children spontaneously infer the causes of sounds. In a violation-of-expectation task, participants saw 1) an agent or inanimate ball, and 2) a xylophone-like staircase; each stair produced a note such that rolling down would produce a descending scale. At test, the staircase was occluded; the agent or ball moved in and behind the occluder; and one of two sounds played: A descending scale or a melody. Producing the melody (using the staircase) would require self-propelled motion. Thus, if participants use their understanding of agents and causality to infer the causes of sounds, then the ball producing the melody should violate their expectations.

I.16

YOUNG CHILDREN'S TRANSFER OF FANTASTICAL AND REALISTIC PROBLEM SOLUTIONS FROM TELEVISION CHARACTERS

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Past research suggests young children are less likely to transfer problem solutions from fantastical stories; however, it is unclear if children display the same difficultly transferring solutions from fantastical television shows (Richert et al., 2009; Richert & Smith, 2011). This poster will present findings from a study of 40 children ages 3.5-6.5 testing hypotheses that children are more likely to transfer problem solutions from television characters when 1) those characters present realistic problem solutions, and 2) children have positive parasocial bonds with those characters. To test this hypothesis, participants view clips of familiar television show characters solving problems; two of the clips include realistic solutions, and two include solutions aided by fantastical elements. Following the clips, participants are asked to solve problems analogically similar to the problems solved by the characters. Children are interviewed for their parasocial relationships with the characters, and beliefs about solution probability and character reality status.

IV.16

EARLY EFFECTS OF BILINGUALISM ON PERCEPTUAL DEVELOPMENT

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Effects of bilingualism on cognition in preschoolers, older children, and adults are well-documented, particularly in the domain of executive function (e.g., Bialystok et al., 2008). However, effects of bilingualism in infancy are poorly understood. Here, we examined patterns of visual attention in infants from bilingual vs. monolingual households to better understand development of responses to emotional and infant-directed content in dynamic face stimuli. In Study 1, 6-month-olds viewed side-by-side silent videos of an adult engaging in happy infant-directed (ID) or happy adult-directed (AD) speech. Monolingual infants preferred the ID face, but, surprisingly, bilingual infants looked about equally at ID and AD faces. In Study 2, 3-month-olds were tested with the same methods, and neither group showed a face preference. These results imply that one consequence of experience with multiple languages early in life is the modulation of social perception, such that attention to social information becomes more broadly distributed.

I.22

MATERNAL INTERACTION STRATEGIES FOR PRESCHOOL CATEGORIZATION PERFORMANCE

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From a Vygotskian theoretical perspective, this study aimed to understand the strategies mothers employ when teaching their young children to categorize items through maternal interactions, and subsequently how such strategies influence preschool task performance. Using a diverse array of pictorial stimuli, 33 mother-child dyads of preschool aged children (M age = 4.15) completed tasks in which they grouped items functionally or perceptually. Results suggest that children grouped items both perceptually and functionally equally during the maternal interaction, but used more functional grouping strategies during an independent post test. Results also suggest that mothers teach their children categorization strategies primarily through the use of questioning, while child communication strategies during the categorization tasks were primarily of a verbal nature as opposed to asking questions, elaborating on the task, or using non-verbal cues.

III.4

PHYSICAL ACTIVITY AND FAMILIAL INFLUENCES ON HIGHER ORDER COGNITIVE PROCESSES

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The present study examined the associations between group vs. individual forms of physical activity, affect experienced during physical activity, and parent and peer relationships and social support with the specific cognitive processes of working memory and attentional alerting and orienting in a collegiate population. 107 college-age participants were assessed using the Attention Network Test (Fan, McCandliss, Sommer, Raz, & Posner, 2002), Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1988), the Fels Physical Activity Questionnaire, and digit span tasks.

Results suggest that group, rather than individual, forms of physical activity, as well as more positive felt affect during physical activity, was associated with faster orienting effects of attention; however, encouragement from peers to be physically active, as well as greater activity levels of fathers and peers, tended to be associated with slower orienting effects of attention.

I.81

THE RELATIONSHIP BETWEEN PARENTS' CONCEPTS OF LYING AND CHILDREN'S THEORY OF MIND

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This study investigates how parenting affects children's theory of mind development by examining a common occurrence between young children and their parents—the parent's response to a child's lying. Coleman and Kay (1981) state lies have three factors: whether the statement is false, whether the speaker knows it is false, and whether the speaker intends the listener to believe it. Previous research shows parents who emphasize mental states in discipline situations have children with more advanced false belief understanding, so the hypothesis is the more parents focus on the speaker's intentions when defining children's lies, the more advanced their children's theory of mind. Preliminary results find that parents who include intent to deceive in their definitions have children with higher theory of mind scores ($r = .35$, $p = .042$). Thus, there is a relationship between parents' inclusion of deceptive intent when defining lying and their children's theory of mind performance.

I.70

IDAQ-CHILD FORM: VALIDATION OF A NEW MEASURE OF INDIVIDUAL DIFFERENCES IN ANTHROPOMORPHISM IN CHILDREN

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The study of anthropomorphism in adults has received considerable interest with the development of the Individual Differences in Anthropomorphism Questionnaire (IDAQ; Waytz, Cacioppo, & Epley, 2010). The study of anthropomorphism in children is also of significant interest, yet a comparable measure does not exist. To fill this gap, we developed the IDAQ Child Form (IDAQ-CF) and report two validation studies. In Study 1, adults (N=304) were administered the IDAQ and IDAQ-CF to assess comparability between the measures. In Study 2, children (N=90) in three age groups – 5, 7, and 9 years – were administered the IDAQ-CF. Results indicated high comparability between the original IDAQ and the IDAQ-CF in an adult sample (Study 1) and validation of the IDAQ-CF measure for use with children as young as 5 years (Study 2). This research provides strong evidence of the IDAQ-CF as a valid measure of individual differences in anthropomorphism in children.

II.55

EMBODIED LEARNING OF CHILDREN'S RELIGIOUS CONCEPTS

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Infants' cognition is dependent upon their sensory and motor processes (Thelen & Smith, 1994). Embodied cognition theorists suggest those processes are not replaced by abstract and internal processes after infancy, but are continually used (Niedenthal et al., 2005). Religious cognition is used to gain a better understanding of cognitive development and is influenced by sensory and motor processes (Barsalou et al., 2005; Richert & Smith, 2009). This research investigates the relationship between participation in religious rituals and the development of religious concepts. Fifty Christian children, ranging from 5 to 10 years old were taught religious knowledge and the physical actions of a religious ritual. Afterwards, participants freely recalled the religious knowledge: those who performed the ritual were more likely than those who observed it to remember the purpose of the ritual ($\chi 2[1]=4.608$, $p=0.032$, $r=0.304$). These results suggest children's religious actions influence the formation of their religious concepts.

IV.56

MORE SIMILARITY IS BETTER BUT NOT TOO MUCH: THE EFFECT OF EXTRANEOUS SIMILARITY ON 3-YEAR-OLDS' SYMBOLIC UNDERSTANDING

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Children's symbolic understanding of scale-models is dependent on a high degree of similarity between the model and referent room (DeLoache & Sharon, 2005). Is high similarity in a symbol still beneficial when the referent space is very detailed and complex? We investigated whether high similarity is still beneficial when the room is detailed with extraneous objects, or whether a simpler model makes a better symbol. Three- and 3.5-year-olds used either a simple model or a rich model, which either excluded or included extraneous objects, to find a hidden toy in a larger room. Children performed better with the rich-model (77% errorless retrievals) compared to the simple-model (55% errorless retrievals). Ongoing research showed that adding even more extraneous objects to the rich model/room produced the opposite effect. Depending on the referent space, extraneous similarity in a symbol can be too much and may not always be beneficial to symbolic understanding.

III.68

WHEN THE GOSTAK DISTIMS THE DOSHES: NOVEL VERB LEARNING FROM NOVEL NOUNS

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By age two years, toddlers learn a verb's basic meaning from its syntactic (e.g., Naigles, 1990) and semantic (e.g., Fisher et al., 1994) context. We ask whether semantic content is necessary, or whether toddlers learn from syntax even without knowing the meanings of the surrounding content words. Twenty-two 25- to 29-month-olds heard novel verbs in transitive or intransitive sentences with two novel nouns (e.g., The dax gorped the stipe.) But first, to familiarize them to the sounds of the novel nouns, we provided dialogues offering little semantic information (e.g., Did you see the dax?). Based on previous work (Arunachalam et al., 2013), we expected toddlers to prefer causative referents for transitive as compared to intransitive verbs from 3 to 5 seconds after the candidate referents displayed. They did: ($t(20) = 2.2$, $p < .05$). This suggests that toddlers can learn from syntactic information alone.

III.73

MANIPULATING THE EFFECTS OF STEREOTYPE THREAT ON PRESCHOOLERS' PERFORMANCE

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Learned gender stereotypes affect people's interests, their beliefs in their abilities, and their performance on tasks. For example, making social category salient by asking people to specify their gender before a math test has negative effects on females' performance, creating a stereotype threat by activating the stereotype that females are weaker at math (Shih et al., 1999). This study explores whether stereotype threat exists among preschool children. After a manipulation intended to activate gender identity, preschool girls were asked to replicate a series of designs with Lego blocks. Girls' level of gender stereotyping was also measured using implicit and explicit measures to assess the relationship between stereotyping level and stereotype threat susceptibility. Preliminary results indicate that girls whose gender identity was activated performed worse than girls in a control condition. Further experiments will explore whether changing the perceived nature of a task changes children's susceptibility to stereotype threat.

IV.76

PARENTAL INPUT ABOUT UNPLEASANT ASPECTS OF THE BIOLOGICAL WORLD

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Previous research suggests that parental input is an important source of information for children's developing theories of biological phenomena, as well as a potential source of misconceptions. The present study addressed how parents convey information about "negative" animal behaviors, such as predation between species or competition within a species, to children of different ages. We asked parents of children aged 4 to 12 to read an illustrated book of animal facts to their child. We analyzed differences in how parents articulated neutral and negative facts by calculating how often those facts were repeated, omitted, or embellished with additional information. Regardless of the child's age, parents typically repeated the neutral facts verbatim but embellished the negative facts with additional comments, questions, or explanations, effectively highlighting the negative information more prominently. We discuss these findings with respect to evolution education and parent-child interactions in informal science learning.

II.38

EFFECTS OF ASYMMETRY, BOUNDARY, AND DEPTH CUES ON CHILDREN'S REORIENTATION

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Humans and other animals reliably use geometric features of the surface layout to reorient themselves, but the reason for this distinctive pattern of behavior is not clear. Previous theories have suggested that humans have evolved to reorient by stable features of the environmental landscape, particularly boundaries. Our study evaluated three features of natural landscapes to assess their effect on children's reorientation: asymmetry; environmental boundary; and depth. Children between 3 and 7 years old were asked to find stickers after being disoriented in a 10'x10' square room with three white walls and one landscape wall. The results indicate robust improvement on this task with age. In older children, the data indicate a strong role for asymmetric visual information in guiding reorientation, and virtually no effects of presence/absence of environmental boundary or depth cues. These findings raise new questions about why geometric information is readily incorporated into reorientation behavior.

I.48

BEYOND INSTRUCTION: SOURCES OF CONCEPTUAL KNOWLEDGE AND NEW STRATEGIES IN MATHEMATICS

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Children's early mathematics education is a period of rapidly developing knowledge of concepts and problem-solving strategies. Where do these new ideas come from? Sometimes children learn in response to explicit educational experiences, including direct instruction and verbal explanations of worked examples. In other instances, however, more subtle factors may guide new learning. This poster presents two studies addressing factors other than explicit teaching, and how they affect the development of conceptual knowledge and strategy use in mathematics.

Study 1 investigates the role of prior knowledge in children's acquisition of knowledge about fraction operations. We examine whether children's conceptual representations of whole number operations predict and support understanding of fraction operations. Study 2 examines how exposure to alternative strategies affects children's knowledge about mathematical equivalence. We investigate whether exposure to alternative strategies prompts strategy generation, and whether strategy generation depends on the certainty of children's knowledge about their current strategy use.

II.87

CHILDREN'S REASONING ABOUT THE REFUSAL TO HELP: THE ROLE OF NEED, COSTS AND SOCIAL PERSPECTIVE TAKING

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There is much research on how children evaluate and reason about negative peer behaviors, whereas social-cognitive research on children's views about the refusal to help is scarce. Children (n = 133, aged 8 to 13) were interviewed about helping situations that systematically varied in recipient's need for help and the costs for the helper. In low costs situations children perceived a moral obligation to help which was independent from peer norms, parental authority and reciprocity considerations. When helping a peer involved high costs this overpowered the perceived obligation to help, but only in situations involving low need and when in line with reciprocity. When both need and costs were high, younger children expressed stronger moral indignation while older children were less negative and reasoned in terms of other solutions. Furthermore, stronger moral indignation was related to more advanced social perspective taking skills when need and costs were high

II.78

INFANTS' EARLY UNDERSTANDING OF COINCIDENCES

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Coincidences are surprising events, but detecting them is not just about assessing the relative probabilities of different events. Sometimes, two events can have the same probability of occurrence, but can differ in their perceived strength of coincidence (e.g. sequence of dice rolls: "2, 1, 4, 3" vs. "1, 1, 1, 1"). In the current research, we investigate whether infants are sensitive to such coincidences. Results from a looking-time experiment and an eye-tracking study demonstrate that 8-month-old infants display a sensitivity to coincidence similar to adults, looking longer when a box containing 6 different colored balls produced a sequence of balls that were all of the same color. Modeling work further revealed that a Bayesian analysis appropriately models how infants evaluate such surprising events, outperforming alternative accounts based on mere probabilities of single events or sets of events.

III.61

EFFECT OF RELATIONAL TRAINING ON CHILDREN'S ANALOGICAL REASONING

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Analogical reasoning – reasoning based on relational similarity – is a fundamental aspect of human cognition, yet young children often reason on the basis of object similarity instead (Gentner & Rattermann, 1991). Improved relational knowledge is one factor that may help children focus on relational similarity and overcome this object bias (Goswami & Brown, 1989; Rattermann & Gentner, 1998). However, few studies have experimentally manipulated children's knowledge to examine the effects on analogical reasoning (but see, Kotovsky & Gentner, 1996). In the current, ongoing study, 5-year-olds' received training on novel relational patterns prior to completing a relational matching task involving the same patterns. Compared to a control group (who received a closely-matched, non-relational training task), we expect children trained on the relevant relations will be more successful at finding relational matches and more resilient against irrelevant object similarity.

II.45

INHALED OXYTOCIN INCREASES AFFILIATIVE INTERACTIONS IN NEWBORN MACAQUES REARED UNDER EARLY SOCIAL ADVERSITY

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Early mother-infant interactions are critical for infants' socio-emotional and cognitive development. Neurochemically, oxytocin promotes social behaviors, regulates affect during social interactions, and plays a pivotal role in mother-infant bonding; however, little is known about the effects of administering oxytocin to newborns. Our goal was to examine oxytocin's effects on 1-week-old nursery-reared macaques' behavior during an interaction with a human experimenter. Similar to severely socially deprived children, nursery-reared macaques lack reciprocal interactions, leading to negative outcomes in socio-emotional development. Using a double-blind within-subject design, we nebulized infant macaques (n = 29) with oxytocin or saline, and confirmed increases in infants' oxytocin levels with saliva assays. We found that oxytocin, compared to the control, increased infants' lipsmacking, a core affiliative gesture in macaques, both one and two hours after nebulization. These data suggest that oxytocin increases the potential for typical, affiliative interactions in infant macaques at risk for impaired social skills.

I.24

3-MONTH-OLD INFANTS EXHIBIT SENSITIVITY TO ACTION EFFICIENCY FOLLOWING ACTIVE EXPERIENCE

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Several studies report a relationship between action production and action perception, but the nature of this relationship is not well understood. Does information derived from early motoric production interact with more abstract knowledge of goal-directed actions possessed prior to experience producing them? We gave 3-month-old infants novel experience grasping objects, and tested their sensitivity to the efficiency of an observed action. Only after experience performing simple reaching actions did infants exhibit violation-of-expectation when an agent reached inefficiently for a goal object. Importantly, infants themselves were given no opportunity to update actions based on environmental constraints, and therefore were unlikely to have learned out action efficiency from the training itself. These results suggest that 3-month-old infants may have prior expectations about the efficiency of goal-directed action that they apply as soon as they have sufficient information—-derived, in part, from production experience—-to infer an agent's goal in a particular instance.

III.16

CHILDREN AND CHOICE: HOW CHOOSING AMONG OPTIONS AFFECTS PRESCHOOLERS' SATISFACTION

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Although adults strongly prefer to have many choices when making decisions, research has shown that an over-abundance of choices can reduce motivation and lead to decreased satisfaction with the chosen outcomes. Here we asked whether these same characteristics are seen in young children. Children aged 3 to 4 years were asked to choose a toy from one of two prize bins, each containing a distinct distribution of toy types. Children chose between bins with 1 or 3 different types of toys, 1 or 15 types, or 3 or 15 types. Afterwards, we measured children's satisfaction with their chosen toy. Like adults, children: 1) preferred to choose from the bin with the greater number of options, and 2) experienced less satisfaction with their choices when they had chosen from among more options. These findings suggest that cognitive and emotional responses to decision making are in place from early in development.

II.21

CHARITY BEGINS AND ENDS AT HOME: DEVELOPMENTAL CHANGES IN INGROUP FAVORITISM IN INFANCY

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Recent findings indicate that infants demonstrate sensitivity to both fairness and ingroup-support. We examined how infants would respond to third-party scenarios pitting these two principles. Infants watched events involving two minimal groups marked by outfits (hippies and princesses). A helper (A1) faced two individuals whose markers had dried out; one individual (A2) belonged to the same group as the helper and one (B1) belonged to the other group. A1 had many markers and gave one to only A2 (helps-only-ingroup event), only B1 (helps-only-outgroup event), or both A2 and B1 (helps-both-groups event). At 17-18 months, the helps-both-groups event (consistent with fairness) and the helps-only-ingroup event (consistent with ingroup-support) were both viewed as acceptable; only the helps-only-outgroup event (which violated both principles) was deemed unacceptable. By 19-20 months, however, the helps-both-groups event was also unacceptable, suggesting that infants now ranked ingroup-support above fairness and expected resources to be reserved for the ingroup.

III.24

AN EVALUATION OF SOCIAL AND INDIVIDUAL INFLUENCES ON EARLY MATH ACHIEVEMENT

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Previous studies have shown that early math abilities are the strongest predictor of later academic achievement (Duncan et al., 2007), and that these abilities vary significantly across socioeconomic status (SES) (Lee & Burkam, 2002). In this longitudinal study with a diverse population of participants from Middletown, CT and San Jose, CA, we assess the relative contributions of individual and social factors to early numeracy. Pre-K participants were tested in two sessions one year apart on their understanding of the cardinal principle, approximate number system acuity (ANS), receptive vocabulary, and math achievement (TEMA-3). Parental questionnaires were used to collect basic demographic information as well as relative levels of income and education. Analyses will reveal whether SES mediates the relationship between symbolic math and numerical acuity, and patterns of growth in these aspects of early numeracy.

I.11

CHILDREN'S UNDERSTANDING OF VILLAINS AND EVIL

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Young children often think positively about others, even when given good reason not to. Given this, we ask whether children have an understanding of evil, and whether it becomes more solid with development. Children aged 4-14 (current n = 119) were assigned to either a familiar or novel villain. Children were asked if their character would engage in sadistic, instrumental, and vengeful aggression. Children were also asked about comforting, helping, and sharing behaviors. Young children did predict evil behavior in familiar villains, but this tendency became stronger with age. Younger children were less willing to predict evil in novel compared to familiar villains. Children who predicted evil in villains also asserted that villains would be kind to a pet, suggesting a nuanced grasp of wickedness. Thus, young children have some understanding of evil, but this understanding becomes richer and more flexible as children move from early to middle childhood.

IV.12

METAPHOR EMBODIMENT IN CHILDREN: HAND CLEANLINESS MAY IMPACT PRESCHOOLER'S REACTIONS TO MISHAPS

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According to a Grounded Cognition framework, language is integrated with sensorimotor systems; linguistic processing activates neural areas associated with perception and action. Consistent with this idea, recent research has shown that adult behavior is influenced when metaphoric relationships are activated. For example, individuals who were asked to recall a misdeed were more likely to engage in cleaning behaviors than a comparison group, in an attempt to "wash away" their transgression. In the current study, we tested the embodiment of the metaphor relating clean/good and dirty/bad in preschool-age children. We manipulated the cleanliness of four- and five-year-old children's hands and then observed their reactions to broken toy. We found a marginally significant effect of hand cleanliness such that children with clean hands were more likely to repair the toy than children with dirty hands. These findings imply that metaphor embodiment is a developmental phenomenon that may begin in early childhood.

III.81

GUIDANCE OF CHILDREN IN A SCIENCE-RELATED ACTIVITY BY MEXICAN-DESCENT MOTHERS FROM TWO SCHOOLING GROUPS

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Prior research suggests that parental schooling and cultural background may be related to informal parental guidance of children. Forty U.S. families of Mexican descent, from two levels of schooling experience, were observed engaging in a science-related task, predicting and testing whether twenty items would sink or float. Parents with higher schooling more often evaluated their children's performance, while parents with basic schooling more often evaluated their own performance. Interestingly, parents in both groups were equally likely to correctly predict outcomes. However, children whose parents had basic schooling made more decisions about sink-float predictions than those with higher schooling. Our findings suggest that Mexican heritage parents with basic schooling engaged their children as collaborators, using the kind of open-ended inquiry that has been argued to foster interest in science. Conversely, parents with more schooling experience took an instructor-like role, which could limit children's opportunities to engage in critical thinking.

III.84

EVENT SEGMENTATION IN INFANCY

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The present study investigated the encoding process of 16- and 20-month-old infants. At the first session, the infants were shown one of two short (30s) movies (cartoons with a simple narrative), with ellipses covering the screen either at breakpoints or between breakpoints for 3 seconds. Two weeks later the infants would watch both movies simultaneously while being eye-tracked. Based on previous studies we expected a familiarity preference as the default (Kingo & Krøjgaard, submitted). However, in accordance with the Event Segmentation Theory (e.g. Kurby & Zacks, 2007), we hypothesized that the movies with pauses inserted at breakpoints would cause a greater disturbance in the encoding process resulting in a smaller familiarity preference at test compared to the movies with pauses inserted between breakpoints. This was indeed what we found, however only for the oldest age-group, suggesting that event segmentation skills develop significantly between the age of 16- and 20- months.

IV.24

DO BILINGUALISM AND ATTENTIONAL DIFFICULTIES INTERACT IN EXECUTIVE FUNCTION PERFORMANCE?

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Poor inhibitory control is a defining feature of children with attention difficulties. In contrast, research with bilingual children suggests that these abilities are well developed and often superior to those found in monolingual children. Despite the apparent link between these areas of research and their opposite effects on executive function, the interaction between bilingualism and attention has not been investigated. We examined 196 (104 females) typically-developing children, aged 8 to 11 years old, who varied in both bilingual experience and attentional control ability. Parents completed measures of attention difficulties and bilingualism and teachers provided additional information about attentional ability. Using the Stop Signal Task as an index of inhibition, a hierarchical regression analysis showed a significant role for both attention abilities and bilingualism on children's performance but no significant interaction between these factors. These results are discussed in terms of factors affecting executive function development in typically-developing children.

IV.50

CHILDREN'S EXPECTATIONS AND UNDERSTANDING OF KINSHIP AS A SOCIAL CATEGORY

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Humans are a highly social species, and we tend to parse the social world into groups—"us" versus "them." We have long had a natural tendency for group living, and this adaptation has become fundamental to the science of human nature (Brewer, 1979; Kurzban, 2001). One category that has yet to be explored—at least in the field of cognitive development—is that of kin versus non-kin. Lieberman and colleagues (2008) argue that kinship should be one of the fundamental social categories. We tested whether children see kinship as a distinct social category and whether kin relations impact children's expectations for social interactions. We find that children distinguish third-party familiar relationships such as kin and friends from strangers but do not show robust explicit distinctions or preferences between kin and friends. Across a set of experiments, we aim to elucidate children's explicit conceptual understanding of different relationship categories.

III.7

THE PRE-KINDERGARTEN NUMERACY AND SPATIAL ENVIRONMENT SURVEY: EXAMINING EARLY EDUCATION SETTINGS FOR NUMERACY AND SPATIAL TOOLS

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The goal of Florida's voluntary prekindergarten (VPK) program is to ensure that all 4-year-olds, particularly those from low-income families, are equipped with early school readiness skills needed to succeed in K–12. Critically, early numeracy/spatial skills are predictive of success in K–12 Mathematics. Research suggests children from low-income families are at-risk for failure in numeracy/spatial, and math content. The present study examined the effects of family income on pre-k children's access to and use of numeracy/spatial materials/manipulatives in the early education setting.. This 69-item Pre-Kindergarten Numeracy and Spatial Environment Survey, completed by the lead educator from a sample of 50 pre-k educators, gathered information about the availability and use of numeracy/spatial materials/manipulatives in the early education setting. We predicted that schools servicing low-income children would have decreased access to and usage of numeracy/spatial materials/manipulatives in the classroom when compared to school servicing high-income children. Preliminary data will be reported.

I.76

INFANTS CHUNK OBJECTS USING OWNERSHIP CUES

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Previous studies show that without spatial or linguistic chunking cues, infants fail to remember more than three identical objects (Feigenson & Halberda, 2004; 2008). Here we investigated whether infants can use the concept of personal ownership to bind representations of individual objects into sets, thereby overcoming the three-item limit on working memory. Specifically, we asked whether infants could chunk four identical objects into two sets of two, with each set "belonging" to a different character. Sixteen infants (15-17 months) watched one character place his identical objects atop a box, saying, "I'm going to put mine here," and then saw another character do the same. The experimenter then hid all four objects inside the box. Only when two unique characters demonstrated these ownership cues did infants successfully remember all four hidden objects. These results suggest that infants can use their early social knowledge to reorganize and expand the contents of memory.

II.7

A LIFETIME OF SEPARATE SELVES: CHILDREN'S INTUITIONS ABOUT PERSONAL IDENTITY

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Research in social psychology and behavioral economics suggests that people sometimes reason about past and future versions of themselves as if they were other people (e.g. Pronin, Olivola, & Kennedy, 2007). This suggests that we might naturally think about the lifespan of one person as consisting of a series of distinct individuals. If so, judgments about what makes an ideal life may be guided by the same principles as judgments about what makes an ideal society. We tested this prediction by asking preschool-aged children to choose between possible distributions of happiness, either for a population of individuals or for the lifespan of one individual. We found striking parallels in children's preferences in the two conditions, which are not easily explained by appealing to simple additive or averaging principles. This pattern of results supports the suggestion that our naïve theory of personal identity involves thinking of ourselves as a series of distinct individuals existing over time.

II.32

SHARED AND SEPARABLE REPRESENTATIONS OF MAGNITUDE IN 5-YEAR-OLD CHILDREN

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Converging evidence suggests that representations of number, space, and other magnitudes engage shared processing resources. Here we tested five-year-old children with three magnitude discrimination tasks – number, line length, and luminance – to determine whether individual differences in discrimination ability are stable across dimensions. We calculated a Weber fraction (w) based on each child's performance in each dimension. Weber fractions were lowest for line length and highest for number, with luminance falling in between. If children were relying on a common representation of magnitude for all three types of discrimination, then performance would be expected to correlate across all dimensions. Instead, we found that w values for number and line length were significantly correlated, whereas both number and luminance and line length and luminance were not. This suggests that representations of number and line length are more closely linked than representations of other magnitudes.

IV.29

KNOWING HOW YOU KNOW: PRESCHOOLERS SHOW ENHANCED MONITORING OF INFORMANTS OVER ALTERNATIVE SOURCES OF BELIEF

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Although research on children's source monitoring has traditionally emphasized preschoolers' failure to track source information (Roberts, 2002), mounting evidence suggests that preschoolers successfully monitor speakers and prefer previously reliable speakers for new information (Koenig & Harris, 2005). The current study sought to reconcile these literatures by exploring whether preschoolers monitor informants more effectively than other sources. In Experiment 1, preschoolers (N=40) monitored the animals liked by three speakers during Informant trials, and the manner in which a single speaker indicated a liked animal (i.e., through a picture, sound, or statement) during Modality trials. Both 3- and 4-year-olds monitored informants at levels above chance, but only 4-year-olds monitored modalities. In Experiment 2, preschoolers (N=17) monitored speakers (in the Informant Condition) or sensory modalities (in the Modality condition) when learning locations of hidden treats. Children showed better source memory for informants immediately after learning, but for modalities after a delay.

II.9

A PLACE FOR LOCATION IN CHILDREN'S MEMORY FOR PERSONALLY EXPERIENCED EVENTS

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Children undergo developmental changes in remembering and placing memories in time and space. To better understand the role that location plays in memory for personally-experienced events, 4-year old children (N=20) performed four different activities at four different locations in a laboratory suite. Children's memory for activity and location was tested at the end of the first session and after a one-week delay. Whereas recall of activity and location was not significantly correlated at Session 1, at Session 2 recall of the two attributes was strongly correlated $r(18) = .55$, $p < .01$. This pattern indicates that children's memory for the attributes of what happened and where becomes better integrated over time across Sessions 1 and 2. Research is currently being conducted to examine whether specific location cues improve memory for events and locations and their conjunction.

III.47

THE RELATION BETWEEN INFANTS' PREFERENCE FOR UPRIGHT BOOKS, EARLY READING EXPERIENCE, AND VOCABULARY GROWTH

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Recognition of the upright orientation of storybooks is one of the earliest concepts children develop about print. Toddlers begin to display explicit knowledge of orientation between 24 and 30 months. We investigated whether younger infants would display implicit knowledge of orientation, and whether this knowledge was linked to reading experiences and vocabulary growth. Fifty seven infants aged 14-19 months and 44 infants aged 20-25 months viewed images of book covers on a Tobii T120 eye tracker. Each book cover appeared in both a standard and inverted orientation. There was a preference for upright books, $F(1,99) = 100.6$, $p < .001$ and no effect of age. Children who displayed an implicit preference for upright books were read to more frequently and displayed faster vocabulary growth than children who did not. Results suggest that orientation preference may be a pre-literacy marker and develops earlier than previously measured.

IV.2

PERCEPTUALLY CONSTRAINED STATISTICS IN TODDLERS' WORD LEARNING

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A growing body of evidence suggests that children's word learning can be conceptualized as a statistical learning process. Statistical learning, however, is likely constrained by processes such as perception, attention and memory. This work examines how perceptual information constrains toddlers' statistical word learning. Using head cameras, we observed toddlers' visual input as parents labeled novel objects during an object-play session. We then constructed two artificial statistical learners that learned by aggregating word-to-object associations. A baseline model accumulated simple word-to-object co-occurrence statistics obtained from the observational data. A perceptually constrained model accumulated weighted co-occurrence statistics, taking into consideration perceptual information (e.g., object sizes) at the time object names were uttered. A comparison of models' object name learning to toddler's learning suggests that the perceptually constrained model captures toddlers' learning patterns better than the baseline co-occurrence model. Implications for the role of statistics and constraints on word learning will be discussed

I.20

CHILDREN'S MEMORY FOR CULTURALLY RELEVANT SIMILARITY ACROSS INDIVIDUALS

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The current study tests children's memory for culturally relevant similarity in the behavior of different individuals. We focus on three behaviors: language, which enables communication; food choice, which varies across cultures but can vary within cultures; and artifact use, an important component of cultural learning. Five- and six-year-old children watched video clips of eight actors (two exemplars and six targets) who spoke one of two languages, chose between two novel foods, or used one of two novel artifacts. Thus, behavior was observed rather than described, characteristic of children's real world experience. Children accurately recalled similarity across individuals for all three types of behavior; further, six-year-olds more accurately recalled similar language use compared to food choice or artifact use. Ongoing work explores children's generalization from one type of similarity to another, and whether children reason differently about culturally relevant similarity compared to more idiosyncratic or culturally universal behaviors.

I.36

FROM SMILES TO NONCOMPLIANCE: EXPLORING CHILDREN'S BEHAVIOR IN HELPING SITUATIONS

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Monolingual English-speaking preschoolers' reactions to a foreign (Spanish) and native language speaker were compared in a between-subjects design. Three- (n = 24) and five-year-olds (n = 24) were randomly assigned to the English or Spanish condition. Participants in the English condition demonstrated more behavior that suggested discomfort or ambiguity (e.g., approaching parent) than participants in the Spanish condition, girls demonstrated more negative behavior (e.g., noncompliance) than boys, and 5-year-olds demonstrated more positively engaged behavior (e.g., greeting experimenter) than 3-year-olds. These findings suggest that factors besides language status may have affected children's behavior, in particular the lack of a sufficient warm-up period. A second study, identical to the first except that the experimenter developed rapport with participants and maintained verbal engagement throughout, was conducted. The same behaviors will be coded and compared to Study 1.

III.28

THE ORIGINS OF PSYCHOLOGICAL ESSENTIALISM: THE CASE FOR THE INHERENCE HEURISTIC

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Humans believe that natural and social kinds (e.g., lions, boys) have internal, microstructural essences. We propose that these essentialist beliefs develop as an elaboration of the intuitions supplied by the inherence heuristic—a more general, and earlier-emerging, tendency to explain regularities in the environment in terms of the inherent features of the entities involved (e.g., fire trucks are red because the features of red make it ideally suited for fire trucks). According to this argument, endorsement of inherence-based intuitions should predict the emergence of children's essentialist beliefs during the preschool years. The findings of a study involving 64 four-year-olds were consistent with this possibility: Children's essentialist beliefs were predicted by broader inherence-based reasoning, even when controlling for age ($r = .40$, $p = .001$). These findings support a new theoretical perspective on the origins of essentialism—namely, that this phenomenon emerges on the foundation laid by the inherence heuristic.

IV.27

THE INHERENCE HEURISTIC AS AN EXPLANATION FOR NOMINAL REALISM

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Traces of the belief that words and their referents are ideally matched (rather than being mere historical accidents or social conventions) can be found across cultures and throughout development. Here, we propose that these erroneous beliefs, known as nominal realism, are an instance of a more general tendency to explain the regularities we observe (e.g., school buses are yellow) in terms of the inherent features of the entities involved (e.g., something about yellow makes it ideal for school buses) —a tendency that arises from a basic psychological process we have termed the inherence heuristic. Four studies supported this proposal, suggesting that broad inherence-based reasoning is a strong predictor of nominal realism in both children and adults. This relationship also held when adjusting for multiple controls. Thus, people (and children in particular) seem to explain word–referent mappings via the inherence heuristic, often arriving at nominal realist intuitions as a result.

III.60

THE EFFECT OF SES ON INFANTS' SELECTIVE EXPLORATION

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Tailoring exploratory actions to the physical context is a foundational cognitive skill that underlies higher-level cognitive processes. We compared the development of selective exploratory behaviors in high and low SES infants. We conducted a cross-sectional study on infants 6-8 months and 10-12 months of age by presenting them with hard and spongy cubes on a tray that was half solid and half-spongy. High SES infants made more selective exploratory choices (e.g., scratching the hard object more than the soft), while the low SES infants did not show this distinction. Low SES infants also made less selective choices in behaviors that combined the object with the surface. Overall, low SES infants showed less sophisticated selective choices in their exploration, which may contribute to other cognitive deficits associated with poverty, both in infancy and throughout childhood.

III.59

SOCIAL COGNITION IN DAILY LIFE: DEVELOPMENTAL CHANGES FROM 12 TO 40 MONTHS

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How often do young children process social information or use an understanding of social phenomena during daily life? Are there changes in spontaneous processing

of social information and application of social understanding as children develop from infancy through early preschool ages? Eighteen children in 4 age cohorts (12-18 months, 18-24, 24-30, 30-40) were observed for one hour monthly for 6 months during daily life at child care. Children engaged in processing social information through visual and auditory means (watch, glance, attend) in daily life 0.8 times per minute on average, and they used an understanding of social phenomena during daily life on average 1.5 times per minute with little variation in total use across age cohorts. However, visual ways of processing social information or using social understanding (glance, responding visually) decreased as children grew older, while vocal/verbal and action ways of using social understanding (respond verbally, imitate) increased.

III.15

DO CHILDREN LEARN WHAT THEY ARE TAUGHT OR WHAT THEY SEE?

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In any given learning episode, certain patterns or relations will be highlighted (taught) while others will be present more implicitly. We present a set of studies exploring the relation between taught and implicit patterns. Young children seem more influenced by implicit patterns than do older children, perhaps because young children are less able to selectively attend to the specific focus of instruction. For example, in a semi-supervised learning paradigm preschool-aged children are more likely to predict feature y using the unconditional distribution of stimuli, p(x) than are older children, who are better able to learn a conditional boundary, p(y|x), that is inconsistent with p(x). Attending to implicit patterns provides more flexible learning: Young children may be learning generative models useful for tasks beyond the focus of instruction. However, such an approach runs the risk of generalizing non-representative patterns introduced by pedagogical sampling.

II.72

EXECUTIVE FUNCTION AND THE ASYMMETRY BETWEEN CHILDREN'S LANGUAGE PRODUCTION AND COMPREHENSION

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Children's sentence production is often observed to lag behind their sentence comprehension. The reasons for this asymmetry are disputed. We hypothesized that immature executive function, specifically the lack of flexibility in word ordering might constrain children's production more than comprehension. Five-to-seven-year-old children were tested in two closely matched tasks where we primed a noun in one phrasal position and asked children to subsequently comprehend or produce that noun in the same or different position. Reaction times that measured the "cost" of overriding a previous order confirmed our predictions. Children showed a significant cost in the production but not the comprehension task. Further, the production cost decreased with age suggesting that a growing ability to flexibly order words might underlie the observed development of language production skills.

I.10

PARENT-TODDLER INTERACTIONS DURING MOTOR PLAY: IMPLICATIONS FOR DEVELOPING VERB COMPREHENSION

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As toddlers increase their word comprehension they also make rapid gains in motor abilities. These motor abilities provide new opportunities for exploring the environment, and possibly, provide new topics of conversation. We examined how parents interact with their 13- to 15-month olds while they engage in three types of motor actions – Body Only (e.g., walk), Whole Body with Object (e.g., ride), and Manual with Object (e.g., throw). Toddlers independently performed more of the Body Only actions than the other categories, though this was a nonsignificant difference ($p = .08$). Parents modeled Body Only and Manual with Object actions more than Whole Body with Object actions ($p < .001$). In contrast, parents assisted toddlers more for the Whole Body with Object actions than for the other categories ($p = .001$). Further analyses examine the communication being used. Implications for how motor abilities might affect word comprehension, specifically for verbs, are discussed

III.45

TESTING THE LIMITS OF INFANTS' EARLY WORD COMPREHENSION

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Six-month-olds comprehend the socially relevant words "mommy" and "daddy", and the self-related body parts "hand" and "feet". Additionally, six- to nine-month-olds comprehend foods and body parts when presented as categories. Four experiments were conducted using a split-screen preferential looking procedure to test if six-month-olds and nine-month-olds comprehend words labeling less socially salient objects (cup and spoon) and actions (drink and eat). The results show that infants fail to comprehend the words in all four experiments, however, stimuli preferences during the test trials might be interfering. Additionally, we examine the role of individual differences in parent input. Parents' self-reported ratings of their use of the test words shows that

parents might be more likely to talk about actions than objects with very young infants. Implications for establishing the scope and limits of early comprehension are discussed.

IV.39

GETTING IT WRONG MAKES THINGS RIGHT: WORD-OBJECT MISMATCHES FACILITATE SUBSEQUENT WORD LEARNING AT 14 MONTHS

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Fourteen-month-old infants' ability to use phonetic detail when mapping novel words to objects (e.g., distinguishing "bin" from "din") is ameliorated when given cues that stabilize word-object links. Infants trained on familiar word-object pairings (e.g., shoe object - "shoe.") will subsequently learn novel words in detail, noticing mispronunciations at test. Without such training, infants fail (Fennell & Waxman, 2010). Accordingly, word-object mismatches during training should disrupt subsequent word learning. However, meaning-maintenance violations enhance adults' subsequent performance on language tasks by motivating them to seek out stable patterns (Proulx & Heine, 2009). To test these hypotheses, fourteen-month-olds experienced incorrect pairings of familiar words and objects (e.g., shoe object - "kitty") before learning a novel word-object pair (e.g., toy - "BIN"). At test, infants looked longer at the toy when hearing its label mispronounced ("DIN") than correctly pronounced [$t(13) = 2.29$, $p = .04$]. Thus, meaning violations may promote subsequent word-learning in infancy.

III.14

ENSEMBLE REPRESENTATIONS OF SIZE AND ORIENTATION IN INFANCY

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Previous research has uncovered a multitude of continuities in Working Memory (WM) processes over ontogeny. While many similarities between adults' and infants' processing of individual objects in WM have been found, much less is known about the possible similarities in the way these two groups represent and remember large ensembles of items. In this series of studies we explore the origins of average size and orientation representations. It has been argued that adults' representations of average size, like those of average orientation are computed automatically via parallel attention. In our studies we find that while infants' average size representations are significantly less accurate than their individual item size representations, the threshold at which they can detect a change in orientation is the same for both individuals and ensemble averages. This divergence in developmental trajectory suggests that these abilities may depend on qualitatively different mechanisms in adulthood.

II.22

THE COGNITIVE UNDERPINNINGS OF THE IS-OUGHT PROBLEM

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People have a pervasive tendency to derive moral truths (i.e., what ought to be) from patterns of current reality (i.e., what is; Hume, 1740/2000). Although this "is-ought problem" remains a popular focus of philosophical discussion, there is limited psychological research on its causes (e.g., Friedrich, 2010). We hypothesize that is-ought reasoning is the output of an inherence heuristic—a cognitive tendency to explain broad regularities in the world in terms of their inherent features (Cimpian & Salomon, in press). Consistent with this hypothesis, we show that both children and adults who think inherently about regularities in the world (e.g., that girls wear pink because pink is an inherently feminine color) are also more likely to use what is (e.g., Americans drive to work) as a guide for what ought to be (e.g., Americans should drive to work). This work thus provides new insights into the psychological sources of is-ought reasoning.

III.32

INFORMATION PROCESSING STRATEGIES FOR ADDRESSING DIFFERENT SPELLING ERRORS

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In applying recent work on metacognition and strategy development, we have conducted a preliminary information processing analysis of spelling errors in elementary school children. Our goal has been to classify different types of spelling errors and develop information processing strategies for addressing the problems (imagery based, verbal based mnemonics, etc.). These include meaning based imagery, e.g., when "president" is misspelled as "presedent," remind the child that there is a man (person) standing in the middle of the word (redraw the "i" as a smiling face on top of a straight line representing the person's body), meaningful phrases that cue individual letters, e.g., remember the spelling of the second half of "jaguar" by asking the child what you do when you encounter a jaguar, you "Get Up And Run." These strategies not only address specific spelling problems but prompt metacognitive knowledge about strategy use in young children.

II.51

EXAMINING ASSOCIATIONS BETWEEN SLEEP QUALITY AND AUTOBIOGRAPHICAL MEMORY IN YOUNG ADULTS

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Sleep has been associated with memory for emotional stimuli as well as mental health problems in adult samples. The present study examined associations between sleep quality and autobiographical memory in 20 female university students. Students reported their most significant positive and negative memories and completed online questionnaires assessing sleep quality and depression. Narratives were processed using the Linguistic Inquiry and Word Count program for positive emotion, negative emotion, and cognition words. Results indicated that participants with good sleep quality used more anger words across narratives. Interactions between sleep quality and memory valence were found for negative emotion words and total words used; in some cases, the obtained effects were reduced or eliminated when controlling for depression. The findings indicate that whereas sleep quality may be independently associated with the language used when discussing autobiographical memories, depression and other mental health outcomes may mediate these relations. Implications will be discussed.

IV.45

FAST & STABLE: WORDS CREATE BETTER TARGET REPRESENTATIONS IN A VISUAL SEARCH TASK

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Previous work has suggested that words can modulate the deployment of visual attention in children, facilitating performance in visual attention tasks (Vales & Smith, 2012). Here we investigated the processes supporting this facilitation effect. Children completed a repeated visual search task where the target object was always the same. Before each search, the target object was either previewed in silence or named. Results suggest that labels create a better representation of the target early in the task, and that the facilitation effect is maintained throughout the task. Follow-up experiments will clarify the role of labels in creating a more stable vs. more precise representation of the target.

IV.3

THE EXTENSION AND RETENTION OF RELATIONAL KNOWLEDGE

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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 experience, but also through self-generation resulting from a number of relational processes, including integration of information acquired in two (or more) separate learning episodes. The present research was an investigation of the effect of delay on self-generation and retention of relational knowledge derived through integration by 4-year-old children. Children were presented with novel facts from passages read aloud to them (stem facts) and tested for self-generation of new knowledge through integration of the facts. Children integrated the stem facts at Session 1 and retained the integrated memory traces over 1 week; however, success was primarily evidenced in conjunction with scaffolding (i.e., recognition questions). The implications of the findings are discussed within the context of the cognitive availability framework.

IV.53

ASSESSING CONCEPTUAL CHANGE IN SCIENCE AND MATH: THE RE-CATEGORIZATION TASK (RECAT)

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Research has documented the considerable conceptual changes that happen in science and mathematics with development and learning. The present research attempted to assess these conceptual changes based on the finding that they are usually accompanied by ontological category shifts. The Re-Categorization Task (RECAT) was designed to test whether the expected ontological shifts had occurred in various cognitive domains in 104 elementary school children and 36 college undergraduates. Thirty-five concepts were selected from 4 different domains. The RECAT was computer-based and measured the participants' accuracy and speed in making category judgments. The results showed that all the participants were less accurate and required more time when making category judgments in the conceptual change condition compared to the non-conceptual change condition. The results indicated that a) considerable ontological shifts happen with development and learning, and b) these conceptual re-organizations do not extinguish intuitive concepts, which continue to exist even in adulthood

IV.44

EARLY INDUCTIVE REASONING: EXAMINING 11-MONTH-OLDS' ABILITIES

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Induction is a fundamental aspect of human learning and reasoning, allowing individuals to generalize beyond what is known to new instances. To investigate the origins of inductive reasoning, we used a modified Switch task design. Eleven-month-olds were

familiarized with two novel animal-sound pairings (e.g., Animal1[red]-Sound1 and Animal2-Sound2), followed by Same, Switch, and Extension test trials. When the familiarized animal-sound pairing was violated (Switch trial; Animal1[red]-Sound2), infants' looking time to this unexpected event increased relative to that of one of the familiar pairings, indicating that infants learned the original pairings. Extension trials examined whether infants would demonstrate category-based inferencing by generalizing the sound property to a novel exemplar of one of the familiarized categories (e.g., Animal1[blue]-S1). Here, infants' looking time increased, suggesting that they had formed one-to-one mappings during familiarization. An additional experiment, in which infants are familiarized to a greater number of category exemplars to facilitate generalization, is in progress.

IV.13

BEHAVIORAL AND NEURAL EFFECTS OF LEARNING WITH DIFFERENT GESTURE STRATEGIES

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Producing gesture strategies, in addition to or in place of speech strategies, facilitates children's ability to learn concepts. The present study (1) extends this finding to a new domain (e.g., what makes a word a palindrome?), (2) investigates whether teaching children to produce gesture and speech strategies that express the same information (SGmatch) or different information (SGmismatch) compared to an isolated speech strategy differentially facilitate learning, and (3) explores the neural basis of these learning effects using functional Magnetic Resonance Imaging. During a learning session, children who produced a SGmatch strategy solved the most problems correctly. At posttest, children who showed phonological competency and produced either gesture strategy were more likely to maintain knowledge than children who produced speech alone. Neuroimaging results suggest this effect may be due to the establishment of a sensory-motor representation of the concept of palindromes after use of a gesture strategy.

I.55

CONSTRUCTING EXPLANATIONS LEADS CHILDREN TO PRIVILEGE INDUCTIVELY RICH PROPERTIES

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Three experiments test the hypothesis that engaging in explanation prompts children to favor inductively rich properties when generalizing to novel cases. In Experiment 1, preschoolers prompted to explain during a causal learning task were more likely to override a tendency to generalize according to perceptual similarity and instead extend an internal feature to an object that shared a causal property. In Experiment 2, we replicated this effect of explanation in a case of label extension. Experiment 3 demonstrated that explanation improves memory for internal features and labels, but impairs memory for superficial features. We conclude that explaining can influence learning by prompting children to favor inductively rich properties over surface similarity.

II.10

IMITATION OF WEIGHT CATEGORIZATION BY 36-MONTH-OLDS

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Weight is an invisible property of objects. Apes (Povinelli, 2012) and very young children have difficulty categorizing objects by this invisible property. For example, 4-year-olds, but not 3-year-olds, can learn to sort objects by weight by imitating social tutors (Wang, Meltzoff, & Williamson, 2013). The current experiment investigates whether the addition of subtle visible markers (a small heart or star mark) can facilitate 36-month-olds' imitation of weight sorting. Children (N=34; M =36.7 months) saw an experimenter sort four objects. In two control groups, a single dimension (weight or the subtle visual cue) distinguished the objects. This was not enough to promote sorting. In contrast, children showed significantly higher sorting scores when both visual and weight cues distinguished the objects, $F(2, 31) = 5.36$, $p = .01$. Thus, with minimal support, even 3-year-olds can imitate a weight-sorting rule, with implications for what modulates imitation.

II.25

STUFF COUNTS: PRESCHOOLERS' USE OF CONTAINERS IN QUANTIFICATION

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The tendency to quantify non-solid substances continuously rather than discretely persists from infancy into preschool years; preschoolers often cannot tell that four cupful of sand is "more sand" than three, although they know four cups is "more cups" than three. Does the acquisition of measure language ("a cup of sand"), which three- and four-year-olds are learning, lead children to appreciate portions as individuals and use containers in quantification? Preschoolers were assessed on their language and ability to use containers for comparing quantities of substances. Use of containers in quantification precedes language acquisition. Furthermore, when containers were highlighted, children's likelihood of using containers in quantification increased despite continual poor performance in comprehending measure phrases.

Therefore, many children who did not grasp measure language were nonetheless able to use containers in quantifying substances. This data shows that the ability to reason about discrete units of substances is not dependent upon language development.

III.70

TEMPORARY ENHANCEMENTS TO CHILDREN'S ANS PRECISION IMPROVE THEIR MATH PERFORMANCE

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Previous research shows a correlation between individual differences in symbolic math performance and people's precision when rapidly and nonverbally estimate numerosities. This is surprising because the Approximate Number System (ANS) underlying nonverbal numerical estimation is shared with infants and non-human animals. However, it remains unclear whether sharper ANS representations actually cause better math performance. To ask whether changes in ANS representations cause changes in math performance, we first replicated the previous finding that 5-year-olds perform in a numerical discrimination task tapping the ANS when their trial order progressed from easier to harder numerical discriminations rather than the reverse. Immediately following, we measured children's performance in either a symbolic math task or a vocabulary task. We found that the changes in 5-year-olds' ANS precision transferred to changes in their symbolic math performance, but not to their performance in the vocabulary task. Our results suggest that enhanced ANS precision improves math performance.

II.12

STAY WITH THE GROUP: OSTRACISM INCREASES IMITATIVE FIDELITY OF IN-GROUP MEMBERS

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Learning ritual is essential not only for participation in group behavior but also for signaling group membership. We propose that imitation of ritual is motivated by affiliative goals. Ostracism was used as a means of increasing affiliative goals within the context of group membership and a ritual task. We predicted that ostracism by in- versus out-group members would have important implications for how ostracism is construed and that this would affect imitation of an in- versus an out-group ritual. We examined children's imitative fidelity of an in- or an out-group ritual after experiencing ostracism from in- or out-group members and found that being ostracized by in-group members resulted in the highest imitative fidelity. Ostracism enhances affiliative motivations and creates a strong impetus to engage in behaviors promoting affiliation with one's group.

I.71

IS A TIPPU A TEPPU? GENERALIZING TALKER-SPECIFIC ACCENTS DURING WORD LEARNING

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How do infants cope with accent variation during word learning? Can they simultaneously learn new words from two speakers whose accents differ? We exposed 10-12-month-olds to words from two speakers whose pronunciations differed in the height of their front vowels. Infants then learned the label for a novel object from one of the speakers ("teppu"). At test, infants saw this object and an untrained object, and heard the two speakers use the label "tippu". Preliminary findings show that, when speaker one says "tippu", infants direct their attention to the untrained object, in keeping with mutual exclusivity. However, when speaker two says "tippu", infants look longer at the trained object. This suggests that infants inferred speaker two's pronunciation of the label, despite not having heard her label that object previously. These findings suggest that young infants can track two speakers' pronunciations simultaneously, and make predictions about the form of unheard words.

IV.14

PARENTAL DISCIPLINARY STRATEGIES, CHILDREN'S SOCIAL BEHAVIOR, AND THEORY OF MIND DEVELOPMENT AMONG LATINO CHILDREN

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The present study investigated relationships among parental disciplinary strategies, socioeconomic status (SES), children's social behavior, and theory of mind development in 88 (43 girls and 45 boys) 3- to 7- year-old Latino children. Children's picture vocabulary and ToM reasoning levels were assessed via established measures in English or Spanish, and their social behavior was measured via observations during free play sessions. Parents completed demographic surveys and a disciplinary questionnaire presenting the parents with five hypothetical, but plausible behavioral transgressions. It was hypothesized that the increased use of verbal disciplinary strategies (and especially among parents who reported that they would discuss the emotional consequences of transgressions), higher family income, and increased social engagement would positively relate to theory of mind reasoning. Contrary to previous findings, there were no significant relations between theory of mind reasoning and SES, but other results supported this hypothesis. Results and implications will be discussed.

II.66

THE INFLUENCE OF PHYSICAL MANIPULATION EXPERIENCE ON CHILDREN'S WORD LEARNING

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According to the embodied cognition perspective, what we understand as properties of concepts depends on our interactions with the environment. In the present study we examined how embodied experiences can affect language processing in childhood by investigating the influence of object interaction on word learning. Five-year-old children were taught labels for novel objects in one of four learning conditions, which varied in the degree of interaction with objects: active interaction, observe interaction, object observation, or object observation with semantic context. Children were then given a recognition task, and preliminary results indicate that actively interacting with objects when taught labels improves word learning, as measured by recognition performance. This finding supports the embodied cognition perspective, and suggests that the sensorimotor experience children gain when interacting with objects becomes associated with the object label, and this information is later simulated when viewing the objects, leading to more accurate word learning.

IV.57

DO LIKE I DO, BE LIKE I AM: RITUALS FOSTER GROUP COHESION IN EARLY CHILDHOOD

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Ritual behavior is pervasive in human cultures, yet little is known about how it affects group dynamics. The current study examines the effect of rituals on children's group behavior and in-group and out-group biases. Prior studies showed children placed in social groups developed a preference for in-group over out-group members (Bigler & Liben, 2007). We use novel social groups to examine the effect of instrumental versus ritual activities on in-group bias by directly investigating the proposal that ritual behavior increases group cohesion (Swann, Jetten, & Gomez, 2012). Children exposed to a repeated group ritual demonstrated greater in-group bias than children who were merely led through free play with novel stimuli. Additionally children exposed to a group ritual who showed greater memory for the way their group performed the ritual showed greater in-group bias. These results are among the first to empirically investigate the impact of performing rituals on group bonding.

III.57

DO YOU HAVE TO EAT THE COOKIE OR COULD YOU CHOOSE NOT TO? THE DEVELOPMENT OF U.S. AND CHINESE CHILDREN'S BELIEFS ABOUT FREE WILL

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Our intuitions about the nature of free will impact our judgments about agency and the causes of behavior. For example, U.S. adults believe that people are in control of their intentional actions and that in the absence of physical constraints, can act however they choose. Little is known about when children come to believe actions are freely chosen, and how variation across cultures is reflected in this development. We explored children's developing concepts of free will by asking U.S. and Chinese 4- and 6-year-olds if they could inhibit or act against their own desires. Overall, U.S. children attributed more agency to people than Chinese children. However 6-year-olds in both cultures believed people have more control over their actions than 4-year-olds did. Results indicate that while there are qualitative cross-cultural differences, children from both cultures follow a similar developmental pattern.

I.61

SELECTIVE SOCIAL LEARNING OF PLANT EDIBILITY IN HUMAN INFANTS

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Recent research underscores the importance of social learning to the development of food preferences. Here we explore whether given the same social information—seeing an adult place something in his mouth—inferences about edibility can be selectively applied to certain entities. Given that humans have relied on gathered plant resources throughout our evolutionary history, coupled with the costs of trial and error learning, we predicted that human infants may possess selective social learning strategies that rapidly identify edible plants. Evidence from studies with 6- and 18-month-olds demonstrates that infants selectively identify plants, but not artifacts, as food sources after seeing the same food-relevant social information applied to both object types. These findings comprise the first evidence for content-specific social learning mechanisms that enable the identification of edible plant resources. Evolved learning mechanisms such as these have enabled humans to survive and thrive in varied and changing environments.

II.68

THYME TO TOUCH: 8- TO 18-MONTH-OLD INFANTS SHOW A RELUCTANCE TO TOUCH PLANTS

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Plants have been central to human life as sources of food and raw materials for artifact construction over evolutionary time. But plants also have chemical and physical defenses (such as harmful toxins and thorns) that provide protection from herbivores. The presence of these defenses has shaped the behavioral strategies of non-human animals. Here we examine whether human infants possess strategies that would serve to protect them from dangers posed by plants. Across two experiments, 8- to 18-month-old infants exhibited greater reluctance to manually explore plants compared to other entities; a behavioral response that would reduce their exposure to plants' noxious chemical and physical defenses. These results expand the growing literature showing that infants are sensitive to certain ancestrally recurrent dangers, and provide a basis for further exploration.

IV.65

THE EFFECT OF INHIBITORY CONTROL ON PRESCHOOLERS' PROSOCIAL BEHAVIOR

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The effect of inhibitory control on prosocial behavior was examined in this research. Prosocial behavior is a complex behavior that consists of a variety of internal and external processes, one such being inhibitory control. However, there is little research on the direct link between inhibitory control and prosocial behavior. If prosocial behavior requires inhibitory control, depleting children's inhibitory control should decrease their ability to behave prosocially. Participants (N = 32, range = 3-5 years) completed both four inhibitory control tasks and four prosocial behavior tasks; half did the inhibitory control tasks first and half did the prosocial tasks first. Results suggest the opposite of the proposed hypothesis: children who completed the inhibitory control tasks first actually demonstrated increased prosocial behavior compared to the control condition. This research provides further understanding for the role of inhibitory control in prosocial behavior and may have implications for encouraging young children to behave prosocially.

III.85

IS MORE ALWAYS BETTER? THE IMPACT OF BACKGROUND INFORMATION ON KNOWLEDGE INTEGRATION IN CHILDREN

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Previous research has demonstrated that children as young as 4 years of age are able to integrate separate learning episodes and derive new knowledge from them. To determine how such knowledge integration may be further facilitated, we examined the ability of 4, 6, and 8-year-olds to integrate separate learning episodes using a story paradigm. Within these learning episodes children were exposed to "target" stories, containing facts that could be integrated, and which the child was asked to self-generate during the test phase. Children were also exposed to additional stories containing facts of the same genre of the "target" stories, but these facts could not be integrated. Preliminary data suggest that providing additional genre related information may not facilitate learning for 4-and 6-year-olds, but by age 8 providing such additional information may facilitate and improve knowledge integration for the "target" facts.

IV.20

DOES EXPOSURE TO NATURAL SCENES RESTORE ATTENTIONAL RESOURCES? AN EXPERIMENTAL INVESTIGATION IN SCHOOL AGE CHILDREN

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In his national bestseller, Last Child in the Woods, Louv (2005) has made a number of claims about the negative effects of children's lack of exposure to nature, including effects on their cognitive processes. Little experimental work has been devoted to testing these claims, although Berman, Jonides, and Kaplan (2008) found some supportive evidence among adults. In the present study, we manipulated children's exposure to natural scenes to determine whether it improves their performance on measures of executive function. Using a within subjects design, eighteen 3rd through 5th graders completed tasks designed to fatigue their attention. In two conditions, they were then shown a 10-minute slideshow of either nature scenes or typical classroom scenes, followed by tests of working memory and response inhibition. A third condition provided no slideshow between tasks. No significant differences were observed to indicate that exposure to natural scenes improved executive function performance under these conditions.

II.63

CHILDREN AND ADULTS' UNDERSTANDING OF INFORMANTS' RELATIVE ACCURACY

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Past research shows that children can distinguish accurate from inaccurate sources of information; children tend to accept and seek new information from previously accurate informants and preferentially ask individuals who have demonstrated ability in the past for help. Less is known about children's ability to distinguish between levels of accuracy. For example, an informant who does not know an object's label, but does know the object's function, is accurate relative to an informant who provides incorrect information. The current study will investigate whether 3- and 4-year-old children will preferentially seek information from someone with incomplete information over someone with inaccurate information. Adults will be tested for comparison. Data collection is in progress. To date, our results suggest 3-year-olds (N = 10) are unable to distinguish partial accuracy from inaccuracy. We expect increasing attention to informants' relative accuracy over development, with older children and adults outperforming their younger peers.

III.44

VOCAL OVERIMITATION IN PRESCHOOL AGE CHILDREN

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Overimitation, the reproduction of irrelevant behaviors or responses, has been studied exclusively in the motor/object domain (Lyons et al., 2007; 2011). An influential hypothesis argues that overimitation is restricted to the artifact domain—a product of distorted causal reasoning. But overimitation may not be limited to artifacts and may extend to other domains such as language. Here we explored whether children overimitate in the vocal domain or distort their pronunciation of common nouns following a demonstration. Experiment 1 (N = 80) evaluated 3- and 4-year olds' pronunciations of two syllable high- and low-frequency nouns. An experimenter pronounced half of the words using a Standard American English accent, the other half was pronounced using a novel accent (i.e., accent on second syllable). If overimitation extends to the vocal domain, imitation should extend to high as well as low frequency nouns. Results showed that children imitated at high rates regardless of noun frequency. Experiment 2 (N = 20) presented children with a picture-naming task where they had to spontaneously and independently name high-frequency common nouns (baseline pronunciation). Once children had identified all nouns, an experimenter pronounced half of the same words with a novel accent and half with a Standard American English accent. Consistent with results in Experiment 1, children distorted their own pronunciation to match that of the model. These results confirm that overimitation is not restricted to the artifact domain and may represent a more general disposition to conform to the behaviors of competent models.

III.65

WHEN FEELING BAD IS GOOD: DEVELOPMENT IN UNDERSTANDING THE SOCIAL SIGNALS OF EMOTIONS

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Two studies examined 4- to 7-year-olds' evaluations of emotional reactions to positive and negative social behaviors. In Study 1, children were presented with a story in which two characters feel opposite emotions (good vs. bad) after sharing a toy with a third character. Children from all age groups liked the character who feels good, predicted she would share again, and want to borrow a toy from her. In Study 2, children made similar judgments about two characters who stole a cake or failed to learn in class. Six- and 7-year-olds liked the character who feels bad afterwards and predicted she would behave positively to compensate (e.g., apologize to the victim or try harder in class), whereas 4- and 5-year-olds favored the character who feels good. These results suggest that preschoolers rely on valence when evaluating emotion. From age 6, children are able to interpret emotions flexibly depending on the context.

III.13

DEVELOPMENT IN THE ABILITY TO LEARNING PERCEPTUAL CAUSALITY

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There is much evidence that infants perceive simple and immediate causal events. However, causes and effects are often separated in space or/and time, although immediate causality is perhaps the most frequent case. This study examines the development of perceiving canonical (or immediate), and non-canonical causal events. Using a Michottian launching paradigm, infants were first habituated to either canonical (immediate launching) or non-canonical (delayed launching) events, and then tested on both canonical and non-canonical events. Results indicate that (1) all training conditions resulted in robust habituation, (2) both younger (6m~9m) and older (10m~24m) infants ably perceived canonical causal events regardless of the training condition, and (3) only older infants generalized trained non-canonical events (delayed launching) to novel non-canonical events (gap launching). Based on the results, we suggest that the concept of causality

changes in the course of learning and that the ability to learn non-canonical causal events also develops.

IV.52

THE EFFECT OF ANALOGY AND ICONICITY ON PRESCHOOLERS' MAP READING

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We investigated the effect of analogical reasoning and iconicity on 3-year-olds' understanding of maps. In study 1, children searched for hidden objects in a miniature room using iconic maps. All children excelled when icons and referents shared both object similarities and spatial locations. However, only children with analogy training succeed when icons and referents occupied the same locations but had different appearances. In study 2, we used abstract maps with circles rather than icons. Children performed worse with abstract than iconic maps; however, children with analogy training outperformed the control group. Together, these studies suggest that object similarity can benefit map learning, when it supports the correct spatial alignment, but may disrupt it when it does not. However, analogy training can help children focus on relational similarities between maps and spaces to improve use of both iconic and abstract maps.

IV.38

INFANTS LEARN WHO IS VALUED BY "EMOTIONAL EAVESDROPPING," WITH CULTURAL DIFFERENCES

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2 studies investigated preverbal infants' use of emotional information to learn others' preferences as third party observers (emotional eavesdropping). Six and 12 month old infants watched videos of animated characters engage in goal-directed actions. Following each action, bystanders observed expressed either positive or negative emotions to convey their differential valuation of the characters. Infants' character choices were significantly influenced by bystanders' emotional reactions. Infants of European descent consistently chose the character whose actions were evaluated positively (binomial probability = .0004). Unexpectedly, infants of East Asian descent showed the opposite pattern: they consistently chose the character whose actions were followed by negative bystander reactions (binomial probability = .0085). This contrast is significant by a Fisher's Exact Test, $p<.001$. Across both studies, results suggest that emotional eavesdropping might be employed for cultural acquisition in infancy. It also documents a novel cultural difference in the influence of distinct emotions on emotional eavesdropping.

I.75

TEMPORAL MOTOR DYNAMICS IN INDUCTIVE REASONING IN TYPICALLY DEVELOPING CHILDREN AND CHILDREN WITH AUTISM SPECTRUM DISORDER

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We investigated the temporal dynamics of response choice in a decision-making task by examining the evolving implicit responses indicated by hand movements made before an explicit response is selected. Participants predicted which of two cars would go faster when the underlying rule was either plausible or implausible, and when two response choices differed with respect to one or two causal variables. In previous research with adults, we found that participants given implausible rules demonstrated less activation of competing representations over time as they induced the underlying rules, particularly on trials in which response choices differed on both causal variables. Mouse trajectories did not change across blocks for participants given the plausible rule, suggesting fast learning. In order to examine typical and atypical development of rule induction, we investigated temporal motor dynamics of typically developing children and children diagnosed with Autism Spectrum Disorder. Preliminary data from these populations are presented.

I.45

MOTOR-SPATIAL DEVELOPMENT IN PRESCHOOLERS: LEARNING GOAL DIRECTED ACTIONS AND GESTURES FROM VIDEO

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Children show age-related changes in the deployment of social learning strategies (e.g., Dickerson et al., 2012; Subiaul et al., 2012), including imitation and emulation (see Want & Harris, 2002 for review). A novel puzzle box task examined the deployment of social learning strategies across the entire preschool age range.

Preschoolers (2.5-5 years) recruited at the National Zoo viewed a video demonstrating how to retrieve a star from a puzzle box using specific tools. The 3-step task is an enabling sequence; that is, step 2 (removing the purple tool) enables step 3 (pushing the inner box compartment with that tool). Following demonstration, children were given the box, and told, "Your turn." Baseline controls did not see the demonstration. At all ages children performed above age-matched baseline controls. Older children imitated demonstrations with greater fidelity than younger children, produced fewer distractor errors, and were less prone to goal emulation.

III.27

PERCEPTION AND INFERENCE AS SOURCES OF KNOWLEDGE IN ONESELF AND OTHERS

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Prior studies using explicit tasks have argued that the ability to identify inference as a knowledge source is a late development. Here, we use implicit tasks to track the development of inference as a knowledge source in oneself and others; we further compare children's ability to use inference vs. perception as knowledge sources. In Experiment 1, 4- and 5- to 6-year-olds used both perception and inference to gain knowledge about events, whereas 3-year-olds only used perception. In Experiment 2, 5- to 6-year-olds understood that both perception and inference function as knowledge sources for others, whereas 4-year-olds did so only for perception. Our results lower prior estimates for the use of inference as a knowledge source compared to previous studies relying on explicit measures. Furthermore, they reveal asymmetries in the development of perception and inference as knowledge source and sources, and between perspectives (self vs. others) in knowledge attribution.