Cognitive Development Society
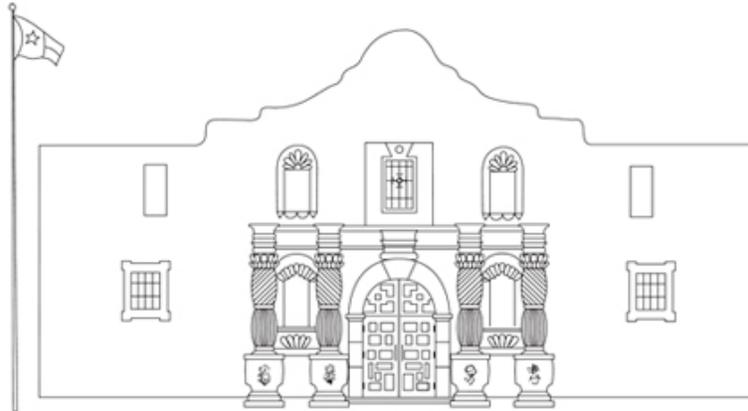# VI Biennial Meeting

October 16-17, 2009
San Antonio, Texas

Cognitive Development Society
VI Biennial Meeting
Meeting Program

Table of Contents

Acknowledgements

The Sixth Biennial Meeting of the Cognitive Development Society would not have been possible without the support of:

Awards, Special Events and Exhibitors

Awards

The CDS Book Award for authored or co-authored volumes is made annually. In 2009, winners for the 2007 and 2008 publication years will be honored.

> Patricia J. Bauer, *Remembering the Times of Our Lives: Memory in Infancy and Beyond* (Lawrence Erlbaum Associates)

> Joan Stiles, *The Fundamentals of Brain Development: Integrating Nature and Nurture* (Harvard University Press)

The *Journal of Cognition and Development* announces "Editor's Choice" awards for 2007 and 2008.

> Camille W. Brune and Amanda L. Woodward (2007). Social Cognition and Social Responsiveness in 10-month-old Infants, *Journal of Cognition and Development (8)*, 133-158.

> Deborah G. Kemler Nelson, Kelly A. O'Neil, and Yvonne M. Asher (2008). A Mutually Facilitative Relationship Between Learning Names and Learning Concepts in Preschool Children: The Case of Artifacts, *Journal of Cognition and Development (9)*, 171-193.

Special Events

Two lunch workshops will be held at CDS.

On Friday, *What's New in Federal Research Funding? The View from NIH and IES* will be held from 12:30 - 2:00 pm in the 3rd floor ballroom (advance registration required). Peggy McCardle, Eunice Shriver Kennedy National Institute for Child Health and Human Development, and Elizabeth Albro, Institute for Education Sciences, will be leading a panel discussion over lunch.

On Saturday, *Burning Questions of the Professoriate: What is the "right" academic job and what does it take to land it?* will be held from 12:15 - 1:45 pm in the 3rd floor ballroom (advance registration required). Organized by the student representatives of CDS, this lunch workshop will feature the following panelists:

Marianella Casasola (Cornell University)	Carol Cheatham (UNC-Chapel Hill)
Jane Childers (Trinity University)	Simona Ghetti (UC-Davis)
Amy Needham (Vanderbilt University)	David Rakison (Carnegie Mellon University)
Steve Reznick (UNC-Chapel Hill)	Laura Schulz (MIT)

Exhibitors

Psychology Press

Oxford University Press

Journal of Cognition and Development

HOTEL SITE LAYOUT

Legend:
- ⓢ ATM
- ☎ Phones
- ⓣ Elevator
- ⓒ Concierge / Bell Stand
- ⓢ Stairs
- Ⓡ Restrooms
- Ⓥ Vending Machine

Laundromat ▶

Coronado Ballroom

Self Parking Lot
(Daily Rates Apply)

Elevators
2 thru 9

Gift Shop

Front Desk

Executive
Offices
(2nd Floor)

Elevators
2 thru 3

Strive Fitness Club
(2nd Floor)

Bolivar: C

Bolivar: B

Bolivar: A

Partagas

Swimming Pool
(2nd Floor)

La Habana

Aviary

R&J Ballroom
(3rd Floor)

Mangos

Expresso

Tiki Bar

Business
Center

Monte Cristo
A & B

Cohiba

Trinidad

River Veranda

San Antonio Riverwalk

El Tropicano
RIVERWALK

Holiday Inn

Schedule for Thursday, October 15

7:00 – 9:00 pm	Welcome Reception in the El Tropicano Lobby

Schedule for Friday, October 16

7:30 - 8:30	Registration in El Tropicano Lobby Continental Breakfast in Coronado Concourse
8:30 - 8:45	Coronado Ballroom Welcome 　　Henry Wellman and Nora Newcombe Presentation of CDS Book and Journal Awards 　　Susan Gelman and Patricia Bauer
8:45 - 9:45	Coronado Ballroom Plenary Talk – *Collaboration and Communication in the Second Year of Life* 　　Michael Tomasello
9:45 - 10:15	Coffee break
10:15 - 12:30	Coronado Ballroom Plenary Symposium – *Bilingualism: Cognitive Development from the Perspective of Acquiring Multiple Languages (*Organizer: Henry Wellman) 　　Presenters: Ellen Bialystok, Diane August, Agnes Kovacs, and Peggy McCardle
12:30 - 2:00	Lunch on your own or Lunch workshop in R&J Ballroom (3rd floor)*: What's New in Federal Research Funding? The View from NIH and IES* (advance registration required*)* 　　Peggy McCardle, Eunice Kennedy Shriver NICHD and Elizabeth Albro, IES
2:00 - 3:45	<u>Three concurrent symposia</u> Monte Cristo Room: *Causal learning and social cognition: The McDonnell Causal Learning Collaborative* (Organizer: Alison Gopnik) 　　Presenters: Andrew Meltzoff, Alison Gopnik, Susan Gelman, James Woodward Trinidad Room: *The role of action in the development of object perception* (Organizer: Sandra Y. Street) 　　Presenters: Dima Amso, Jeffrey J. Lockman, Sandra Y. Street, Karin James Coronado Room: *Interplay between language development and cognitive control processes* (Organizer: Sarah Creel) 　　Presenters: Anna E. Holt, John C. Trueswell, Sarah Creel, J. Bruce Morton

Schedule for Friday, October 16 (continued)

4:00 – 5:45	Three concurrent symposia
	Monte Cristo Room: *Phylogenetic and ontogenetic consequences of group membership for intergroup cognition* (Organizers: Kiley Hamlin & Andrew Scott Baron) Presenters: Dario Cvencek, Andrew Scott Baron, Marjorie Rhodes, Kiley Hamlin, Neha Mahajan
	Trinidad Room: *Religious thinking: The development and influence of religious concepts on cognition* (Organizer: Erin Smith) Presenters: Jacqueline Woolley, Jonathan D. Lane, Erin Smith, Maira Roazzi, Paul L. Harris
	Coronado Room: *The development of ownership: Looking across ages, species, cultures, and domains* (Organizer: Ori Friedman) Presenters: Ori Friedman, Alex Shaw, Philippe Rochat, Sarah F. Brosnan, Michael Tomasello
	Alternate Poster Session A in La Habana
6:15 - 7:45	La Habana and Bolivar Poster Session I

Schedule for Saturday, October 17

7:30 - 8:30	Registration in El Tropicano Lobby Continental Breakfast in Coronado Concourse
8:30 - 9:30	Coronado Ballroom Plenary Talk – *Bayesian Models in Cognitive Development* Josh Tenenbaum
9:30 - 10:00	Coffee break in Coronado Concourse
10:00 - 12:15	Coronado Ballroom Plenary Symposium – *Making Cognitive Development Research Relevant in the Classroom* (Organizer: Nora Newcombe) Presenters: Elizabeth Albro, Julie Booth, Susan Levine, Christine Massey
12:15 - 1:45	Lunch on your own or Lunch workshop in R&J Ballroom (3rd floor)*: Burning Questions of the Professoriate: What is the "right" academic job and what does it take to land it?* (Advance registration required)

|	
1:45 – 3:30	<u>Three concurrent symposia</u> Monte Cristo Room: *Learning from others: The scope of epistemic trust* (Organizers: Cagla Aydin & Tamar Kushnir) Presenters: Patricia Brosseau-Liard & Susan A. J. Birch, Stanka Fitneva, Tamar Kushnir, Cagla Aydin, Melissa Koenig Trinidad Room: *Mechanisms of learning from multiple exemplars: Alignment and explanation* (Organizer: Stella Christie) Presenters: Marianella Casasola, Stella Christie, Jill Lany, Su-hua Wang, Dedre Gentner Coronado Room: *Neural and behavioral origins of mathematics* (Organizer: Koleen McCrink) Presenters: Daniel Ansari, Jessica Cantlon, Daniel Hyde, Kerry Jordan, Koleen McCrink, Susan Carey
3:45 – 5:30	<u>Three concurrent symposia</u> Monte Cristo Room: *Inference in a social context: What social and non-social reasoning have to teach each other* (Organizer: Laura Schulz) Presenters: Emily Blumenthal & Jung-eun Yun, Lili Ma, Kathleen Sullivan, Claire Cook Trinidad Room: *Creationism is not the (only) issue: Developmental constraints on an understanding of evolution* (Organizer: E. Margaret Evans) Presenters: Andrew Shtulman, Deborah Kelemen, Camillia F. Matuk, E. Margaret Evans, Karl Rosengren Coronado Room: *Understanding knowledge change: Investigations on how children learn mathematics and literacy skills* (Organizer: Bethany Rittle-Johnson) Presenters: Martha Alibali, Philip Kellman, David Uttal, Bethany Rittle-Johnson, Mitchell Nathan <u>Alternate Poster Session B in La Habana</u>
6:00 - 7:30	La Habana and Bolivar Poster Session II

JOURNAL OF COGNITION AND DEVELOPMENT
Official Journal of the Cognitive Development Society
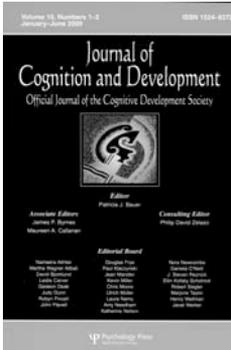
> **2008 Impact Factor: 1.106**
> Ranking: 55th out of 71 journals in Experimental Psychology (Social Science), Experimental and 39th out of 55 journals in Developmental Psychology (Social Science).
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The Cognitive Development Society
(http://www.cogdevsoc.org/index.html)

Your Subscription is a Benefit of Society Membership!

The **Cognitive Development Society (CDS)** was incorporated in September 1999 in order to provide a unified voice for the wide range of scholars, practitioners, and others who are interested in change and continuity in the intellectual processes that support mental life.

Some **CDS** members are concerned with basic research or theory; others focus on policy issues and practical applications. There is thorough coverage on cognitive development during all stages of life, and the ontogenetic processes in both humans and nonhumans. Interests also encompass typical as well as atypical development, and **CDS** society members attempt to characterize both biological and cultural influences on cognitive change and continuity.

The **Cognitive Development Society** has selected the **Journal of Cognition and Development** as its official journal. The relation is symbiotic in that the journal enhances the field of cognitive development by providing a prestigious forum for innovative research and theory.

Enter your **Society** membership by visiting the website at:
http://www.cogdevsoc.org/index.html

Poster Session I: Friday, October 16, 6:15 to 7:45 pm

1. Children's Attribution of Perspectives and Emotions to Story Characters and its Relation to Narrative Ability - *Naomi J. Aldrich, Patricia J. Brooks, Jennie Sines, Harriet R. Tenenbaum*

2. How Teachers Talk: Revoicing and Children's Emerging Understanding of Symmetry - *Marnie Arkenberg, James G. Greeno, Brian MacWhinney*

3. Categorization of Infant-Directed Speech: Processing Asynchronous Audio-Visual Speech - *Kristin Kuhlman Atchison, Kate Georgelas Shepard, Melanie J. Spence*

4. Storytelling and Ownership: Children's Conceptions of Intellectual Property - *Jennifer Barnes, Kristina Olson*

5. Cognitive Dissonance in Birds - *Tamra Beckman, Jennifer Vonk, Stephanie Jett*

6. Developmental Increases in Cognitive Flexibility during Middle Childhood - *Allison Bock, Alycia Hund*

7. Maternal Elaboration and Behavioral Direction during Reminiscing - *Jennifer Bohanek, Amy Hedrick, Lynne Baker-Ward*

8. The Impact of Pedagogy on Infants' Understanding of a Tool Use Sequence - *Kara Braun, Dare Baldwin*

9. Preschool Engineers?: Young Children Coordinate Material and Design Properties to Judge Functional Capacities - *Kimberly Brenneman, Rochel Gelman, Jamie Liberti, Zipora Roth, Christine Massey*

10. The Time-course of New Word Learning in Children - *Helen Brown, Gareth Gaskell*

11. Eleven-month-olds Anticipate Goals - *Erin Cannon*

12. Cross-linguistic Differences in English-, German-, and Korean-learning Infants' Categorization of Support Relations - *Marianella Casasola, Soonja Choi, Katharina Rohlfing, Silke Fischer, Youjeong Park, Cheryl Downs, Juyoun Pyoun*

13. Individual Differences in Children's Prospective Memory Performance: Qualitative Change Matters - *Kayla Causey, David F. Bjorklund*

14. Linguistic Cues to Conventionality at 14 Months - *Marian Chen, Sandra Waxman*

15. Sesame Street: Science Learning in the Museum - *Isabelle Cherney, Samantha Brown, Maren Hankey*

16. Preschoolers' Free Will Understanding - *Nadia Chernyak, Tamar Kushnir*

17. Progressive Alignment and the Comparison of Events in Verb Learning - *Jane Childers, Amy Hirshkowitz, Laure Saint Georges, Kristin Benavides*

18. The Impact of Generic vs. Non-generic Language on Children's Motivation - *Andrei Cimpian*

19. The Role of Testimony in Children's Understanding of Historical and Fictional Figures - *Kathleen Corriveau, Angie Kim, Paul Harris*

20. Children's and Adults' Scientific Reasoning about Food Allergy - *Steve Croker, Rebecca C. Knibb*

21. The Relationship between Theory of Mind, Categorization, and Understanding the Division of Cognitive Labor - *Judith Danovitch*

22. Developmental Changes in Children's Essentialist Beliefs about Language and Race - *Jocelyn B. Dautel, Katherine D. Kinzler*

23. Foundations of Analogical Reasoning: Do 7- and 9-Month-Old Infants Understand the Abstract 'Same' and 'Different' Relations - *Alissa Ferry, Susan Hespos*

24. It Could Taste Like Candy: Maternal Strategies Used to Encourage Children to Eat Familiar and Unfamiliar Vegetables - *Brandy N. Frazier, Julie C. Lumeng*

25. Measuring Mental Rotation in 4-year-olds Using a Nonverbal Touch Screen Paradigm - *Andrea Frick, Nora Newcombe*

26. Children's Participation in Sustainable Community Practices in Rural Uganda - *Mary Gauvain, Heidi Beebe*

27. Finding the Goals that Structure Events - *Sarah A. Gerson, Lauren H. Shuck, Amanda L. Woodward*

28. The Role of Explanations in Children's Judgments about Improbable and Impossible Events - *Maliki Ghossainy, Jacqueline D. Woolley*

29. Categorization of Grounds in Dynamic Events - *Tilbe Goksun, Stacey Austin, Kathy Hirsh-Pasek, Sarah Roseberry, Roberta M. Golinkoff*

30. An Investigation of Recollection and Familiarity in Early Childhood - *Meghan Graham, Tracy Riggins*

31. Autobiographical Memory in Individuals with Child Abuse Histories: Links to Executive Function and Emotion Regulation - *Andrea Follmer Greenhoot, Sarah L. Bunnell*

32. The Potential Benefits of Speaking More Than One Language on Non-Linguistic Cognitive Development - *Kandice Soraya Grote*

33. Some Types of Parent Number Talk Count More Than Others - *Elizabeth A. Gunderson, Susan C. Levine*

34. Mothers' Use of Relative Proximity in Communicating about Location to Young Children - *Kathryn Haggerty, Jodie Plumert*

35. Does Inquiry Learning Foster Creativity? - *Christy Hedlund, Sarah Handal, Joseph Bond, K. H. Grobman*

36. Linking Talk during Events to Children's Consistency in Recall over Time - *Amy Hedrick, Priscilla San Souci, Amanda Jones, Catherine Haden, Peter Ornstein*

37. A Developmental Study of Science Learning: Comparing 4th and 7th Grade Children and Their Teachers - *Marc W. Hernandez, Nancy L. Stein, Florencia K. Anggoro*

38. Studies of Infant Cognition Using the Continuous Novelty Preference Task - *Karinna Hurley, Heidi Baumgartner, Lisa Oakes*

39. Who Do Children Ask for Information? Parents vs. Strangers and Siblings - *Kristi Imberi-Olivares*

40. Planning during a Fitting Task - *Wendy P. Jung, Bjorn Alexander Kahrs*

41. Cross-modal Recognition of Shape in Toddlers - *Hilary Kalagher, Chasity Kern, Susan S. Jones*

42. When Do Children Learn Conditional Probabilities? - *Charles Kalish, Andrew Young, Sunae Kim*

43. Narrative Elaboration and Suggestibility in a Diverse Preschool Sample - *Sarah Kulkofsky, Rachel Barnhart, Jennifer L. Richardson*

44. Preschoolers' Strategy Adoption Patterns in a Logical Selection Task: Evidence for a Matching Bias - *Matthew Lancaster, Susan Somerville*

45. Linking Children's Earliest Memories and Maternal Reminiscing Style - *Marina Larkina, Natalie Merrill, Robyn Fivush, Patricia J. Bauer*

46. Quantification and Arithmetic: How Are They Related? - *Jo-Anne LeFevre, Brenda Smith-Chant, Lisa Fast, Deepthi Kamawar, Jeffrey Bisanz, Sheri-Lynn Skwarchuk, Marcie Penner-Wilger*

47. A Link between Perspective-Taking and Body-Matching in Preschoolers - *Sarah Lopez-Duran*

48. Development of the Featural/Configural Distinction in Human Action Discrimination - *Jeff Loucks, Dare Baldwin*

49. Is Regularity a Cue to Intentionality? Infants' Use of Statistical Evidence in Agency Attribution - *Lili Ma, Fei Xu*

50. How Should My Ingroup Behave? 12-month-olds' Expectations about the Social Behaviors of Ingroup and Outgroup Members - *Neha Mahajan, Kiley Hamlin, Karen Wynn*

51. Teachers' Difficulties at Promoting Text Processing by Kindergarten Children - *Maria Soledad Manrique, Ana M. Borzone*

52. Understanding Language Conventions: The Role of Exposure to Multiple Languages - *Jennifer Menjivar, Nameera Akhtar, Elena Hoicka, Mark Sabbagh*

53. Executive Functions and Theory-of-Mind among Deaf Children: Different Routes to Understanding Other Minds? - *Marek Meristo, Erland Hjelmquist*

54. Wait a Second: Using Toddler's Response Times as a Measure of Reflection on an EF Task - *Stephanie Miller, Stuart Marcovitch*

55. When and How Are Symbols Transparent in Meaning? - *Lauren Myers*

56. Competence and Performance in Children's Appreciation of Ownership Transfers - *Karen Neary, Ori Friedman*

57. Do Children Consider Listener Knowledge When Interpreting Verbal Irony? - *Elizabeth Nilsen, Melanie Glenwright, Vanessa Huyder*

58. Visual Perspective-Taking Difficulties in Non-clinical Adults Higher in Autistic Traits - *Tasha Oswald*

59. Linguistic Mediation of Young Children's Symbolic Understanding in a Modified DeLoache Model Task - *Natalya Petroff, Elizabeth O. Hayward, Bruce D. Homer*

60. Infants Understand that False Beliefs Can Be Corrected by Perception - *Diane Poulin-Dubois, Alexandra Polonia*

61. Children's Natural Conversations Following Exposure to a Rumor: Linkages to Later False Reports - *Gabrielle Principe, Julie DiPuppo, Jessie Gammel, Stephanie Guiliano*

62. Mother Knows Best! The Role of Parent Input in Children's Spatial Language Development - *Shannon Pruden, Susan C. Levine, Janellen Huttenlocher*

63. Where Do We Come From? Representations of Sources in Infants' Event Representations - *Rachel Reardon, Laura Lakusta, Paul Muentener, Susan Carey*

64. Measuring Infants' Learning through Anticipatory Eye Movements - *Alexa Romberg, Hannah Wendel, Jenny Saffran*

65. Children's Talk about Future Events. A Study in Marginalized Urban Commmunities of Buenos Aires, Argentina - *Celia Renata Rosemberg, Alejandra Stein, Maria Luisa Silva*

66. Hierarchical Chunking in 13-month-old Infants Increases Working Memory Capacity - *Rebecca D. Rosenberg, Lisa Feigenson*

67. Variability in Infant Visual Orienting: A Dynamic Field Account of the IOWA Task - *Shannon Ross-Sheehy, John P. Spencer*

68. Measuring Vocabulary Sophistication from Parent-Child Interaction - *Meredith Rowe, Jason Voigt, Max Masich*

69. Electrophysiological Indices of Memories for Emotional Events among Children and Adults - *Priscilla San Souci, Patricia J. Bauer*

70. Group Bias, Statistical Reasoning, and Social Judgments - *Mariah Schug, Anna Shusterman, Hilary Barth, A. Patalano, E. Herrig, K. MacDonald*

71. Children as Philosophers: Differing Conceptualizations of Free Will at Ages 4 and 6 - *Elizabeth Seiver, Tamar Kushnir*

72. Parent-Child Interactions with Artifacts in Everyday Activities - *Deborah R. Siegel*

73. Infant and Adult Face Discrimination Beyond Primates: Perceptual Narrowing of Facial Identity - *Elizabeth Simpson, Krisztina Varga, Janet Frick, Dorothy Fragaszy*

74. Children's Use of Perceptual and Conceptual Information in Three Inferential Tasks - *Clare Sims, Eliana Colunga*

75. The Pretend-Reality Boundary: Thinking Outside the Box - *Eric Smith, Angeline Lillard*

76. Evidence from the Supernatural: How People Evaluate Non-Scientific Explanations - *Andre Souza, Cristine Legare*

77. Toddlers' Word Learning from an Interactive-style Video Presentation - *Gabrielle Strouse, Georgene Troseth*

78. The Effects of Cue Availability and Frequency on Cross-Situational Word Learning - *Sumarga Suanda, Nassali Mugwanya, Laura L. Namy*

79. Cognitive Underpinnings of Preschoolers' Ability to Learn from Others - *Jennifer M. Tamargo, M. Jeffrey Farrar*

80. Cultural Variability in Early Executive Function Task Performances - *Duc Tran, Maria Arredondo, Hanako Yoshida*

81. Trusting Trickers: Young Children Are Blinded by the Prize - *Kimberly Vanderbilt, Gail Heyman, David Liu*

82. Investigating Childrens' Essentialist Beliefs in the Context of the Digital Age: The Case of Artificial Life - *Caren Walker*

83. Failure on Equivalence Problems Is Not Universal - *Rebecca Watchorn, Menglung Lai, Jeffrey Bisanz*

84. Relations between Life Story Episodes and Attachment Security - *Theodore Waters, Arica Austin, Harriet Waters*

85. Theory of Mind and Emotion Understanding among Bilingual Children - *Amy Weimer, Cheryl Barton, Katrina Meza, Cynthia Valenzuela, Jessica Sims, Andrea Fernandez*

86. Facilitative Effects of Pretend Play on Inhibitory Control in Young Children - *Rachel E. White, Stephanie M. Carlson*

87. Parent-Child Conversations about Objects and Museum-Based Learning - *Erin Wilkerson, Catherine Haden, David Uttal, Caroline Crouch, Nathaniel G. Meadow, Iris Chin*

88. Chunking Increases Working Memory Capacity in 7 Month-old Infants - *Mariko Yamaguchi, Arin Tuerk*

89. Infants' Learning about Motion Events with Multiple Dynamic Correlations: Behavioral and Simulation Findings - *Yevdokiya Yermolayeva, David H. Rakison*

90. Bilingual Children's Integration of Multiple Cues to Understand Referential Intent - *W. Quin Yow, Ellen M. Markman*

Poster Session II: Saturday, October 17, 6:00 to 7:30 pm

1. Overhypothesis Formation in Young Children's Learning - *Maxim Abelev, You-bin Park, Fei Xu*

2. Preschoolers' Emotional Memory in the Context of Close Relationships - *Kristen Weede Alexander, Heidi Bortfeld*

3. Think Before You Read: When Reading Helps or Hinders Science Learning - *Florencia K. Anggoro, Nancy L. Stein, Marc W. Hernandez*

4. When X Doesn't Mark the Spot: Children's Understanding of the Representational Nature of Maps - *Andrea Astle, Corrie Vendetti, Erin Jansman, Gal Podjarny, Deepthi Kamawar*

5. Face Discrimination in Preschool-Aged Children - *Lorraine E. Bahrick, Melissa A. Argumosa, Hassel Lopez, James T. Todd*

6. Entrenched Folk Physical Beliefs Held by Typically Developing Children and Children with Autism - *Sara Baker, Kim Murray, Bruce Hood*

7. Children's Memory for a Dental Procedure: The Impact of Stress and Coping on Remembering - *Lynne Baker-Ward, Peter A. Ornstein, Rocio Quinonez, Michael Milano, Hillary Langley, Seungjin Lee*

8. Early Arbitrary Object Memory in Toddlers May Set the Stage for Episodic Memory - *Frances Balcomb, Nora S. Newcombe, Katrina Ferrara, Jule Grant, Sarah M. Hittinger*

9. Developmental Continuity in Numerical Estimation - *Hilary Barth, Annie Paladino, Jessica Sullivan*

10. Gesture and Moral Development - *Leanne Beaudoin, David Walsh, Jennifer Olsen, Bianca Frusa, Laura Pacheco, Susan Goldin-Meadow*

11. Perceptual-Motor Task Demands Affect Young Children's Ability to Inhibit - *Sarah Berger*

12. Stop One Thing or Stop Everything: Developmental Trade-offs in Global vs. Selective Inhibition - *Katharine A. Blackwell, Nicholas J. Cepeda, Yuko Munakata*

13. Children's Belief in a Novel Non-Holiday-Related Fantasy Figure - *Elizabeth Boerger*

14. The Relation of Magnitude Acuity to Mathematical Ability in Young Children - *Justin W. Bonny, Stella F. Lourenco*

15. Children's Interpretive Theory of Mind and Self-Perceptions: Age and Gender Differences - *Sandra Bosacki, Janet J. Boseovski, Candace C. LaPan*

16. Neural Correlates of Children's Belief- and Desire-Reasoning: An ERP Study - *Lindsay Bowman, David Liu, Henry Wellman*

17. Concepts of Ignorance and False Belief in 15-Month-Old Infants - *Amanda C. Brandone, Henry M. Wellman*

18. Infants' Small Number Discrimination: The Role of Featural Information - *Caitlin Brez, Leslie B. Cohen*

19. Effects of Eye Gaze on Imitative Grasping Behaviour in Children and Adults - *Sonja Brubacher, Kim Roberts*

20. The Influence of Pedagogical and Statistical Cues on Children's Imitation of Causal Action Sequences - *Daphna Buchsbaum, Thomas Griffiths, Alison Gopnik, Kimberly Yung*

21. Exploring Relations between Maternal Book Talk and Children's Temperament - *Melissa Burch*

22. The Role of Visual Cues in 3-year-olds' Rule-Representation in the Dimensional Change Card Sort Task - *Aaron Buss, John Spencer*

23. Students' Attitudes toward Science: Does Change Predict Behavior? - *Elizabeth Carey, Lisa Szechter*

24. The Attentional Basis of Deontic and Moral Reasoning in Social Situations - *Kayla Causey*

25. Children's Trust in Testimony: The Roles of Prior Knowledge and Epistemic Authority - *Cheri Chan, Katherine Roessler, Twila Tardif*

26. Preschoolers Use of Live and Televised Individuals as Sources of Information about the Real World - *Laura Claxton, Katelyn Ponto*

27. A Friend Who Knows What to Do: How Competency and Helpfulness Influence Young Children's Help-seeking Behavior - *Annette L. Cluver, Leslie J. Carver, Gail Heyman*

28. Benefits of "Concreteness Fading" for Children with Low Knowledge of Mathematical Equivalence - *Emily Conrad, Nicole McNeil*

29. Psychological and Deontic Concepts in Children's Understanding of Promising - *Sabine Doebel, Janet Wilde Astington*

30. Do Children Gifted in Realistic Drawing Share Perceptual and Personality Traits with Individuals with Autism? - *Jennifer Drake*

31. The Relative Contributions of Physical Attractiveness and Prosocial Behavior in Preschool Friendship Choices - *Sarah Edelman, Anna Shusterman*

32. Working Memory and Language: A Longitudinal Study of Trilingual Children - *Pascale Engel*

33. A Bigger, Better Test of Belief - *William Fabricius, Amy Weimer, Kathleen Carroll*

34. Social Behavior and Object-Related Gestures in Infants with Cochlear Implants - *Mary Fagan*

35. The Effects of Social Interaction on Word-Object Association - *Laurel Fais, Stephanie Helm, Janet Werker*

36. Positive and Negative Testing Effects in 1st and 3rd Graders - *Lisa Fazio, Elizabeth Marsh*

37. Patterns of Parent-Infant DVD Co-viewing - *Jodi Fender*

38. Germs, Mermaids, and God: Parent-Child Conversations about Absent and Invisible Entities - *Caitlin Ford*

39. Is a Knife a Boy or a Girl? How Grammatical Gender in French Influences Bilingual Children's Conceptualizations in English - *Cassandra Foursha-Stevenson, Elena Nicoladis, Mary-Anne Craft*

40. Children Use Intentionality to Infer Causation in an Imitation Task - *Amy Gardiner, Marissa Greif*

41. The Impact of Instructional Activities on Children's Developing Memory Skills - *Jennie K. Grammer, Jennifer L. Coffman, Peter A. Ornstein*

42. Children's Fiction Preferences - *Lily Guillot, Kristina Olson, Paul Bloom*

43. The Effects of Elaboration and Rehearsal Strategies on Source Monitoring in 4-year-old Children - *Suzanne Hala, Lee Ann McKay, Valerie San Juan*

44. Making Connections: Activating Students' Prior Knowledge during a New Lesson - *Shanta Hattikudur, Pooja G. Sidney, Martha W. Alibali*

45. Comparing Elicited and Spontaneous Imitation among Children with Autism Spectrum Disorder and Down Syndrome - *Mikael Heimann, Josephine Connant, Tomas Tjus*

46. How Teachers Link Mathematical Ideas in Classroom Instruction - *Steven A. Jacobs, Chelsea Johnson, Suyeon Kim, Matthew Wolfgram, R. Breckinridge Church, Martha W. Alibali*

47. Students' and Teachers' Mental Models of Viruses - *Benjamin D. Jee, David H. Uttal, Amy Spiegel, Judy Diamond*

48. The Effects of Distraction and Task Complexity on Preschoolers' Attention and Performance - *Kathleen Kannass, Nancy Wyss, Meghan Cole, William Fayen*

49. Ignorance Is Bliss for 3-Year-Olds - *Robyn Kondrad, Vikram Jaswal*

50. Children's Assessment of Reliability Influences Willingness to Learn Second Labels - *Sheila Krogh-Jespersen, Catharine H. Echols*

51. The Influence of Children's Interest on Mothers' Art-related Conversations in a Museum - *Che-yu Kuo, Joyce Alexander, Kathy Johnson, Babara Wolf*

52. Object Talk and Movement in Child-Directed Speech - *Mariel Kyger, Catherine Sandhofer*

53. Forgetting Common Ground: Six- to Seven-Year-Olds Have an Over-interpretive Theory of Mind - *Kristin Lagattuta, Liat Sayfan*

54. Children's Knowledge of Various Dialects of English - *Laura Wagner, John Pate, Cynthia Clopper*

55. Neural Response to Reasoning about Mental States - *David Liu, Annette L. Cluver, Kimberly E. Vanderbilt*

56. Do 10-month-old Infants Understand Others' False Beliefs? - *Yuyan Luo*

57. The Origins of Intergroup Processing: Exploring the Consequences of Social Groupings in Primates - *Neha Mahajan, Natashya L. Gutierrez, Gil Diesendruck, Laurie R. Santos*

58. What's the Rule? The Development of Functional Thinking in Elementary School - *Katherine McEldoon*

59. A Close Link between Production and Perception of Reaching Movements at 12 Months of Age - *Anne Melzer, Moritz M. Daum, Wolfgang Prinz*

60. Children's Processing of Action Boundaries - *Meredith Meyer, Bridgette Hard, Dare Baldwin*

61. Problem Solving in Preschoolers: Learning from Listening to Others Ask and Answer Questions - *Candice Mills, Judith Danovitch, Meridith Grant, Fadwa Elashi*

62. Computational Models of Connective Acquisition - *Bradley Morris*

63. Detection of Angry Faces Predicts Attentional Bias towards Affective Faces - *S. Katherine Nelson, Claire E. Cole, Koraly Perez-Edgar, Daniel J. Zapp, Vanessa LoBue*

64. The Relation between Understanding of Identity Statements and False Belief - *Thien-Kim Nguyen, Josef Perner*

65. Executive Functioning and Temperament in Infants with a Family History of ADHD - *Julia Noland, Bahr Weiss, Amber Vinson, Carol Whaling, Shannon Morgan*

66. Absent Reference Comprehension in 12-month-old Infants - *Maria Osina, Megan Saylor, Patricia Ganea*

67. Getting to the Point: Young Children Have Difficulty Inhibiting Expectations about Pointing Gestures - *Carolyn M. Palmquist, Heather E. Burns, Vikram K. Jaswal*

68. Episodic and Autobiographical Memory: Comparing Recognition in a Photo Paradigm Using ERP - *Thanujeni Pathman, Zoe Samson, Kevin Dugas, Patricia Bauer*

69. Young Children's Theory of Personality: Person or Situation Attributions? - *Jamie Lee Peterson, Janet Boseovski*

70. Children's and Adults' Understanding of the Impact of Nutrition on Growth and Mood States - *Lakshmi Raman*

71. Teaching Children Where They Learned Information: A Test of Two Techniques - *Justine Renner, Kim P. Roberts*

72. Transitive Inferences Revisited: Can Preschoolers Make Congruent Guesses about Arbitrary Correlations? - *Sarah Schwind, Heidi Kloos*

73. Specificity in Children's Memory for Negative Social Information - *Nicole Baltazar, Kristin Shutts, Katherine Kinzler*

74. The Effects of Relational Language and Executive Control on Children's Analogical Ability - *Nina Simms, Dedre Gentner*

75. Emerging Executive Functions in Preschoolers - *Mary Skinner, Fran Blumberg*

76. Preschoolers Focus on Harm, Not Just Emotions, in Their Moral Judgments - *Deena Skolnick Weisberg, Alan M. Leslie*

77. Gender Differences in Sustaining Interests in Science and Math - *Nancy L. Stein, Marc W. Hernandez, Florencia K. Anggoro*

78. Children's Trust in Different Sources of Information - *Medha Tare, Vikram Jaswal, Judy DeLoache, Kathleen Hudson*

79. How Children Learn to Form Supra-ordinate Categories: A Training Study - *Andrea Taverna, Olga Peralta*

80. Social Cognition during the Transition between Infancy and Preschool - *Joan Test*

81. Developmental Differences in Memory for Events Observed from Different Media - *Karen Thierry*

82. Mechanisms for Overcoming Reality Status Biases - *Ansley Tullos*

83. Sex Effects, Age Effects, and Malleability in Spatial Navigation - *Alexandra D. Twyman, Nora S. Newcombe, Thomas J. Gould*

84. Storytelling and Gesture Practices Support Cultural Differences in Folkbiological Thinking - *Sara Unsworth, Wallis Levin*

85. The Influence of Learning about Causal vs. Non-Causal Relations between Shape and Function on Children's Categorization - *Elizabeth Ware, Amy Booth*

86. Relation between Children's Spatial Working Memory Performance and Attention Behaviors in Everyday Contexts - *Megan Willer, Anne Schutte, Sandra Wiebe, Margaret Ortmann, Heidi Fleharty*

87. A Question of Flexibility: Children's Cross-Classification and Gender Stereotyping - *Tess Young, Ashley Noble, Jamie Chaffman, Helana Girgis, Simone Nguyen*

88. Similarities between Adolescents' and Mothers' Autobiographical Narratives - *Widaad Zaman, Theodore Waters, Robyn Fivush*

89. Teaching through Gesture: The Effects of Training on False Belief Tasks - *Sarah Zelonis, Amy Franklin*

90. Capturing U-shaped Developmental Patterns in Spatial Bias with Dynamic Field Theory - *Christine Ziemer, Aaron Buss, John Spencer, Jodie Plumert*

Alternate Poster Session A: Friday, October 16, 4:00 – 5:45 pm

1. Young Children's Word-Learning in Pretend Contexts - *Margaret Altschaefl*
2. Investigating the Relationship between Language and Landmark Use - *Amber Ankowski, Emily Thom, Aaron Blaisdell, Catherine Sandhofer*
3. The Role of Conversational Questions in Children's Vocabulary Learning - *Marnie Arkenberg, Brain MacWhinney*
4. Communication and Inhibition in Children with and without ADHD - *Kristi Baerg, Elizabeth Nilsen*
5. The Role of Testimony in Solving a Gravity-driven Invisible Displacement Task - *Igor Bascandziev, Paul L. Harris*
6. One Trial Learning in 16-Month-Olds - *Viridiana Benitez, Linda B. Smith*
7. Story Time: The Dynamic Organization of New Cognitive Structures - *Rebecca Boncoddo, Caitlin Sleight, Lara Shearer, James A. Dixon*
9. Pulling out the Data: Adult Framing Helps Children Extract Causal Evidence Embedded in a Complex Scene - *Lucas P. Butler, Ellen M. Markman*
10. Cross-Cultural Differences in Age of Earliest Memories in the Swahili and Maasai of Kenya - *Elizabeth Calkins, Kelly Snyder*
11. Development of Memory for Object-in-Place Association - *Yen-chen Chang, Kelly Snyder, Anna Kresse*
12. Young Children Use Self-performed Actions to Organize Memory - *Naomi Chatley, Stuart Marcovitch, Lili Sahakyan*
13. Concurrent Statistical Learning of Words and Categories in Preschool Children - *Chi-hsin Chen, Chen Yu, Lisa Gershkoff-Stowe*
14. Relationship between Inhibitory Control and Drawing Development in Preschool Children - *Sarah Conway*
15. A Computational Model of Infant's Acquisition of Physical Knowledge - *Lewis Fishgold, Benjamin Kuipers, Dana Ballard*
16. Conversations with Parrots: The Effect of the Vocalizing Source on Speech Perception in Infants and Adults - *Hanna Gelfand, Athena Vouloumanos*
17. Does Social Interaction Facilitate Learning from Video? - *Elizabeth Goldenberg, Georgene Troseth, Kate O'Doherty, Priya Shimpi, Nameera Akhtar, Megan Saylor*
18. The Development of Numerosity Concepts: Language's Role in Number Knowledge - *Kelli Gross*
19. Children's Ability to Override Personal Taste and Source Knowledge in Evaluating Works of Art - *Angelina Hawley, Ellen Winner*
20. How Do Preschoolers Understand Invisible Agents? As Absent, Hypothetical, Small or Invisible ? - *Florian Kiessling, Yvan Russell, Josef Perner*
21. The Relationships among False Belief, Emotion, Language, and Social Behavior in Four- and Five-Year-Old Children - *Kyung-A Kim, Hyeonjin Lee, Eun-Yeong Gwon*
22. Children Do Learn from Non-credible Informants - *Sunae Kim, Charles Kalish*
23. Do 11 Month Old Infants Understand that Pointing Can Communicate Information about Objects? - *Madelaine Krehm, Kristine H. Onishi, Athena Vouloumanos*
24. Just the Facts or Just for Fun: Children's Understanding of and Sensitivity to Memory Sharing Contexts - *Sarah Kulkofsky, Gabrielle F. Principe, Francisco B. Debaran*
25. Preschoolers Know When It's Not the Right Answer: Performance on a Modified Version of Piaget's Hidden-Figure Task - *Matthew Lancaster, Susan Somerville*
26. Do Korean Children Use Morphological Cues in Learning Novel Spatial Nouns? - *Yoonha Lee*
27. Exploring Explanation: Causal Explanation Guides Hypothesis-testing Behavior - *Cristine Legare*
28. The Role of Speaker Gender in Children's Learning from Others - *Lili Ma, Jacqueline D. Woolley*
29. The Cognitive Development of a School-refusal Child with High-functioning Autism Using the Landscape Montage Technique - *Yoshitsugu Murakami*
30. Child's Matching Bias on the Disjunctive Selection Task - *Kenji Oura*
31. Relationships between Joint Attention and Language Development in Korean Infants - *Young-shin Park*

32. Links between Attention Orienting and Attention Biases in 'Hot' and 'Cold' Contexts - *Koraly Perez-Edgar, S. Katherine Nelson, Claire E. Cole, Daniel J. Zapp*

33. The Adaptive Nature of Children's Immature Thinking: Developmental Trends in the Judgments of Children's Expressions - *Virginia Periss, Carlos Hernandez Blasi*

34. Highchair Philosophers: The Impact of Ontology-relevant Seating and Young Children's Naming Biases - *Lynn Perry, Larissa Samuelson*

35. Development of Semantic and Decoding Skills in Young Readers - *Lara Polse, Judy Reilly*

36. Less Is More: Performance of Children with Autism on an Executive Function Task - *Julianna Sapienza, Stephanie Carlson, Jessica Hobson*

37. Is Knowledge Subjective? A Sex Difference in Adults' Epistemic Intuitions - *Christina Starmans*

38. The Role of Implicit Learning and Experience in Children's Word and Category Learning - *Haley Vlach, Jessica Morales, Catherine Sandhofer*

39. Which Motionese Parameters Change with Children's Age? - *Anna-Lisa Vollmer, Katrin S. Lohan, Jannik Fritsch, Britta Wrede, Katharina J. Rohlfing*

Alternate Poster Session B: Saturday, October 17, 3:45 to 5:30 pm

1. Grammatical Gender Influence on Object Perception in Bilingual Speakers - *Jissel Anaya, Catharine Echols*

2. Changes in Children's Representations of Water-Related Activities in Rural Uganda - *Heidi Beebe, Mary Gauvain*

3. Why Are Children Consequentialists? Growing into Moral Deontologists - *Marine Buon, Jacob Pierre, Dupoux Emmanuel*

4. Discrete and Continuous Quantities: The Role of Number - *Lisa Cantrell, Linda B. Smith*

5. Social Perspective Taking and Learning Disorders: How Learning Disorders Can Affect the Social Realm - *Tracy Cassels, Susan Birch, Sherilynn Chan, Samantha Bangayan*

6. The Effects of Lexicalization on Korean Children's Inferences about Personal Characteristics - *You-jung Choi, Hyun-joo Song*

7. The Relations between Theory of Mind and Deontic Reasoning in Korean Children - *Suk Young Chun, Hyeonjin Lee*

8. Children's Explanations for Just and Unjust Events - *Chelsea Cornelius, Jacqueline Woolley*

9. Children's Sociolinguistic Judgments about Northern vs. Southern American English - *Jasmine DeJesus, Katherine Kinzler*

10. Academic Language in the Early Home Environment of Children with Pre- Or Perinatal Brain Injury - *Ozlem Ece Demir, Meredith L. Rowe, Gabriella Heller, Susan C. Levine, Susan Goldin-Meadow*

11. In-Group Attitudes of Muslim Children - *Fadwa Elashi, Candice Mills, Meridith Grant*

12. Transforming Preschoolers' Geometric Shape Knowledge: Exploring Verbalizations & Behaviors during a Categorization Task - *Kelly Fisher, Katrina Ferrara, Kathy Hirsh-Pasek, Nora Newcombe, Roberta Golinkoff*

13. Factors Mediating the Effects of Interactive Media Use on Cognitive Development - *Rachel Flynn*

14. Two- and Three-Year-Olds Learn Tool Use Best through Observation - *Amy Gardiner, Marissa Greif*

15. Using Structural Alignment to Facilitate Learning of Spatial Concepts in an Informal Setting - *Dedre Gentner, Susan Levine, Sonica Dhillon, Ashley Poltermann*

16. The Social Cognitions of Children with ADHD: Their Attributions for Parenting Behaviour - *Randall Gillis, Charlotte Johnston*

17. Children's Understanding of Physical and Psychological Trait Constancy in Pretense - *Thalia Goldstein*

18. Passive-voice Priming in Spanish-Speaking Children: The Evidence of Animacy Effects - *Ligia Gomez Franco, Marina Vasilyeva*

19. Abstracting Feature Sequence of the Internally-changing Object - *Maciej Haman*

20. The Development of the Sensitivity to Geometry in Visual Forms - *Veronique Izard, Elizabeth S. Spelke*

21. The Effect of Mental Context Reinstatement on the Accuracy of Children's Repeated-Event Memory - *Donna Jennings, Martine Powell*

22. Children's Conceptual Knowledge of Arithmetic: Developmental Progression and Relation with Executive Function - *Kathy Knox, Glenda Andrews, Michelle Hood*

23. Familiarization Boost Retention in Fast-mapping - *Sarah Kucker*

24. The Side-Effect Effect in Korean Children - *Hyeonjin Lee*

25. Moderate Vagal Withdrawal Is Associated with Optimal Performance for 3.5-Year-Old Children on Executive Function Tasks - *Janet Leigh, Stuart Marcovitch, Susan D. Calkins, Esther M. Leerkes, Marion O'Brien, A. Nayena Blankson*

26. Probing Preschoolers' Event Memory: Combining Electrophysiological and Behavioral Methods - *Jacqueline S. Leventon, Ayzit O. Doydum, Patricia J. Bauer*

27. The Effect of Delay on Children's Prospective Memory - *Caitlin Mahy, Louis Moses*

28. The Qualitative Learner of Action and Perception: A Model of Action Acquisition - *Jonathan Mugan, Benjamin Kuipers*

29. 24-month-olds Segment Novel Events and Re-enact Action Subcomponents: Preferential Looking and Behavioral Evidence - *Amy Pace*

30. Taking A Step Up; How Parents Perceive Their Infant's Ability to Climb-up a Step - *Veronica Ramenzoni, Julia Li, Rachel Keen*

31. The Development of Children's Inequity Aversion - *Cary Roseth, Megan Fedor, Barbara Thelamour, Ammon Wilcken*

32. Contextual Factors in Early Comprehension and Production of Pictures - *Analia Salsa, Olga Peralta*

33. Investigating What Preschoolers Understand about Visual Perception: A Training Study - *Elizabeth Seamans, Barbara D'Entremont*

34. The Role of Novelty in Cognition: An Evolutionary Approach - *Nushien Shahnami, Valerie Sims*

35. Niche Fitting: Do Children Understand that Size Can Be Relevant to Function? - *Alex Shaw*

36. The Development of Rapid Word Learning - *Emily Thom*

37. Uncovering a Differentiated Theory of Mind in Children with Autism and Asperger Syndrome - *Michele Tine*

38. First Order Relational Matching in Chimpanzees (Pan Troglodytes) - *Jennifer Vonk*

39. Science Fair Judging: What It Reveals about Scientists' and Adolescents' Understanding of Science - *Jenna Watson, Courtney Snyder, Genevieve Lapre, K. H. Grobman*

40. Young Children's Understanding of Others' Emotion, Desires and Prosocial Behaviors - *Jeong-ae Won*

41. Examining the Relationship between Temperamental Effortful Control and Cognitive Inhibitory Control Abilities - *Hwajin Yang, Vanessa Tan Wan Ting, Sujin Yang*

42. How Do Children Track Change? Further Advances in the Theory of Mind - *Emily Burdett, Justin Barrett*

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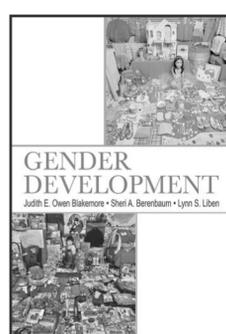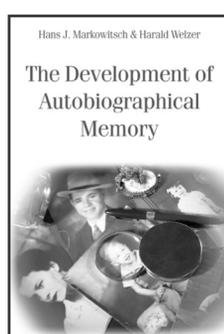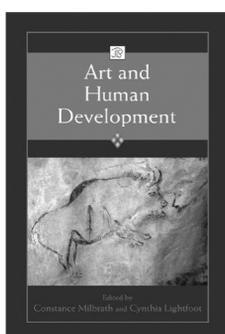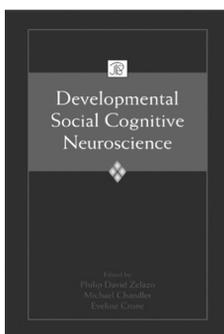
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Invited Speaker and Symposia Abstracts

The Cognitive Development Society Sixth Biennial Meeting includes two plenary invited talks, two plenary invited symposia, and four symposia sessions with three concurrent symposia.

Friday, October 16, 2009

8:45 - 9:45	Coronado Ballroom: *Collaboration and Communication in the Second Year of Life* Michael Tomasello
10:15 - 12:30	Coronado Ballroom: *Bilingualism: Cognitive Development from the Perspective of Acquiring Multiple Languages (*Organizer: Henry Wellman)
2:00 - 3:45	Monte Cristo Room: *Causal learning and social cognition: The McDonnell Causal Learning Collaborative* (Organizer: Alison Gopnik) Trinidad Room: *The role of action in the development of object perception* (Organizer: Sandra Y. Street) Coronado Room: *Interplay between language development and cognitive control processes* (Organizer: Sarah Creel)
4:00 – 5:45	Monte Cristo Room: *Phylogenetic and ontogenetic consequences of group membership for intergroup cognition* (Organizers: Kiley Hamlin & Andrew Scott Baron) Trinidad Room: *Religious thinking: The development and influence of religious concepts on cognition* (Organizer: Erin Smith) Coronado Room: *The development of ownership: Looking across ages, species, cultures, and domains* (Organizer: Ori Friedman)

Saturday, October 17, 2009

8:30 - 9:30	Coronado Ballroom – *Bayesian Models in Cognitive Development* Josh Tenenbaum
10:00 - 12:15	Coronado Ballroom: *Making Cognitive Development Research Relevant in the Classroom* (Organizer: Nora Newcombe)
1:45 – 3:30	Monte Cristo Room: *Learning from others: The scope of epistemic trust* (Organizers: Cagla Aydin & Tamar Kushnir) Trinidad Room: *Mechanisms of learning from multiple exemplars: Alignment and explanation* (Organizer: Stella Christie) Coronado Room: *Neural and behavioral origins of mathematics* (Organizer: Koleen McCrink)
3:45 – 5:30	Monte Cristo Room: *Inference in a social context: What social and non-social reasoning have to teach each other* (Organizer: Laura Schulz) Trinidad Room: *Creationism is not the (only) issue: Developmental constraints on an understanding of evolution* (Organizer: E. Margaret Evans) Coronado Room: *Understanding knowledge change: Investigations on how children learn mathematics and literacy skills* (Organizer: Bethany Rittle-Johnson)

Collaboration and Communication in the Second Year of Life

Michael Tomasello, Max Planck Institute

Although primates have evolved complex cognitive skills and strategies for competing with others in their social group, only humans have developed complex cognitive skills and motivations for collaborating with one another in joint endeavors. This cooperative dimension of human cognition emerges most clearly around the first birthday as children begin to collaborate and communicate with joint intentions and joint attention. This collaboration is also grounded in social motivations for helping and sharing with others that are unique to humans. In using the skills of shared intentionality that underlie these cooperative interactions, 1-year-olds come to create perspectival cognitive representations.

Bilingualism: Cognitive Development from the Perspective of Acquiring Multiple Languages

Organizer: Henry Wellman, University of Michigan, hmw@umich.edu
Summary: Most of the world's children grow up exposed to and learning at least two languages. This influences not only their language development but wide-ranging aspects of their cognitive development, schooling, identity, and life. In this plenary symposium leading scholars in the field present current research and thinking on bilingualism and its influences on cognitive development and learning in infants, preschoolers and school-age children.

Controlling language, controlling cognition: Effect of bilingualism on development

Ellen Bialystok, York University

It is increasingly clear that certain experiences modify the development of cognitive networks and cognitive performance in childhood. One such experience may be bilingualism. For children growing up in a bilingual environment, two lexicons are incorporated into the child's emerging conceptual system, two linguistic patterns constrain the structure and composition of speech, and language use entails a choice between these distinct systems. The main outcome of this experience appears to be earlier development of components of the executive function system than is found in comparable monolingual children. In this talk I will describe developmental differences in executive functioning that have been found for monolingual and bilingual children, relate those developmental features to specific aspects of bilingual language use, and propose a mechanism that could underlie some of these developmental differences.

Two languages in the crib: Cognitive enhancements in bilingual infants

Ágnes Melinda Kovács, Central European University, Budapest

Although bilingual children have to learn roughly twice as much about language as their monolingual peers, their speed of acquisition is comparable to that of monolinguals. However, it is unclear how young infants cope with the multi-language input and how bilingualism affects early development. In three eye-tracking studies we show that 7-month-old bilinguals display improved cognitive control abilities compared with matched monolinguals. Whereas both monolinguals and bilinguals learned to anticipate a reward on one side of a screen signaled by a cue, only bilinguals succeeded in redirecting their anticipatory looks when the cue began signaling the reward on the opposite side. Consecutive studies provide a crucial link between domain-general improvements in cognitive control found in 7-month-olds and specific enhancements in the domain of language acquisition. We find that 12-month-old bilinguals have become more flexible at learning speech structures than monolinguals. When given the opportunity to

simultaneously learn two different regularities, bilingual infants learned both, whereas monolinguals learned only one of them. These findings show that processing representations from 2 languages leads to a domain-general enhancement of the cognitive control system and to an increased flexibility in learning conflicting regularities well before the onset of speech.

THE DEVELOPMENT OF COMPREHENSION IN SECOND-LANGUAGE LEARNERS
Diane August, Center for Applied Linguistics

English-language learners are growing in numbers, comprise a large percent of the population of US students, and are at-risk for poor educational outcomes because of their poor reading comprehension. Research that examines the development of reading comprehension in English monolinguals has provided insight into its prerequisites, including the ability to read words accurately and rapidly, good language skills, and well-developed stores of world knowledge. A recent review of the research on developing literacy in second-language learners (Lesaux, et al., 2006) found these skills and knowledge to be important for English-language learners (ELLs) as well. Researchers have also identified effective instructional methods for improving reading comprehension in English monolinguals, including comprehension monitoring, cooperative learning, use of graphic and semantic organizers, question answering, question generation, and summarization (National Institute for Child Health and Human Development, 2000). Methods to develop comprehension in ELLs build on first language research but generally have been modified to take into consideration the unique needs and strengths of ELLs (Shanahan & Beck, 2006). Modifications have included a greater emphasis on building background knowledge, scaffolding, and reinforcement, as well as capitalizing on first language strengths and are intended to ensure ELLs understand oral and written English as well as to further develop their text comprehension. In this talk we describe the research on the development of reading comprehension in ELLs, as well as methods that have been successful in building reading comprehension in these students. For each method, we briefly review the experimental research, and then illustrate best practices with examples drawn from our ongoing research studies.

DISCUSSANT: Peggy McCardle, Eunice Kennedy Shriver National Institute of Child Health and Human Development

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FRIDAY, OCTOBER 16, 2009: 2:00 – 3:45 PM

CAUSAL LEARNING AND SOCIAL COGNITION: THE McDONNELL CAUSAL LEARNING COLLABORATIVE
ORGANIZER: Alison Gopnik, University of California at Berkeley, gopnik@berkeley.edu
SUMMARY: For the past five years the McDonnell Foundation has supported a cross-disciplinary, cross-university collaborative project investigating the psychological, philosophical and computational bases of causal learning. Understanding the causal structure of the world is a crucial developmental achievement and one that underpins many other important abilities. What learning mechanisms allow young children to accomplish this?

One idea that has emerged from the collaborative is that children use other people to understand how the world works, and simultaneously use causal learning to understand others. This symposium will report on this empirical research, across several ages and tasks, investigating the role of action, statistics and conversation, and including theoretical ideas from computation and philosophy. Andrew Meltzoff will describe work at Washington showing that infants use the actions of others to learn causal relationships, going beyond simple imitation to make genuinely causal inferences about the outcomes of actions. Alison Gopnik will report work at Berkeley showing that preschoolers can use statistics in a computationally rational way, both to segment a continuous stream of actions and to infer underlying personality traits from action patterns. Susan Gelman will report work at Michigan showing that in conversation preschoolers both seek and use the linguistic causal explanations of other people, and demonstrating how explanation facilitates learning. Finally, James Woodward, a philosopher at Caltech, will discuss the relationship between human agency and physical mechanisms in the very idea of causation itself, and integrate the developmental

literature about when infants use social and physical information to draw causal conclusions.

Causal Learning and Imitation
Andrew Meltzoff, University of Washington

Infants copy novel actions, but do they learn genuinely causal relations through imitation? We tested this with an apparatus with two boxes and a light. 24-month-old infants saw an adult use a tool repeatedly to press a button on one of the boxes ('cause'), which made the light come on ('effect'). The adult used the tool to press the button on the other box and the light did not come on. The results showed that: (a) all infants used the tool to push the button (b) infants significantly chose to push the causal button rather than the control button, and (c) infants who pushed the correct button looked towards the effect, as if expecting that their action would cause the light to come on (in fact, the light was disabled). In Study 2 the sequence of events was identical but the 'effect' (the light coming on) preceded the 'cause', (the button push) by 1 second. This should indicate to the infants that the action did not, in fact, cause the effect. Infants used the tool to press a button, but they picked each box at chance, and did not look towards the light. We conclude that 24-month-olds learn causal relations from the actions of others, and seek to duplicate causal effects using their own actions. We are now repeating these conditions in a "natural experiment" where infants observe a correlation that does not involve a human agent and are testing younger infants. We consider the implications for theories of imitation and for Woodward's 'interventionist' theory of causal learning.

The statistical social learner: Using rational inference to learn from actions
Alison Gopnik, Daphna Buchsbaum, Elizabeth Seiver, University of California, Berkeley

Recent work shows that children can infer causal structure from statistical data. We describe two different ways that statistical causal learning helps children learn about other people, and the actions of others facilitate causal learning. In the first series of studies, we explore how children learn how to segment and interpret goal-directed action sequences. Preschool children saw different series of repeated actions on a toy with different statistical relations to outcomes. For example, they might see that the experimenter shook, pulled and rolled a toy and the toy played music, but that it did not play when the experimenter shook it, squished it and rolled it, along with three other different statistical patterns. Children used that statistical information to pick out the subset of actions that were the most likely cause of the outcome, and in their imitation they produced just those sequences.

In the second series of studies we showed 4 and 6-year-old children different patterns of covariation between actions and either individual people or situations. 4-year-olds correctly used covariance to accurately infer whether the actions were caused by an enduring trait of the person or by the external situation. 6-year-olds were also sensitive to covariation evidence but had developed a consistent prior bias towards person explanations. Statistically based causal inference may be responsible for the development of social knowledge, and particularly of a trait bias.

Finally, we present rational computational models that can help characterize both these types of inferences.

The function of causal explanations in children's conversations with others
Susan A. Gelman, Cristine H. Legare, Brandy N. Frazier, Henry M. Wellman, University of Michigan

Causal explanatory knowledge is central to human reasoning. Children both provide and solicit explanations in the context of conversations, yet little is known regarding why they do so and how these interchanges actually function. To address these issues, we present two interrelated lines of research examining children's explanations, and their role in early cognitive development.

One project examines the events that prompt children to provide explanations. Children's explanations could be triggered by either consistent events (suggesting a confirmatory function) or inconsistent events (suggesting that explanations promote discovery). In two studies with preschool children, events consistent with children's prior knowledge were contrasted with events that were inconsistent, and children were invited to provide an explanation. Inconsistent outcomes were a powerful trigger for children's explanations, and the explanations provided refer to internal causal properties, overriding perceptual appearances. Thus, inconsistent events motivate children to construct explanations, and children's explanations promote discovery.

A second project examined preschool children's questions and their reactions to the answers they receive, in conversations with adults (both naturalistic and experimental settings). If children actively seek explanatory

knowledge, they should react differently depending on whether they receive causal explanations. We found that children more often agreed and asked follow-up questions following adult explanations and, conversely, more often re-asked their original questions and provided their own explanations following non-explanations. This confirms that young children seek causal information and use specific conversational strategies to obtain it.

Altogether, these findings emphasize the function of explanation in children's early construction of knowledge.

Learning about causal relationships: action and observation, covariation and contact mechanics
James Woodward, California Institute of Technology

Contemporary philosophical accounts of causation may be grouped into two broad categories, which seem to draw on fundamentally different intuitions about causation. Difference-making theories rely on the guiding idea that causes make a difference to their effects. Such theories emphasize the role of covariation and action outcomes in causal learning. The interventionist account of causation is one example of such a theory: it focuses on the role of covariational information generated by interventions, canonically goal-directed intentional actions, in causal learning and understanding. Within psychology, theories inspired by the causal Bayes net formalism have this character and have been applied to both adults and children. Such theories contrast with a second family, contact mechanical theories, that focus on the role of physical processes and mechanical relationships in causal learning and the characterization of casual relationships. Within psychology, such approaches often stress the role of representations in terms of "forces" and "generative mechanisms" in understanding causal relationships.

This talk will explore the relationship between these two ways of thinking about causation (and the capacities for learning and understanding associated with them). Adult humans apparently seamlessly integrate information about causal relationships derived from causal perception and contact mechanics with contingency information and information resulting from goal-directed human interventions. In contrast, infants appear to show sensitivity to contact mechanical relationships, as revealed in looking time studies, but do not combine this with intentional action information. This raises the question of when (and how) these different sources of information and ways of thinking about causal relationships are integrated in human development.

The Role of Action in the Development of Object Perception
Organizer: Sandra Y. Street, Indiana University, systreet@indiana.edu
Summary: Emerging research suggests developmental dependencies between object recognition and children's own actions on objects. These dependencies make sense: Children's actions on objects create the dynamic visual input on which the representations and processes that underlie object recognition depend. Moreover, because action organizes experiences in time and creates predictive relations between doing and seeing, infants' visual and manual explorations of objects may be an early agent creating unified object representations. This symposium brings together four researchers studying object perception and action on objects from varying perspectives.

Talk 1 discusses the impact of oculomotor development on infant's object perception, presenting evidence that developmental change in active visual exploration directly impacts object perception. Talk 2 examines infants' use of handles to control action and their ability to adapt to object-induced changes in the manual system. Handles present an interesting case for the coordination of parts and whole in vision and action; handles must be segregated from the whole but action on the handles also depends on the properties of the whole. Talk 3 presents evidence showing dramatic changes between 18- and 24-months in infants' ability to align objects to slots in posting tasks; results suggest these changes are due to increased integration and coordination of visual and motor systems. Talk 4 offers fMRI evidence from 5 year-olds indicating that performing an action and observing an action recruit different neural systems. The neural activation in children differs from that in adults suggesting developmental changes in functional connectivity of motor and visual systems throughout childhood.

The role of oculomotor development on object perception
Dima Amso, Cornell University

There is progress over the first several postnatal months from a fragmented perception of objects to a more mature perception of objects as continuing across space and time. This work considers the possibility that developments in visual exploration skills or 'oculomotor action' are a potential agent of this change. We presented infants with a visual search task designed to examine voluntary versus reflexive oculomotor control. A group of 3-month-old infants participated in both a rod-and-box perceptual completion task as well as this visual search paradigm in the same testing session. Infants who provided evidence of perceiving the unity of object parts in the absence of visual input also showed efficient scanning patterns during habituation. Importantly, these same infants also provided evidence of visual search behavior indicative of voluntary attention-guided saccadic eye movements. Schlesinger, Amso, and Johnson (2007) used computational modeling to pinpoint the neural mechanisms involved in differences in 3-month-old infants' performance in the visual search paradigm. Real-time visual search performance was simulated with the outcome that increasing recurrent parietal processing effectively simulated performance changes on visual search between those infants who perceived object unity and those who did not. In a second similar model examining performance on the perceptual completion displays, manipulating this same parameter resulted in increases in object-targeted scans, again approximating performance of 3-month-old unity perceivers. These data support the possibility that developmental changes in visual exploration and associated cortical circuitry bear directly on object perception.

Extending the range of action: Infants' use of handled objects
Jeffrey J. Lockman, Tulane University

Many human artifacts consist of handles attached to objects and constitute an advance in the lithic record. Handles confer advantages to object users, yet pose challenges for controlling action: Individuals must gear their behaviors to the object attached to the handle. In this presentation, we address the developmental origins of this ability. In Study 1, 8- and 10-month-old infants (N=48) explored hammer-like objects (a hard or soft cube attached to a cylindrical handle) on composite tabletop surfaces that were half-rigid and half-flexible. If infants use handles as extensions of objects, they should gear their manual behaviors to the material properties of the cubes attached to the handle, even when grasping the handle. By 10 months, this was the case: Older infants, for instance, banged the hard hammer significantly more on the rigid substrate, possibly to produce noise. In Study 2, we asked how infants use handles to control objects. A new group of 8- and 10-month-olds (N=48) explored hammer-like objects consisting of a hard cube attached to either a rigid or floppy handle. Results indicated that both age groups adapted to the handle's properties. Infants held the floppy handle more often at the upper (near the cube) than the lower handle end, presumably to gain better control of the cube. In contrast, infants held both ends of the rigid handle equally often. Collectively, the findings suggest that infants adapt quickly to object-induced changes of the manual system. The implications of these findings for understanding the origins of tool use and problem solving will be considered.

Vision for Action: Integrating visual and motor processes 18- to 24-months
Sandra Y. Street, Indiana University

By the end of the second year of life, children become active users of objects, routinely putting objects in openings, stacking and aligning things. These actions require integration of visual properties of objects with motor control. Shape sorting toys are frequently used in childhood assessments and as a marker of a developmental delay. However, little is known about the underlying developmental processes. Three experiments demonstrated that these abilities undergo remarkably dramatic changes between 18 and 24 months, changes that appear to reflect neither visual perception nor motor development alone but the integration of the vision and action systems. The first experiment documents the developmental trend (comparing 17-18 and 23-24 months) in a posting task. Results indicate rapid change taking place during this time period. The younger children failed to align discs with slots whereas the task was trivial for children just 6 months older. Experiments 2 and 3 examine the motor and visual skills necessary for successful posting. Motor skill was addressed by demonstrating prior to each trial and handing the disc to the child correctly oriented near the slot. The children need only grasp and insert the disc. Young children were able to do this. Visual discrimination was addressed by having the child insert their hand into a vertically or

horizontally oriented slot. The children easily aligned their hand correctly. The key problem appears not to be holding the objects correctly for insertion nor discriminating orientations, but know how to rotate the object so that it is properly aligned.

The neural correlates of acting and perceiving in the developing brain
Karin James, Indiana University

There is considerable debate regarding the relationship between acting and perceiving in the mature brain and how these functions relate to imitation. Contrary to the 'mirror neuron hypothesis' we have recently shown that in the adult brain performing an action and observing another perform the same action does not recruit common neural systems. The current research extends this finding by investigating the systems involved in acting, observing and imitating, in the developing brain. Using functional Magnetic Resonance Imaging (fMRI), we measured neural responses while 5 year-old children acted, observed the same action, and imitated an experimenter performing an action. Results demonstrated that different neural systems were recruited during action and observation, and further, that the putative 'mirror neuron system' was engaged only during imitation. These results confirm our previous findings that action and perception do not recruit overlapping systems and extend this finding to the developing brain. In addition, the present results show that the systems involved in these functions in the child are qualitatively different than those recruited in the mature brain. The neural correlates of acting and observing actions changes over development, but the system involved in imitation appears to be developed by 5 years of age.

Interplay Between Language Development and Cognitive Control Processes
Organizer: Sarah Creel, University of California San Diego, creel@cogsci.ucsd.edu
Summary: Various lines of research have converged on cognitive control—the ability to shift perspective or response set when needed—as a crucial component of language processing during development. Cognitive control has been implicated in areas as diverse as vocal affect apprehension, word recognition, syntactic parsing, and discourse anaphora resolution. Models of adult language comprehension have routinely emphasized competitive and inhibitory processes. Bialystok and colleagues have demonstrated that language exposure may influence cognitive control. The speakers here will argue that the reverse is also true—that cognitive control processes may profoundly influence language development.

This symposium brings together researchers from various areas of language development, each of whom investigates cognitive control aspects of developing language comprehension, using methodologies including eye tracking, fMRI, and behavior. Each contributor focuses on a particular area of language processing: pronominal reference (Holt/Deák), syntax (Trueswell), phonological competition (Creel), and apprehending emotion from speech (Morton). The various contributors will explore the roles of competition, inhibition, bias, and cue combination in particular aspects of language processing. This exploration of cognitive control processes in language comprehension will help to unify researchers' understanding of the evolving abilities and difficulties of the young language learner.

Finally, our discussant, Sharon Thompson-Schill, will relate these findings in language development to the neuroscience of normal and impaired executive function, in order to increase our understanding of how cognitive function and language do (and do not) interrelate.

Resolution of Ambiguous Pronouns by Children: Inflexible Use of Pronoun Lexical Features
Anna Holt & Gedeon Deák, UC San Diego Cognitive Science

Making anaphoric judgments across multiple sentences is more difficult than within a single sentence. Adults use lexical features of a pronoun (gender, animacy, and number) as the most reliable source for disambiguation. When lexical features of a pronoun are underspecified, adults use conflicting strategies, including verb aspect semantics (Rohde, Kehler & Elman, 2006) and order-of mention cues. Children correctly use gender to disambiguate reference by age three (Brenner, 1983; Tyler, 1983). They may not, however, reliably use other strategies (Sekerina et al., 2004;

Arnold & Griffin, 2006). We tested how children and adults (children n=45, ages 3-5; adults n=24) resolve cues to inter-sentential pronoun interpretation in a short story paradigm. We were interested in whether children would weight verb aspect cues or last mentioned entity over lexical features of a pronoun (gender and number)—showing inflexibility. We scored children on the number of imperfective aspect-guided pronoun switches and the number of gender errors. We found that children did not develop adult-like use of verb aspect cues until age five. Unlike adults, younger children made gender errors. They ignored gender in those cases in which the referent predicted by pronoun gender was inconsistent with information from other strategies. Adults were slowest in same-gender versions of this condition. Ongoing data collection addresses whether choice and RT performance on tests of flexible cognition (i.e. a computerized version of Dimension Change Card Sort Task and the go/no-go task) predict individual and group variability of these errors in the pronoun short-story paradigm.

The role of cognitive control in the development of children's sentence parsing abilities

John C. Trueswell, University of Pennsylvania; Jared Novick, University of Maryland; Youngon Choi, Skidmore College

It is well documented that children (3-6 years of age) exhibit deficits in general executive function abilities, often referred to as 'cognitive control'. In this talk, we will review child sentence processing studies from our lab indicating that cognitive control plays an important role in explaining developmental changes in child sentence processing abilities, especially under conditions in which the initial interpretation of an ambiguous phrase needs to be inhibited based on linguistic evidence found later in the sentence (Novick, Trueswell & Thompson-Schill, 2005). These patterns arise because children, like adults, attempt to process sentences incrementally. Linguistic evidence (prosodic, morphological, lexical syntax and semantics) is used by children as it is encountered, to assist in developing a hypothesis about the most likely interpretation of the sentence as a whole. Eyetracking studies from Korean and English speaking children and adults will be presented, along with data from adult patients with frontal lobe damage. We'll conclude with some predictions that this account makes for grammar learning in verb-initial and verb-final languages.

Cue integration in word recognition: when better cognitive control leads to more errors

Sarah Creel & Melanie Tumlin, UC San Diego Cognitive Science

Children's difficulty in spoken language processing has been linked to poor abilities to inhibit preactivated syntactic interpretations (Trueswell et al., 1999). Our research examined whether similar errors arose at a smaller temporal grain—word recognition—and whether these errors were linked to poorer cognitive control performance on a card-sort task. In an eye-tracked object selection task, children saw four pictures at time (e.g. candy, candle, frog, shoe) and heard an instruction to point at one "target" object. The target always had a phonological competitor (candle/candy). Responses and eye movements were recorded.

Most interesting were instructions with bias toward the phonological competitor: children heard "Teddy [the cartoon experimental protagonist] wants to blow out the candy. Can you show him where it is?" Here, errors of selecting the candle were greater than in an unbiased condition. However, this pattern only appeared in children with good card sort task performance. This was not a result of differences in verb bias sensitivity: eye tracking confirmed that good and poor cognitive control groups were similarly sensitive to verb bias. While these errors resembled perseverative interpretations, a second experiment demonstrated that "candle" errors dropped to baseline when the target was not phonologically similar to the biased competitor. Thus, choosing "candle" for "candy" was not a simple perseveration on the verb, but perhaps integration of verb and word sound information to find the most likely interpretation. Together, these results suggest that better cognitive control is linked to ability to maintain and integrate multiple cues to sentence meaning.

Executive functioning and concepts of mixed emotion in children's judgments of speakers' feelings

J. Bruce Morton, University of Western Ontario, Department of Psychology

When propositional and paralinguistic cues to emotion in speech conflict, 6-year-old children typically judge a speaker's feelings on the basis of message content even if explicitly instructed to ignore content and listen instead to the speaker's voice (Morton, Trehub, & Zelazo, 2003). Following these kinds of instructions is much easier for older children and adults, perhaps because of changes in the strength with which attention-guiding rules are represented over development (Morton & Munakata, 2002). In my talk, I will present the results of two experiments that tested this general account. One set of results is largely consistent with this account by showing that in the absence of explicit instructions, children and adults show similar judgments of emotional utterances, and that only when given explicit instructions to attend to paralanguage do their judgments diverge. The second set of results however points to limitations in this account by highlighting a close connection between children's inflexibility and the presence of emotional conflict in the test materials. I will conclude by discussing ways of conceptualizing the connection between language processing, executive functioning, and developing concepts of mixed emotions.

Discussant: Sharon Thompson-Schill, University of Pennsylvania

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Friday, October 16, 2009: 4:00 – 5:45 pm

Phylogenetic And Ontogenetic Consequences Of Group Membership For Intergroup Cognition

Organizers: Kiley Hamlin, Yale University; kiley.hamlin@yale.edu; Andrew Scott Baron, Harvard University

Summary: This symposium recruits methods from social, cognitive, developmental, and comparative psychology to characterize the foundations of social group representations, and the consequences of these representations for early intergroup cognition. In particular, this symposium addresses the acquisition and development of representations of social group membership with a particular emphasis on the conceptual role of the ingroup in shaping intergroup cognition across both a phylogenetic and ontogenetic time scale (infancy through middle-childhood).

Papers I and II explore how membership in a stigmatized group shapes the acquisition and development of explicit and implicit representations of self and its relationship to ingroup and outgroup members in early-middle childhood. Paper III extends this work to preschoolers by examining the role of intergroup competition as a foundation over which children scaffold their social group representations. Paper IV begins to unpack the criteria by which conceptions of ingroup and outgroup are established by examining preverbal infants' evaluations of social interactions involving those who are similar versus dissimilar to the self. Finally, Paper V examines the emergence of intergroup preferences and self-other judgments among a species of non-human primate, the Rhesus macaque. Collectively, these papers promise to offer a broad survey of new research across both an evolutionary and developmental time frame and across explicit and implicit measures, which documents early social-cognitive representations of the self and its relation to the group.

The relationship between explicit and implicit self-identification with math and the development of a math-gender stereotype

Dario Cvencek, Andrew Meltzoff, & Anthony Greenwald; University of Washington

This paper examines the relationship between explicit and implicit representations of the self and the development of intergroup stereotypes. In particular, the present research focused on uncovering cognitive developmental mechanisms that may contribute to gender differences in self-identification with math. 247 elementary school children (ages 6-11) completed self-report and parallel Implicit Association Tests (IAT; Greenwald, McGhee, & Schwartz, 1988) measures assessing: (a) Gender identity: the association of self with male, (b) Math-gender stereotype: the association of math with male, (c) Math self-concept: the association of self with math.

Three new findings emerged. First, elementary-school children have absorbed the cultural stereotype that math is for boys, as these children reported stronger explicit and implicit associations of math and male. Second, boys' self-concepts differ from girls'—boys identify with math more strongly than do girls. Third, implicit data showed that principles of cognitive balance demonstrated in adults (Heider, 1946; Greenwald et. al, 2002) also operate in young children, such that the children who more strongly identified self and math with their gender, also reported stronger identification with math. The findings suggest that the math-gender stereotype develops early and influences math self-concepts prior to ages at which there are actual differences in math achievement. Finally, these data point to the important relationship between stereotype formation and the development of self-concept and will be discussed in terms of convergence and divergence with explicit and implicit measures.

Foundations of intergroup cognition: The special status of the ingroup
Andrew Scott Baron, Harvard University

Turner, Brown & Tajfel (1979) proposed that self-categorizing as an ingroup member has numerous consequences for intergroup cognition including the over extension of positive properties to ingroup members and of negative properties to outgroup members. Apart from guiding inductive inferences in the absence of learning, it remains unclear whether self-identification with a group mediates the acquisition of social category concepts. For example, objectively positive and negative information about a social category may be remembered, evaluated, or utilized differently to support inductive reasoning when the target is a member of the ingroup versus the outgroup.

Children ages 3-8 were randomly assigned to one of two novel social groups and were read a story in which members from one group (the Actors) engaged in either all negative social transgressions (Experiment 1) or in an equal number of positive and negative social transgressions (Experiment 2) directed toward a second group (the Patients). Following the story manipulation, a pronounced influence of group membership was observed such that children assigned to be Actors drew fewer negative inferences about other Actors compared with children assigned to be Patients. Patients reported a stronger preference for other Patients compared to the Actors who reported no preference for either group. Furthermore, compared with Patients, Actors were less likely to remember the negative transgressions from the story. Together, these data suggest that group membership imposes constraints on the development of intergroup cognition and will be discussed in terms of explicit and implicit representations of the ingroup and outgroup.

Preschoolers' representations of coalitional alliances
Marjorie Rhodes, New York University

The studies to be presented in this talk examine the conceptual underpinnings of social categories in early childhood. Drawing on an evolutionary framework, this work tested the hypothesis that early emerging abilities for coalitional reasoning (e.g., tracking and reasoning about groups that are defined by within-group cooperation and between-group competition) importantly contribute to early social categorization. In this work, 4- and 5-year-olds were introduced to novel social categories, which were described as engaged in within-group cooperative efforts to obtain an important resource. By condition, this resource was described either as limited (not enough for both groups), or unlimited (enough for both groups). When the resource was described as limited, there were four notable features of children's social reasoning: 1) children inferred that social competition would occur, 2) children attended to markers of membership in these novel groups, over other social information (e.g., race), during categorization tasks, 3) children inferred that individuals should cooperate only with members of their own group, not with members of another group, and 4) children inferred that it would be permissible to engage in immoral actions (e.g., hitting, stealing) towards members of another group, but not towards members of one's own group. In contrast, when the resource was described as unlimited, children did not infer that social competition would occur, preferentially attend to markers of group membership, or use group to make inferences about social or moral obligations. This work provides evidence that coalitional reasoning is an important contributor to early social categorization.

Infants reason differently about similar and dissimilar others
Kiley Hamlin and Karen Wynn, Yale University

Research into infants' social preferences has revealed that infants prefer certain social partners: those who are prosocial versus antisocial (Hamlin, et al, 2007; under review), and those who are similar to versus different from them (Kinzler, et al, 2007; Mahajan & Wynn, in prep). Interestingly, adults' social preferences often change depending on who is involved in a situation; for example, liking those who behave antisocially toward those they dislike (e.g. "The enemy of my enemy is my friend:" Aronson & Cope, 1968; Gawronski et al, 2005; Heider, 1958). The current studies examine whether infants, like adults, prefer those who are antisocial toward disfavored others — specifically others who are disfavored because they are different from the infants.

Infants at 9- and 14-months of age were shown puppet shows in which one puppet was prosocial and another puppet was antisocial toward a target puppet. Critically, for half of the infants, the target was similar to the infant, as it had previously expressed the same food preference as the infant; for the other half of the infants, the target was dissimilar to the infant, as it had previously expressed a different food preference from the infant. Following the show, infants were presented with a choice between the prosocial and antisocial puppets. The target's identity appeared to influence infants' choices: those who had seen the puppets act on a similar target preferred the prosocial character, while those who had seen the puppets act on a dissimilar target preferred the antisocial character.

The Evolution of Group Biases: Experiments on Intergroup Behavior with Rhesus Macaques
Neha Mahajan & Laurie Santos, Yale University

Humans are known to form social categories from a relatively young age. In addition to forming such categories, there is growing evidence that children, like adults, display relatively negative attitudes towards outgroups (Greenwald & Banaji, 1995; Baron & Banaji, 2006). Although developmental psychologists have learned much about the ontogenetic emergence of intergroup cognition and ingroup biases, less work has addressed the phylogenetic emergence of these capacities. Humans are not the only species to engage in intergroup aggression, but do the same proximate mechanisms underlie intergroup behavior in our evolutionary ancestors? Here, we demonstrate in several studies that one primate species, the rhesus macaque (Macaca mulatta), exhibits biases nearly identical to those of humans. Macaques automatically distinguish members of their ingroup from members of their outgroup and show increased vigilance behavior for outgroup members over ingroup members. In addition, they attach group status to novel objects associated with members of particular groups, and exhibit similar increased vigilance for objects tagged with outgroup status. Finally, macaques evaluate and valence ingroup members more positively than outgroup members; they associate positive stimuli with members of their ingroup and negative stimuli with members of other groups. These findings suggest that human intergroup conflict may be rooted in biases that are phylogentically-ancient cognitive mechanisms and a tendency to categorize the world into "us" and "them" that emerges early in our evolutionary ancestry.

Religious Thinking: The Development And Influence Of Religious Concepts On Cognition

Organizer: Erin Smith, University of California, Riverside, esmit006@ucr.edu
Summary: A central question in the field of cognitive development is how children and adults construct and coordinate intangible concepts, such as concepts of the mind or God, and how the organization of these concepts influence thinking and reasoning. Four papers will be presented to address this question.

Paper 1 examines how preschool-aged children from religious and non-religious homes use God's presence in a story as a cue to adjust their real/not real boundary for impossible events and the characters that performed them. The second paper investigates how preschool-aged children's understanding of agency, as well as the pattern of cultural input they receive about supernatural agents, influences their developing theory of extraordinary minds. This evidence provides critical support of the anthropomorphism hypothesis and resolves current disparities in this area. Paper 3 explores the development of immaterial concepts of the soul and the mind in children and adolescents from

diverse religious traditions. Additional evidence with adults will augment these findings by providing evidence that mature concepts of the soul, but not the mind, influence adults' pattern of reasoning about moral dilemmas. The final paper examines how diverse samples of adults from the US and Brazil organize and distinguish concepts of the soul, the mind, and the spirit. A concluding dialogue will be led by the discussant, an accomplished expert in the development of cognition and religious concepts.

This symposium highlights the intersection of religion and cognition and carefully considers individual and cultural differences that influence the effect of religious concepts on cognition.

Does God Make It Real? Children's Belief In Religious Stories From The Judeo-Christian Tradition
Jacqueline Woolley & Victoria Cox, The University of Texas

During the preschool years, children begin to make various distinctions between entities and events that are real and those that are not real (Woolley & Wellman, 1990). One prominent aspect of children's cognitive development that is ripe for exploration of reality status beliefs, yet has been relatively neglected, is the domain of children's religious cognition. To what extent do children judge religious events, beings, and canon as real? In the present research, 127 4- to 6-year-old children were read religious (religious references intact) or non-religious (religious references removed) versions of both familiar and unfamiliar Bible stories. All stories contained a focal impossible event. Children were questioned about their belief in the reality status of the characters and events in the stories. Results showed that children in the religious condition had higher levels of belief in the reality of both story characters and events than did children in the non-religious condition, and that this relation strengthened significantly with age. Children from more highly religious homes were more likely to judge characters and events as real than were children from less religious homes. We conclude that children use God's involvement in a story to adjust the boundaries of their real/not real distinction and believe in an otherwise unbelievable situation, and that religiosity affects the likelihood of making such adjustments.

Developing An Understanding Of Extraordinary Minds: A Comparison Of Children From Religious And Secular Contexts
Jonathan D. Lane, Henry M. Wellman & E. Margaret Evans, University of Michigan

How do children come to understand extraordinary mental capacities? An anthropomorphism hypothesis (Piaget, 1929) posits that, as children begin to appreciate the constraints of mental states —e.g., that knowledge may differ from reality —they will attribute those constraints to all agents (even supernatural agents). In contrast, a preparedness hypothesis (Barrett & Richert, 2003) holds that very young children initially understand all agents' (even humans') mental capacities to be infallible. Because of this preparedness, when children begin to appreciate the constraints of ordinary, human minds, they can still easily understand extraordinary/infallible mental capacities (e.g., God's omniscience). To test these opposing hypotheses, we assessed children from religious and secular preschools on theory-of-mind tasks. Children made judgments and reasoned about the knowledge and beliefs of several contrasting agents: Some were ordinary humans, some had exceptional perceptual capacities (e.g., x-ray vision), and others possessed extraordinary mental capacities (e.g., someone that children were instructed, 'knows everything').

Results indicate that, in contrast with younger and older peers, preschoolers who were just beginning to attribute constrained mental states to ordinary humans also attributed those same constraints to 'omniscient' agents, including God. This pattern was especially pronounced for children with little religious experience. Overall, these data lend critical support to an anthropomorphism hypothesis while shedding light on contextual influences on children's developing theory-of-mind. Thus, both children's (anthropomorphic) understanding of agency and culturally received information influence their emerging beliefs about extraordinary agents. These data also reconcile disparities between the findings of other studies on children's understanding of extraordinary minds.

Someone With A Soul Wouldn't Do That: The Development Of The Soul Concept And Its Relation To Moral Reasoning In Adulthood

Erin I. Smith & Rebekah A. Richert, University of California, Riverside

Previous research into children's conception of the mind and the soul has indicated that even children as young as 6 years old may differentiate these concepts along lines of stability and function (Richert & Harris, 2006). While it is likely that children's naive concepts and the pattern of cultural input surrounding these concepts influence the development of the differentiation between concepts of the soul and of the mind, an understanding of these influences is limited without consideration of how children and adults in diverse religious traditions reason about these concepts. Two studies will be presented to address this question. In experiment 1, 419 undergraduate students (178 male, M age = 19 years) were asked to consider the function and role of the soul and the mind. Additionally, they were asked to consider several situations where an explicit religious concept of the soul would be likely to impact patterns of reasoning. Results indicate that particular beliefs about the soul, but not the mind, differ by religious background. Particular beliefs about the existence and function of the soul also influence individuals' reasoning about moral dilemmas, particularly abortion, euthanasia, and suicide. Experiment 2 extends these findings by looking at developmental patterns of reasoning about the soul and the mind in 5 to 16 year olds from different religious backgrounds. It is expected that patterns of reasoning about the soul, but not the mind, will become more differentiated across religious traditions with age.

Exploring Adults' Intuitions On Immaterial Agents: A Study Of Spirit, Soul And Mind

Maira Roazzi, Melanie Nyhof, & Carl Johnson, University of Pittsburgh

The cognitive science of religion is centrally concerned with the nature and culture of ideas about distinctly immaterial agencies. Considerable controversy currently focuses on whether concepts of "spirit" or "soul" are framed by an intuitive concept of "mind" and whether there is an intuitive tendency to think about sprit possession as a whole (transferring whole identities) or in part (partial transfer of attributes). The main goal of the present research was to examine how these concepts are organized, regarding the interplay of intuitive and cultural influences. Participants were presented to a series of contrasting conditions where either the spirit, soul or mind of one character is transported into the body of another character. Participants were then asked to make inferences about the consequences as a whole and in part, related to distinct attributes. Samples represent select differences in education, culture and theology: Brazilian samples consisted of university students (recruited from a public university in Recife) from a Catholic as well as a distinctly Spiritist persuasion, as well as a non-university sample from the Candomblé religion. In contrast to conventional Catholicism, Spiritists and the Candomblé have elaborate beliefs and practices about spirit possession. Comparative samples were also drawn from university students in the USA. The results obtained from the USA sample indicate that participants discriminate mind from soul and spirit corroborating previous findings in literature. Analysis of data from the Brazilian sample is still being run.

Discussant: Paul L. Harris, Harvard University

The Development Of Ownership: Looking Across Ages, Species, Cultures, And Domains

Organizer: Ori Friedman, University of Waterloo

Summary: Ownership of property is involved in countless activities, including sharing, borrowing, buying, and stealing. Ownership influences behavior in relation to things—the owner of a car is permitted to drive it, whereas non-owners may not. And it also influences social behavior and moral judgments—if a non-owner drives a car without the owner's permission, the owner will protest and will be supported by others. Reasoning about ownership involves abstract principles, raising the question of how these principles are acquired in childhood. Despite all of this, little research within cognitive development has investigated ownership. The goal of this symposium is to present the

"state of the art" in recent research on ownership, while also motivating ownership as an important domain of inquiry. Friedman and Neary provides evidence that preschoolers infer ownership via two different principles—one for non-owned objects and another for already-owned objects. Shaw and Olson provide evidence that children extend ownership to ideas by age five, and reason similarly about the ownership of objects and ideas. Rochat presents data from preschoolers from seven cultures, and suggests that there is a universal progression in how reasoning about ownership develops in early childhood. Brosnan provides evidence that non-human primates have some capacity to reason about ownership, and considers why they are limited in this reasoning. Our discussant Michael Tomasello brings expertise in social-cognition from developmental, cultural, and comparative perspectives, and will provide a synthesis of the papers and the new area of research they open.

How children discover and decide who owns what
Ori Friedman and Karen R. Neary, University of Waterloo

Appropriate behavior towards an object requires the ability to infer who owns it. There are two major contexts in which people make such inferences. In "Discover" contexts, people infer who owns an already-owned object (e.g., a ball with which several children are playing). In "Decide" contexts, people decide who has established ownership over an un-owned object (e.g., a seashell seen first by one child, but then grabbed by another). We provide evidence that although children use first possession to infer ownership in both contexts, distinct principles guide ownership inferences in each case. In Experiment 1, preschoolers watched scenarios in which two characters played with a toy in turn. When the toy began in one character's possession, children chose that character as the owner. However, children chose between the characters at chance when the toy began between the characters. We believe these findings suggest that in Discover contexts, children use first possession flexibly, as a means of inferring object history. In Experiments 2 and 3, preschoolers watched scenarios in which one character approaches an un-owned object, which another character then captures. Though the object began between the characters, children chose the first possessor over the approacher. However, this bias was diminished in scenarios where the approacher intended to obtain the object. These findings suggest that children weigh first pursuit against first possession when inferring ownership in Decide contexts. Together the findings of the three experiments suggest that preschoolers adhere to different principles when inferring ownership in Discover and Decide contexts.

'No fair copycat!': Children, plagiarism, and ownership of ideas
Alex Shaw and Kristina Olson, Yale University

Adults attach ownership to both objects and ideas. Children attach ownership to objects (Ross, 1996; Fassig, 2000), but whether they attach ownership to ideas remains an open question. To investigate the developmental emergence of ownership for ideas, our first two studies investigated children's responses to idea theft—plagiarism. If children respond negatively to plagiarism, this would provide evidence that they apply ownership to ideas. In Study 1 we found that 6-11 year olds and adults liked plagiarizers less than unique drawers, indicating an intolerance of idea theft by middle childhood. Study 2 investigated this question with 3-6 year olds using video stimuli. Five and six year olds evaluated plagiarizers more negatively than unique drawers, but 3-4 years olds did not differentially evaluate the drawers. These results provide preliminary evidence that by age 5 children assign ownership to ideas. In a second set of studies we investigated whether or not children's intuitions about ownership are similar for objects and ideas. Adults and children endorse the first possession heuristic for objects (Friedman, 2008; Friedman & Neary, 2008), inferring that the person who first touches an object owns it. In Study 3 we investigated whether 6-9 year olds apply the same first-possession heuristic to ideas, finding evidence that they do. These experiments provide the first evidence that children apply ownership to ideas and may use similar heuristics to determine ownership for objects and ideas.

Property sense by young children across 7 cultures
Philippe Rochat, Emory University

What is the role of culture in children's early reasoning about property? The question remains wide open. We collected data on the sense of property by young children across 7 cultures, testing over 200 3- and 5-year-old children growing up in highly contrasted social and cultural environments: urban children from low (1); middle to

upper middle class United States (2) or Brazil (3); low and very low class Brazilian children living either in crime infested Favelas of Rio de Janeiro (4); living un-supervised by adults on the streets of Recife (5); children from a Chinese Communist Party run university pre-school of Shanghai (6); and children growing up in a small scale traditional society on a remote Melanesian island in Vanuatu (Mota Lava in the Bank islands) (7).

Our observations show a unified and synchronous developmental tendency across cultures. From 3 years of age, all children are above chance in determining who owns what, on the basis of who created it and who is the neediest (poorest) among individuals fighting for ownership over that object. Across cultures, it is also by 5 years that children are above chance in determining property, on the basis of how much someone was familiar and used to live close to the object of contention.

We interpret these data as pointing toward a universal progression in the early developing sense of property, even among young preschoolers growing up in very different socio-cultural and economic circumstances.

Concepts of property in non-human primates
Sarah F. Brosnan, Georgia State University

Individual property is a rarity in most species of nonhuman primates, most likely because their lifestyles are not conducive to the maintenance of property. Nonetheless, just because these species do not frequently maintain property does not mean that they lack the propensity to do so. Several recent experiments shed light on primates' concepts of property. First, several primate species are known to show an endowment effect, similar to that in humans, preferring to maintain property that they have in their possession rather than trading it for other (presumably superior) items. Second, chimpanzees are quite good at barter, either between themselves and a human experimenter or between conspecifics, however they show little inclination to do so in risky or potentially costly situations. In a recent study, subjects were trained to barter with each other, yet ceased doing so as soon as experimenter control was removed. Property concepts beyond possession may be challenging for chimpanzees due to the risks involved when social and institutional controls for maintaining property (e.g. gossip or legal mechanisms) are lacking. By comparing these data in other primates to that available in humans, we gain perspective on how human property concepts have evolved.

DISCUSSANT: Michael Tomasello, Max Planck Institute for Evolutionary Anthropology

Bayesian models in cognitive development

Josh Tenenbaum, Massachusetts Institute of Technology

In learning about their world young children routinely make strong generalizations from just one or a few observations. Children's wild inductive leaps, while not always correct are successful far more often than they have any right to be: they far outstrip the generalization capacities of conventional machine-learning algorithms, or even the supposedly normative bounds on generalization performance given in computational learning theory. How? This talk will take a computational approach to answering this question, along with the parallel question of how we might bring machines closer to these distinctively human-like learning abilities.

I will argue that children's inductive leaps can be understood as Bayesian inferences over hypothesis spaces generated by abstract knowledge representations — what cognitive developmentalists have sometimes called "folk theories", "framework theories", or "schemas". The talk has two goals: first, to show how we can characterize formally some of the early-developing abstract systems of knowledge that guide children's early inductive leaps, second to explain how such knowledge systems can be modified, constructed and reconstructed in response to children's experience. This second goal is addressed by hierarchical Bayesian models, with multiple levels of probabilistic representation: higher levels generate hypothesis spaces and prior distributions for levels under them, and inference is performed at multiple levels simultaneously. These models show how abstract knowledge may be acquired at the same time as it is being used to guide more specific generalizations from sparse data. They address a key challenge which we can trace back at least to Piaget: balancing the learner's need for strongly held inductive biases—essential for constraining generalization from sparse data—with the flexibility to change and grow her understanding of the world, acquiring new inductive biases for which we could not have been pre-programmed.

Making Cognitive Development Research Relevant in the Classroom

Organizer: Nora Newcombe, Temple University, newcombe@temple.edu
Summary: To many of us, it seems obvious that research on cognitive development should inform educational practice. Is this promise being realized? In this symposium, three researchers will present data linking cognitive developmental principles to mathematics learning, and the final speaker will discuss policy and future directions.

Individual variations in preschoolers' mathematical knowledge: Parent talk matters

Susan Levine, University of Chicago

Mathematical knowledge is a central aspect of human cognition, and the development of this knowledge has been a topic of intense study. In large part, this literature paints a general picture of what children know at particular ages, as well as changes in their knowledge across development. Much less attention has been paid to individual differences in number and spatial knowledge, two central aspects of mathematical thinking. Here we consider the extent to which parent talk about number and space to young children varies, and the relation of these variations to children's knowledge.

Our data come from a longitudinal language project in which we followed a diverse sample of monolingual parent-child dyads every four months beginning at 14 months of age. Our findings show that there are marked variations in the amount and nature of parent talk about number and space in the early home environment. Moreover, these variations influence the development of children's knowledge, even controlling for overall parent talk. In view of recent findings showing that children's level of mathematical knowledge at the time of school entry is

predictive of later achievement, it is important to find ways of enhancing early mathematical input for reasons of equity as well as to increase the pipeline of students who are well prepared to enter the STEM disciplines.

USING PERCEPTUAL LEARNING PRINCIPLES TO IMPROVE MIDDLE SCHOOL STUDENTS' MATHEMATICS LEARNING
Christine Massey, University of Pennsylvania

Perceptual learning (PL) refers to experience-induced changes in the ability to extract information. Although perceptual learning has been recognized as crucial in the development of expertise, it has largely been neglected in K-12 instruction, which typically focuses on declarative and procedural knowledge. Experts selectively perceive problem-relevant features as well as higher-level relationships that seem invisible to novices, and they do so rapidly and with little attentional load. In contrast, even when particular distinctions and relationships are explicitly taught, novices often ignore them or fail to recognize them in new cases.

This talk will report on a series of experimental studies testing whether perceptual learning can be systemically accelerated in middle school mathematics, with a particular focus on concepts related to fractions and measurement. The perceptual learning interventions are delivered via specially designed interactive software modules. Assessments administered to control and intervention groups evaluate whether PL interventions improve performance on traditional mathematics problems. Study results indicate that PL interventions can produce robust, long-lasting gains in structural intuitions and fluency related to math concepts that are known to be problematic for many middle school students. Instructional approaches based on principles of perceptual learning thus may prove to be important complements to traditional forms of instruction in mathematics classrooms as well as other learning domains.

APPLYING COGNITIVE RESEARCH TO TRANSFORM ALGEBRA ASSIGNMENTS
Julie Booth, Temple University

Algebra 1 is considered to be a "gatekeeper course", determining for many students whether they will have access to higher levels of mathematics and science instruction. Unfortunately, many students fail to master Algebra, and a disproportionate number of those who fail are minority students. The purpose of the present study is to apply two well-documented instructional principles from cognitive research—worked examples and self-explanation—to create more effective algebra assignments and improve student learning of key concepts and procedures related to algebraic equation solving. In these assignments, we interleave both correct and incorrect worked examples with procedural problem-solving activities and prompt students to self-explain while studying the examples. Students who completed example-based assignments showed greater improvement on a test of key concepts and procedures compared with students in the control group, who worked on an alternate version of the assignments containing the same types of problems, but no examples or self-explanation prompts. The effect of the example-based assignments was even more pronounced for minority students, and a positive impact on the achievement gap was found. Results suggest that application of these important principles is useful for improving learning in real world classrooms.

CAN COGNITIVE SCIENCE TRANSFORM INSTRUCTION AND LEARNING IN SCHOOL?: AN OVERVIEW OF RESEARCH SUPPORTED BY THE INSTITUTE OF EDUCATION SCIENCES
Elizabeth Albro, Institute of Education Sciences, U. S. Department of Education

For decades, cognitive developmental scientists have described how learning occurs in the natural context of the home, and examined conditions that support or hinder learning in controlled laboratory settings. This body of research has created substantial knowledge of how learning occurs across development. However, we assume, but have not always explicitly asked whether these scientifically validated principles generalize to teaching and learning in school. The Institute of Education Sciences has asked researchers to bring the knowledge of cognitive science into the context of school, and to examine the conditions under which these these principles generalize to school-based teaching and learning. A synthesis of findings from these programs of research and a discussion of areas that remain unaddressed by the cognitive research community will be presented.

Learning from others: The scope of epistemic trust

Organizers: Cagla Aydin & Tamar Kushnir, Cornell University
Summary: Social information has been established as an important cue for word learning beginning in infancy (Baldwin, 1996). By age 3, children take into account the epistemic state of speakers, preferring to learn words from knowledgeable over ignorant sources (Sabbagh & Baldwin, 2001). Moreover, preschoolers can use a variety of cues to infer who is a knowledgeable speaker, including the speaker's age (Jaswal & Neely, 2006), history of accuracy (Koenig & Harris, 2005) or social consensus with others (Corriveau, Fusaro, & Harris (2009).

Recently, researchers have become interested in how children's epistemic trust may influence their conceptual development more generally. In this symposium we address how children evaluate and use information learned from others in domains beyond word-learning. These four papers present research examining the scope young children's epistemic trust from an international group of scholars. Specifically, Paper 1 asks whether children generalize speaker past accuracy across different knowledge domains. Paper 2 examines how preschoolers evaluate another's past accuracy in light of their own expectations. Paper 3 asks when and how children consider epistemic constraints in causal learning. The final paper asks whether children make use of linguistic expressions of knowledge source to evaluate conflicting information from others. Our discussant is a leader in the field of word learning and social cognition. Collectively, these talks show that children are sensitive to epistemic information; they learn from others in a range of domains and infer epistemic states from diversity of cues. We hope to offer new insights about the mechanisms through which children's developing social cognition influences how they learn about the world.

Developmental Change in the Scope of Children's Attributions about Others' Prior Accuracy

Patricia Brosseau-Liard & Susan A. J. Birch, University of British Columbia

Recent research on children's attention to speaker credibility in learning situations has demonstrated that preschoolers prefer to learn from a previously accurate individual in a variety of domains. Here, we present findings relating to children's generalization of past accuracy across knowledge domains. In a series of studies, we investigated the scope of preschoolers' attributions of knowledge following a history of accuracy in one domain. We found that older preschoolers generalized from knowledge about object functions to a variety of other domains. By contrast, younger preschoolers, although attentive to the informants' past accuracy, did not make such generalizations beyond the immediate domain. These data indicate a developmental change in the scope of children's attributions and inferences following a brief history of accuracy or inaccuracy.

Expectations vs. Informant Prior Accuracy as Factors in Children's Learning about Events

Stanka Fitneva, Queens University

There is a growing interest in the mechanisms underlying children's learning from the testimony of others and the cues that children use to discriminate between informants. Focusing on children's acquisition of knowledge about events, this paper will examine the role of children's expectations and informant prior accuracy in their informant selection and learning.

In two studies, we examined the hypothesis that 4-year-olds may be influenced by their expectations about the correct answer in evaluating informants. These expectations may discount the value of accuracy cues by leading children to choose an informant who confirms their expectations rather than an informant who had been accurate. Experiment 1 established that informants' agreement with participants' expectations is sufficient in itself to guide 4-year-olds' information-seeking behavior. Experiment 2 showed that when informants' agreement with children's expectations is contrasted with informants' accuracy, 4-year-olds selected an informant at chance despite accurately identifying who had been correct. Together, these findings suggest that 4-year-olds use their expectations to evaluate informants and may find it challenging to integrate information from different sources.

Preschooler's trust of others in causal learning

Tamar Kushnir, Cornell University

Preschool children learn about cause and effect through social transmission and through direct experience. Here, we investigate how these two pathways to causal learning interact. Specifically, study one asks whether children consider some causal actions to be more informative than others based on two components of an actor's knowledge state: whether an actor possesses causal knowledge, and whether an actor is allowed to use their knowledge in a given situation. Study two compares children's causal learning from their own actions to the actions of an expert. Study three addresses the question of whether preschoolers are sensitive to the fact that that some types of causal learning (e.g. learning functions of commonly used tools) may benefit most from social transmission whereas others (e.g. learning about the functioning of individual toys) may benefit more from direct experience. Taken together, these studies demonstrate that preschoolers consider both personal and situational constraints on knowledge when engaged in causal learning from other people, and that they evaluate other's knowledge in light of their own direct experiences.

Children's use of linguistic source cues to deal with conflicting information from others

Cagla Aydin, Cornell University

In order not to be misled when learning from others, children need to pay special attention to the indicators of speaker's knowledge state. Taking into account speaker's source of evidence, i.e., direct perception vs. social transmission, might result in attributing differential reliability values to the conflicting utterances. Linguistic expressions of the nature of speaker's evidence- evidentiality markers- have been found to influence children's learning from others' testimony. Little is known, however, whether young children make use of these grammatical markings of source to actively resist to suggestions by others. In a misinformation paradigm, we looked at children's use of linguistic coding of sources of evidence to infer epistemic trust. The findings demonstrate that use of grammatical markings of informational access in Turkish language -where evidentiality is a standard part of the message- act as a moderating factor in sensitizing children to the children's resistance to misinformation in children as young as 4 years old.

Discussant: Melissa Koenig, University of Minnesota

Mechanisms Of Learning From Multiple Exemplars: Alignment And Explanation

Organizer: Stella Christie, Northwestern University, christie@northwestern.edu

Summary: Learning from multiple exemplars is ubiquitous in cognitive development, in everyday life and in laboratory studies. For example, in habituation studies, infants are shown multiple exemplars of an event and subsequently tested on their understanding of it. The goal of this symposium is to lay out theory and evidence on the mechanisms underlying learning from multiple exemplars. The first presentation shows that learning spatial categories does not always improve with more exemplars; instead, it peaks at optimal numbers of exemplars, which depend on age and the specific task. The second presentation suggests that learning from multiple exemplars relies on comparison: preschoolers were more likely to arrive at a relational abstraction over exemplars (a) if they are induced to compare exemplars; and (b) if they have received prior exposure to close, readily comparable matches (progressive alignment). The third presentation also shows that prior experience, when aligned with the task at hand, can dramatically change learning from multiple exemplars: acquisition of non-adjacent dependencies in language-like strings was facilitated by prior experience with adjacent dependencies but not by experience with prosody. The final presentation shows that infants as young as 9 months can be taught to attend to spatial relations if they are shown alignable events with contrasting outcomes, and suggests that observing such a contrast prompts infants to derive an explanation for the difference. Altogether, the symposium demonstrates that learning from multiple exemplars benefits from highlighting contrast, facilitating alignment, and optimizing the range of exemplars.

From specific to abstract: Exploring the role of exemplar number in infant spatial categorization

Marianella Casasola, Cornell University

The present study explored whether infants best generalize a spatial relation to a novel instance when habituated to few or many examples of the relation, continuing the line of inquiry of Casasola (2005). Fifty-four infants of 10 months and 55 infants of 14 months were tested on their categorization of containment or support relations. Half of the infants assigned to each habituation relation (containment or support) viewed two examples of the habituation relation (i.e., two objects in a containment or support relation) while the remaining infants viewed six examples of the habituation relation (i.e., six objects in a containment or support relation). Results yielded a significant interaction of spatial relation, age and exemplar number, F (1, 105)= 7.69, p = .007. Infants of 10 months formed the abstract spatial categories of containment and support when habituated to six examples, but not when habituated to only two examples of each relation. In contrast, there was not a significant effect of exemplar number on 14-month-olds' spatial categorization, although their performance was more robust when habituated to only two examples for the support relation. The results indicate that the effect of exemplar number differs across development and that younger infants best learn to generalize a containment and support relation when provided with more rather than fewer exemplars during habituation.

Relational learning from multiple exemplars: the role of alignment

Stella Christie and Dedre Gentner, Northwestern University

The ability to represent and reason about relations is a core feature defining the human mind (Gentner, 2003; Penn, Holyoak, & Povinelli, 2008). We hypothesize that comparison and alignment across exemplars allows children to notice and learn common relational structure. In one line of research, we asked whether children would notice and use the simple relation of identity (i.e., matching AA with BB rather than with CD). Children were given triads of geometric figures, and asked to choose which of the two choices (e.g., circle-circle vs. triangle-cross) was most like the standard (e.g., square-square). No feedback was provided. 4.5-year-olds spontaneously chose the relational match, but 2.5- and 3-year-olds were at chance. Two methods of encouraging comparison led to greater relational responding in the younger group: First, children showed more relational matching when invited to apply a common label—e.g., "This [the standard] is a dax. Show me the other dax"—consistent with evidence that common labels invite comparison (Gentner & Namy, 2004). Second, children who had received a set of close matches (e.g., AA -> A'A' or CD, where A and A' differed only in color) subsequently showed more relational responding on purely relational matches (e.g., AA -> BB or CD) than did those receiving the same number of purely relational trials. In a related line, we found that 3-4-year-olds are better able to learn novel, complex spatial categories when they compare exemplars than when they receive the same exemplars either singly or sequentially.

Learning from Multiple Examples: How Experience Shapes Sensitivity to Statistical Regularities in an Artificial Language

Jill Lany, University of Wisconsin, Madison, and Rebecca Gomez, University of Arizona

Statistical regularities are pervasive in our environment, and play an important role in detecting structure in auditory and visual input. Statistical structure pertains to the particular items a learner experiences (e.g., item-frequency or probability of co-occurrence with another item), but several of our recent studies suggest that sensitivity to such structure can be dramatically improved through experience with similar patterns. For example, we found that 12-month-old infants who listen to an artificial language containing predictive relationships between adjacent word categories can subsequently learn relationships between novel words from these categories when presented nonadjacently. Infants given equivalent exposure to the language's vocabulary and prosodic characteristics, but not the co-occurrence restrictions, failed to learn the nonadjacent relationships. We also found that adults' experience with an artificial language containing adjacent relationships facilitates learning nonadjacent relationships instantiated in completely novel vocabulary. Moreover, we found that adults' acquisition of probabilistic structure was enhanced by prior experience with matched probabilistic contingencies, particularly when the two patterns were instantiated with varying surface features. Together these studies suggest that experience with multiple examples can highlight the

relevant units on which to track statistics, (e.g., word categories vs. individual words), as well as which statistics to track over such units (e.g., specific transitional probabilities between adjacent word categories).

Explanation-Based Learning through Observation and Action by Infants
Su-hua Wang, University of California, Santa Cruz

As they observe or produce events, infants identify variables that help them predict outcomes in each category of events. How do infants identify a new variable? An explanation-based learning (EBL) account suggests three steps: (1) observing contrastive outcomes relevant to the variable; (2) discovering the conditions associated with these outcomes; and (3) generating an explanation for the condition-outcome regularity discovered. In Experiment 1, 9-month-old infants watched exemplars designed to "teach" them the variable height in covering events. After watching three or two exemplars (but not one) designed in accord with the EBL account, infants identified the variable and used height information to predict the outcome of a covering event in a violation-of-expectation and an action task. In Experiment 2, when one of the EBL steps was removed from teaching events, 9-month-olds failed to learn even with three exemplars, suggesting that each of the EBL steps were essential for identifying a variable. In Experiment 3, 9-month-olds watched one exemplar but were allowed to manipulate the objects. The action experience compensated for insufficient data from the observational experience and facilitated infants' learning. Finally, Experiment 4 extended this research to 6-month-old infants, and showed that infants learned both normal and anomalous condition-outcome regularities as long as they were supplied with an explanation. This result highlights the importance of explanation in learning. Together, the present findings support the EBL account and help specify the processes by which infants acquire their physical knowledge through observational and action experiences.

Discussant: Dedre Gentner, Northwestern University

Neural and behavioral origins of mathematics
Organizer: Koleen McCrink, Barnard College, koleen.mccrink@gmail.com
Summary: This symposium aims to highlight several new findings in numerical cognition, using both the classic methods of the behavioral realm as well as the cutting-edge methods of developmental cognitive neuroscience. Used together, these methods paint a complex developmental picture of early intersensory numerical connections (Jordan), intuitive conceptions of complex arithmetic (McCrink), two neurally-distinct numerical subsystems in both infancy and adulthood (Hyde), increasing symbolic specificity for differing cortical areas (Cantlon), and individual differences in numerical processing (Ansari). This set of studies provides a window into not only numerical processing, but also the larger question of how any complex cognitive ability is mastered, and how this mastery is influenced by canalized cognitive blueprints, culturally-specific demands, and individual differences. The participants are a group of young investigators who have trained with well-established mentors and are forming new theories, and rethinking old ones, as their work progresses in their own laboratories. The discussant (Spelke) is known for her work on this topic, in addition to many other topics, and is well-qualified to provide a broad, relevant, and theoretical discussion/critique of the new methods and findings outlined by the participants.

The calculating brain: Roles of development and individual differences
Daniel Ansari, The University of Western Ontario

Adult neuropsychological and neuroimaging studies have consistently implicated a circuit of brain areas in the left inferior parietal cortex (comprising the angular and supramarginal gyrus) in mental arithmetic. Relatively less is known about developmental changes in the brain circuitry underlying calculation and how individual differences mathematical competence and strategy use affects brain activation. I will present data from functional and structural neuroimaging studies with children and adults that serve to demonstrate that the left inferior parietal cortex specializes for mental arithmetic over developmental time. Specifically, I will show that a dynamic, age-related shift occurs in the brain regions underlying mental arithmetic. Furthermore, I will demonstrate that individual difference variables, such as mathematical competence and strategy use modulate the activity of the left inferior parietal cortex

in such a way that mathematically more competent individuals exhibit higher levels of activation in these brain regions. These studies will serve to highlight the importance of understanding the developmental trajectories of the neural correlates of higher-level cognitive functions such as mental arithmetic.

Cortical Organization of Numbers and Letters in Early Childhood
Jessica Cantlon, University of Rochester

Cortical regions along the inferior temporal and fusiform gyri exhibit greater responses to images of real objects compared with scrambled images and the like (e.g., Grill-Spector, Knouf, and Kanwisher, 2004). Within these cortical regions, certain object categories such as faces and words evoke preferential responses in predictable subregions. How does this category-selective pattern of neural activity develop? We recorded brain activity (using fMRI) in four- to five-year-old children (N=15) and adults (N=14) as they passively viewed images from each of four categories (faces, numbers, letters, and shoes). Four-year-olds exhibited a similar degree of selectivity in the fusiform gyrus to adults for faces. Voxels that exhibited the strongest response to faces in children were within the typical adult fusiform face-selective region whereas voxels that responded more strongly to symbols (letters and numbers) were in the typical adult fusiform/inferior temporal word form area. Interestingly, the visual word form region that exhibited a response bias for both letters and numbers in children exhibited a bias only for letters in adults—likely because experience attunes this brain region to the specific symbolic elements relevant for reading words. This finding suggests that in the early developmental stages of symbolic number development, numbers share processing mechanisms with letters in high-level visual cortex. Our results reflect both the existing brain structure that allows children to process expected information (e.g., faces) and the brain flexibility that allows children to confront novel cognitive challenges (e.g., reading and math).

Neural evidence of representational differences between small and large numbers in infants
Daniel Hyde, Harvard University

Infants have the ability to mentally represent non-symbolic number. However, contrasting behavioral patterns suggest infants may represent small quantities differently than large quantities. For example, infants succeed at distinguishing between sets of 1 vs. 2, 1 vs. 3, or 2 vs. 3, but fail to distinguish between sets of 1 vs. 4 or 2 vs. 4. Nevertheless, infants are able to distinguish numerical quantities of the same ratios involving large numbers (e.g. 8 vs. 16) (see Feigenson et al., 2004). These contrasting patterns of successes and failures suggest distinct mental representations of small (1-3) and large (4+) non-symbolic quantities. Other evidence, however, suggests that all quantities are represented by one cognitive system (e.g. Cordes & Brannon, in press). Behavioral work has yet to distinguish between competing theories; measures of brain response may be a more sensitive measure of the underlying mental representations in infants, as has been the case with adults (see Hyde & Spelke, in press). A series of experiments investigated the neural response (ERPs) to number in 6-7.5 month old infants. We observed spatial, temporal, and qualitative differences between small and large number processing. Specifically, the P500 over parietal cortex was modulated by the numerical ratio between quantities for large numbers, but not for small numbers. And, the P400 over occipital-temporal was influenced by absolute cardinal value for small numbers, but not large numbers. These results are remarkably similar to those observed in adults and suggest that infants spontaneously form distinct representations of small and large non-symbolic number.

Intersensory Redundancy Enhances Early Numerical Abilities
Kerry Jordan, Utah State University

We have recently found that multisensory stimuli facilitate numerical performance in infancy and early childhood. The first experiment I will present employed a habituation-dishabituation paradigm and showed that providing redundant, multisensory numerical information allowed preverbal infants to make more precise numerical discriminations than when they were provided with numerical information in the visual modality alone. Furthermore, in the face of perceptually redundant information, six-month-old infants attained a level of discrimination previously thought attainable only after additional months of development. I will then outline our recent experiment that extended this line of work to preschool children, who performed more accurately in a

numerical matching task when given multisensory rather than unisensory information about number. In this study, three to five-year-old children learned to play a numerical matching game on a touchscreen computer, which asked them to match a sample numerosity with a numerically equivalent choice numerosity. Samples consisted of a series of visual squares on some trials, a series of auditory tones on other trials, and synchronized squares and tones on still other trials. Children performed at chance on this matching task when provided with either type of unisensory sample, but improved significantly when provided with multisensory samples. Taken together, the data from this series of studies suggests that intersensory redundancy may boost early cognitive abilities such as numerical competence.

Non-Symbolic Foundations of Mathematical Operations
Koleen McCrink, Barnard College

Many populations who do not possess symbols, language, or formal education are able to represent large numbers of objects in an approximate fashion. This "number sense" also appears to underlie the ability to perform rudimentary arithmetic operations. In this talk, I will discuss two projects which address the nature of these operations and the manner in which our minds calculate outcomes to numerical operations. In the first set of studies, infants, children, and adults were shown videos which depicted the addition of two visual arrays or subtraction of one array from the other. At all ages, the participants were able to perform the computation to arrive at the approximately correct outcome to the problem. Additionally, there is a bias in all age groups to overestimate addition outcomes and underestimate subtraction outcomes (termed operational momentum). A second set of experiments tested the hypothesis that our approximate number system can be used to support the operations of multiplication and division. In these studies, preschool children were shown a 'magic multiplying / dividing wand' which transformed a large array of objects by a factor of *2, *4, *2.5, or /2. They were then shown new arrays, which were occluded and multiplied/divided by the wand. In all conditions, these children were able to infer the outcome of this multiplicative/divisive transformation. Taken together, these studies provide support for the theory that the core system of numerical knowledge is able to transcend simple estimation and support calculations of arithmetic operations.

Discussant: Susan Carey, Harvard University

Saturday, October 17, 2009: 3:45 -5:30 pm

Inference in a social context: What social and non-social reasoning have to teach each other

Organizer: Laura Schulz, Massachusetts Institute of Technology
Summary: Learning in early childhood requires integrating specifically social information (about agents' preferences, goals, knowledge, and beliefs) with a wide range of inferential processes (language learning, statistical reasoning, inductive generalization, and causal reasoning). This symposium features young investigators at the cutting edge of work in each of these areas, presenting new research on how social cognition interacts with reasoning more broadly. Study 1 explores the extent to which infants' generalization abilities enable inferences about the stability of agents' goals across changes in physical context. Study 2 considers toddlers' ability to use statistical evidence (the degree to which samples are or not representative of a population) to make inferences about an agent's preferences. Study 3 investigates the ways in which understanding the conventionality of language helps children move beyond mere associative mapping between words and objects. Study 4 looks at how a social vs. non-social framing (introducing hypotheses as contrastive beliefs rather than mere possibilities in the world) affects children's ability to generate evidence to distinguish competing causal hypotheses. This exciting new work suggests that investigating the dynamic interplay between social processes and other cognitive domains may provide valuable insight into the mechanisms underlying both.

Infants' generalization of an actor's goals across the first year of life
Emily Blumenthal, Jung-eun Yun, Jessica Sommerville, University of Washington- Seattle

A crucial part of learning is knowing which aspects of an event can be generalized beyond the current situation. A variety of evidence suggests that infants' generalization abilities develop over the first years of life (e.g. Aaron et al., 1994; Gomez & Gerken, 1999; Hanna & Meltzoff, 1993). Whether generalization abilities develop differently across domains is an open question. Knowing more about how infants generalize features of an event can give us evidence about the underlying mechanisms of learning. The present studies examined the extent to which infants' generalization abilities intersect with their social-cognitive knowledge. In particular, we investigated whether infants generalize psychological states, such as goals, across changes in context and changes in people. Our results suggest that by 10-months, infants generalize an actor's goals across changes in context and changes in the superficial appearance of the actor (i.e. a change in clothing), but do not generalize one actor's goals to a different actor. It appears that by 10 months, infants are selective in their generalization of another's goal-directed actions: restricting goals to individuals, but generalizing them across changes in the physical context of the action.

Toddlers' Use of Sampling Evidence to Infer the Subjective Nature of Preferences
Lila Ma, University of British Columbia; Fei Xu, University of California- Berkeley

This work explores whether toddlers are able to use sampling evidence to infer the subjective nature of preferences. In the first study, after observing another person sample only boring objects from a population of mostly interesting and a few boring objects, 2-year-olds interpreted this apparent violation of random sampling as a cue to a preference and drew inferences accordingly: they revised their previous belief that the person would prefer the interesting objects as they themselves did and inferred that the person actually preferred the boring ones. When the person picked a few boring objects from a population that consisted of only the boring objects, 2-year-olds stuck to their prior belief that the person would prefer the interesting objects. In the second study, 16-month-olds responded similarly across the two sampling conditions, but they were less likely to update their prior belief than were the 2-year-olds based on the evidence of nonrandom sampling. Together these results suggest that the ability to infer the subjective nature of preferences based on sampling information emerges between 16 months and 2 years of age. Our findings provide some of the first evidence for an early ability to make rational inferences from statistical evidence in social understanding.

Conventionality grounds word learning in social reasoning
Kathleen Sullivan, University of California- Berkeley, Lori Markson, Washington University

What role do social-cognitive processes play in the learning of words? Learning the meanings of words could be characterized as simply mapping sounds to various aspects of the world. However, language gains its power as a referential, communicative, and intentional tool because speakers of a language share knowledge of those mappings. Speakers achieve communicative goals as a result of conventionality – the notion that users of a common language share knowledge of the lexicon, and expect others to use specific forms to express particular meanings. Are children sensitive to the conventional nature of words, or do they possess a more egocentric perspective, focusing on their own knowledge of word meanings without considering whether others share that knowledge? To address this question, we examined children's judgments about a speaker's use of conventional and unconventional labels for familiar objects. Our findings support the idea that young children expect speakers to use words in conventional ways. Further, children use this expectation to evaluate a speaker's use of words, such that they reason flexibly about whether an individual speaker is indeed a conventional user of the language. Children's sensitivity to the conventional nature of words suggests that word learning goes beyond the simple association of sounds with referents, and instead relies on the interplay of both social and cognitive processes.

The effect of contrastive beliefs on children's causal reasoning
Claire Cook & Laura Schulz, Massachusetts Institute of Technology

Considerable research speaks to the sophistication of young children's causal reasoning (e.g., Gopnik et al., 2004). Nonetheless, even school-aged children have difficulty generating evidence to show how they know what they know

(e.g., Kuhn, 1989). Here we show that children's ability to prove that one hypothesis is true and another false dramatically improves in a social context. In two experiments, children (mean: 56 months) heard hypotheses presented neutrally (e.g., "There are two ways this ramp could work: One is the height—it's the height that makes a difference to where the ball lands. Another way is that it's the kind of ball that makes a difference…") or as contrastive beliefs ("Emily thinks it's the height that makes a difference… Bob thinks it's the kind of ball…"). Children were allowed to play free freely and then told: "Show me that the height makes a difference and the kind of ball does not." Play did not differ between conditions, suggesting no difference in motivation. However, children were more likely to provide sufficient evidence (each ball at each height) in the beliefs than the neutral condition. In Experiment 3, children were asked to confirm and disconfirm each hypothesis separately ("Show me that the ball doesn't matter;" "Show me that the height does"). Children performed near floor in the neutral condition, but significantly better in the beliefs condition (25% at ceiling). We suggest that in undermining naïve realism, contrastive beliefs may support attention to sources of evidence.

CREATIONISM IS NOT THE (ONLY) ISSUE: DEVELOPMENTAL CONSTRAINTS ON AN UNDERSTANDING OF EVOLUTION

ORGANIZER: E. Margaret Evans, University of Michigan, evansem@umich.edu

SUMMARY: Among industrialized nations, the U.S. ranks second to last in acceptance of evolution (Miller, Scott & Okomoto, 2006). Even among those who endorse evolution, misunderstandings are the norm. What unites the papers in this symposium is the authors' desire to go beyond the science versus religion debate to ask why this is the case. The answers should reveal not only why evolution is problematic but also why creationist ideas seem so plausible. A key issue is that such beliefs seem to be rooted in children's early understanding of the world around them.

Papers 1 and 4 focus on essentialist beliefs in the inviolate nature of species. In Paper 1, adults who judged various behavioral and anatomical traits to be variable within species were more likely to grasp natural selection; however, most participants, especially children, denied such variability. In Paper 4, experts and novices used evolutionary trees to describe common descent, with novices more likely to interpret the trees as graphic representations of developmental change at the individual level, rather than evolutionary change at the population level.

Papers 2 and 3 focus on the power of narrative. In Paper 2, children who were read a picture-book on adaptive change in a novel species were more likely to grasp the process of natural selection and less likely to use teleological explanations. Paper 3 takes a different tack to find that college students' penchant for meaningful narrative led them to misinterpret animated and static cladograms, the abstract evolutionary trees that are ubiquitous in textbooks and exhibitions.

ESSENTIALIST CONSTRAINTS ON THE DEVELOPMENT OF EVOLUTIONARY REASONING
Andrew Shtulman, Occidental College and Laura Schulz, MIT

Historical analyses of evolutionary thought have identified two qualitatively different ways of understanding evolution: 'variationism' and 'transformationism' (Mayr, 2001). Variationism (the biologically correct theory) construes evolution as the selective propagation of within-species variation. Transformationism (the historical precursor to variationism) construes evolution as the uniform, cross-generational transformation of all species members. Recent work on evolutionary reasoning has revealed that most modern-day students hold transformational misconceptions similar to those held by pre-Darwinian evolutionary biologists (Shtulman, 2006). From where do such misconceptions arise?

In this talk, data will be presented suggesting that transformational misconceptions are a byproduct of early-developing essentialist biases. Participants in their study (43 children aged four to nine and 34 adults) were asked to judge the variability of various behavioral and anatomical traits across different members of the same species. Adults were also asked to provide explanations for a diverse range of evolutionary phenomena. On the whole, most participants denied the variability of most traits. Only adults who demonstrated a correct, selection-based understanding of evolution reliably endorsed the variability of both behavioral and anatomical traits. All other

participants denied within-species variability at least as often as they endorsed it, justifying their judgments in biologically inappropriate ways. These findings suggest that psychological essentialism, though a useful bias for drawing species-wide inductions, leads both children and adults to devalue within-species variation and, consequently, to fail to understand natural selection.

Reasons to be Cheerful: Young Children Can Learn about Natural Selection from Picture Books
Deborah Kelemen, Rebecca Seston, & Patricia Ganea, Boston University

"It is almost as if the brain were specifically designed to misunderstand Darwin and to find it hard to believe (Dawkins, 1987)." Research exploring adults and adolescents understanding of evolution justifies Dawkins' pessimistic assessment for biology education. Even after instruction, students' beliefs about the origin of adaptive traits remain rife with teleological and design-based misconceptions (Bishop & Anderson, 1986; Brumby, 1985; Ferrari and Chi, 1998)--misconceptions with roots in cognitive biases that emerge early in development (Kelemen, 1999; DiYanni and Kelemen, 2005; Evans, 2000). In this talk, we will however, provide reasons for optimism.

Recent work has shown picture books to be effective for teaching young children biological facts (Ganea, Ma & DeLoache, 2009). This project explored the viability of teaching 5- to 8-year-olds natural selection using the interpersonally rich context of picture-book reading. The book contained factual explanations of how a novel animal population acquired an adaptive body part (e.g., long nose) using the concepts of variability, selective advantage, differential reproduction, heritability, differential survival, and accumulation of change over multiple generations. Despite the many concepts that children had to process and the relatively short picture-book interaction, pre-test to test change in comprehension was profound in every age group. Five and 6-year-olds showed the greatest gains in comprehension (M=57% versus 89%) and all ages generalized the concepts to novel animals at post-test (M=86%). Seven and 8-year-olds also improved on independent measures of biases toward teleological explanations of biological phenomena. Implications of these results for teaching evolution will be discussed.

Re-telling the tree: How Viewers Spatialize Folk Theories of Evolution
Camillia F. Matuk & David H. Uttal, Northwestern University

Scientific representations should clarify concepts otherwise difficult to grasp verbally. However, recent research documents systematic misconceptions in reading an especially important diagram in evolutionary biology: The cladogram (Gregory, 2008; Halverson, 2008, 2009; Meir et al., 2008). Some offer perceptual explanations for these student errors (Novick & Catley, 2008), but the problem may be fundamentally one of narrative. Indeed, the narrativization of evolution is widely discussed by scholars from various fields (e.g., Abbott, 2003, 2008; Gould, 1995; O'Hara, 1992; Landau, 1997): On the one hand is our penchant toward narrative for structuring and relating our experiences; on the other is the very unnarratable phenomenon of evolution.

To investigate how meaning is constructed from a cladogram, we conducted a total of 152 individual interviews, in which we asked undergraduate students to interpret and reason with a cladogram. In Study 1, we found that particular visual elements cued them to project the folk theory onto the visual structure of the cladogram, and that these were associated with the errors documented in prior literature. In Study 2, we manipulated the presentation of the cladogram with animation, and found that certain assumptions of the viewer about the content and about the representational system were more flexible than others. Our follow-up projects investigate questions of the visual representation of evolution, implications for education, and provide suggestions for the design.

Tree-thinking: Do Pictorial Representations of Evolutionary Relationships Help or Hinder Museum Visitors' understanding?
E. Margaret Evans, Brandy Frazier, Ashley Hazel, Andrea Kiss, Jon D. Lane, Amy Spiegel, & Judy Diamond, University of Michigan

From Darwin's iconic representation of a simplified tree of life to abstract modern cladograms, graphic representations of evolutionary relationships between diverse species have played a crucial role in conveying core ideas about common ancestry. One question investigated in this study is whether such 'tree-thinking' helps viewers grasp the counterintuitive idea that contemporary species have descended from a common ancestor, which is unlike

its descendents. Common ancestry violates the everyday intuition that each kind of animal is characterized by an unchanging essence (Evans, 2000, 2001; Gelman, 2003; Mayr 1982). Further, this is the evolutionary principle most likely to be rejected by Biblical literalists.

We assessed natural history museum visitors' (30 adults; 32, 11-18 year-olds) interpretation of pictorial representations of four evolutionary trees: whale, human, HIV, fruit fly, following a visit to an evolution exhibition that included these trees. Visitors completed pre- and post-visit interviews; 15 expert biologists also did the post-visit interview. In comparison with data collected on non-pictorial scenarios, most participants—novice or expert— included discussion of common ancestry in their responses, even for the more complex trees. However, novice participants were more likely than experts to report that one organism "changes into" another, focusing on individual rather than population change. Trees typically show a single member of a taxon, inaccurately suggesting that the individual is the unit of change and, further, eliciting the everyday intuition that evolutionary change is like developmental change. In sum, while tree-thinking may foster acceptance of evolutionary relationships, it may impede an understanding of the mechanism.

Discussant: Karl Rosengren, Northwestern University

Understanding Knowledge Change: Investigations on How Children Learn Mathematic and Literacy Skills

Organizer: Bethany Rittle-Johnson, Vanderbilt University, bethany.rittle-johnson@vanderbilt.edu

Summary: Understanding how change occurs is the holy grail of developmental psychology; changes in knowledge, behavior and emotions obviously occur, but understanding when and how they occur has been elusive (e.g., Flavell, 1984; Siegler, 1998). What experiences help children perceive and encode problem information correctly? How do the symbols we use to present information impact learning? How does juxtaposing examples impact what children notice and learn? Participants in this symposium have been pursing questions like these to better understand how knowledge change occurs. Their studies have largely been conducted in the context of helping school-aged children learn mathematics, as well as early literacy skills. They bring together a wide range of perspectives on learning mechanisms that provide both insights into a fundamental issue in developmental psychology and into how educational practices might be improved. Our discussant, Mitchell Nathan, will reflect on the implications of the presentations for both cognitive science and educational practice.

Sources of Change in Children's Encoding of Mathematics Problems
Martha Alibali & Liza Meredith, University of Wisconsin, Madison

Theories of change in children's problem solving need to account for change at many levels of analysis, including changes in the correctness of problem solutions, in the strategies learners use to solve problems, and in the conceptual knowledge learners bring to bear on solving problems. This paper explores changes in problem encoding as an engine of change at other levels of analysis. Past research suggests that children sometimes solve problems incorrectly because they fail to encode key features of the problems. Further, past work has shown that there are close ties between problem encoding, conceptual understanding, and strategy use. However, relatively little is known about the factors that lead children to begin to encode new problem features.

This paper will review a series of recent studies that examine sources of change in children's encoding of mathematical equations. Study 1 shows that learning new strategies for solving the problems can lead to improvements in encoding. Study 2 shows that simple exposure to problems can lead to changes in encoding, via implicit learning about problem structure. Study 3 shows that manipulations that increase perceptual salience of problem features—in particular, manipulations of spacing in the problems—can lead to improvements in problem encoding. A better understanding of factors that lead children to alter their encoding will contribute to better understanding of processes of change in problem solving across levels of analysis.

Adaptive Learning Technology in Mathematics Learning: Optimizing Item Learning and Pattern Recognition

Philip J. Kellman, University of California, Los Angeles; Christine Massey, University of Pennsylvania & Timothy Burke

Computer-based learning activities offer great potential to adapt the flow of learning events to optimize progress for each individual. Here we describe research on novel adaptive learning algorithms that dynamically sequence learning items based on each learner's accuracy and speed of responding on earlier trials. By combining continuous, embedded assessment with a number of laws of learning, these algorithms allowing improved efficiency for factual learning as well as perceptual learning and pattern recognition. We will describe results from both laboratory studies and from studies of three adaptive learning modules with 3rd and 4th grade mathematics learners in online schools. Results indicate that adaptive sequencing based on accuracy and speed, as well as implementation of retirement criteria for well-learned items, produce efficiencies superior to control conditions lacking sequencing or retirement. In the online school studies, adaptive learning software produced remarkable gains in students' learning of basic math facts, their structural understanding of word problems, and in a comprehensive math review relevant to standardized testing.

Rethinking the role of concrete objects in early symbolic development

David Uttal, Northwestern University

Educators and researchers often assume that young children's thinking is inherently concrete. Consequently, educational materials for young children are often designed to appeal to their concrete way of thinking. For example, parents and preschool teachers often give children letter or number blocks to play with, perhaps with the assumption that these concrete symbolic objects will help children learn to read or to understand numbers. Likewise, early elementary school teachers use a variety of concrete manipulatives to help young children learn mathematics.

I will present the results of several studies that challenge the reliance on concrete objects in early childhood education. One line of studies has focused on the consequences of playing with letter blocks on children's recognition of letters, letter-sound correspondences, and the representational properties of letters. Another line of studies has addressed children's understanding of the correspondence between concrete and written representations of simple addition problems. In both cases, we found that working with concrete objects can be helpful in early stages of learning, but that it can be distracting or even inhibit learning in children who already understand the abstract or symbolic representation of the object. The results will be discussed in relation to theories (e.g., Goldstone & Son, 2005) that suggest that concreteness is necessary in early stages of learning but 'fades' as learning progresses.

Pathways to Flexibility: Leveraging Comparison and Prior Knowledge

Bethany Rittle-Johnson, Jon Star & Kelley Durkin, Vanderbilt University

We have been evaluating the role of a fundamental learning mechanism—comparison—in supporting knowledge of mathematical concepts and flexible procedures. Comparison, defined as identifying similarities and differences in multiple examples, has emerged as a potentially powerful means for promoting flexible, transferable knowledge (e.g., Gentner, 2005). However, few studies have investigated the advantages of different types of comparison or the importance of learners' prior knowledge. We have explored (1) what types of comparison supported the most learning and (2) how differences in learners' prior knowledge impact the effectiveness of the different comparisons. Across three studies (N = 70, 162, 236), middle-school students learned to solve multi-step algebraic linear equations by comparing solution methods, problem types, isomorphic problems, or by studying the same examples one at a time (sequentially). Results indicate that flexibility and knowledge of concepts were best supported by comparing solution methods and to a lesser extent by comparing problem types. However, this was not true for learners with low prior knowledge, indicating an important aptitude-by-treatment interaction. Overall, comparison is a key learning mechanism, but careful attention must be paid to what is being compared and who is making the comparisons.

Discussant: Mitchell Nathan, University of Wisconsin, Madison

POSTER ABSTRACTS

Plenary poster sessions are scheduled in the evenings on Friday, October 16 and Saturday, October 17. Alternate poster sessions are scheduled during the last symposia sessions on Friday and Saturday afternoons.

On the following list of abstracts, the session and poster number are indicated before the title of each poster. The session is noted with an "F" for Friday or "S" for Saturday, and an "A" is added to indicate an alternate session.

Examples: F21: Friday plenary session, poster #21
             SA11: Saturday alternate session, poster #11

The poster abstracts are listed in alphabetical order by the last name of the first author.

S1
Overhypothesis Formation in Young Children's Learning

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Overhypotheses are a form of abstract conclusions drawn inductively from concrete experience and used to constrain subsequent inferences (Goodman, 1965). For example, a learner may use first-order associations between individual mineral kinds (e.g. basalt, sandstone and malachite) and particular colours (black, red, and green, respectively) to hypothesize a second-order link, such that all mineral kinds are expected to have a characteristic colour. Overhypothesis formation has been proposed as a learning mechanism in early cognitive and linguistic development (Shipley, 1993; Smith, 1999). We report two studies in which 4- and 5-year-olds were presented with evidence of contingencies among object properties and asked to make predictions about analogous properties of related yet novel object properties. Our findings suggest that children's predictions were significantly influenced by second-order generalizations based on concrete evidence presented in the experiment, even when they were at odds with strong prior domain-specific knowledge.

F1
Children's Attribution of Perspectives and Emotions to Story Characters and its Relation to Narrative Ability

Naomi J. Aldrich, Patricia J. Brooks, Jennie Sines, Harriet R. Tenenbaum

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Storytelling serves as an important cultural tool for expressing socio-cognitive understanding. Younger (23 5/6-year-olds) and older (24 7/8-year-olds) children generated fictional narratives, using a wordless picture book about a frog experiencing jealousy, and were given a standardized test of emotion comprehension (TEC). Narratives were coded for instances and placement of emotion expression, thematic understanding, narrative emphasis and complexity. We also included a unique assessment of perspective taking, investigating how children objectively and subjectively narrate events through characters' varying viewpoints. Age-related differences in narrative emphasis and complexity, and socio-cognitive understanding were found. Older children scored higher than younger children on the TEC and on understanding the story's complex emotional theme, including the ability to identify a rival. They were more advanced in perspective-taking abilities, and showed differential placement of emotion expressions. Results are discussed in relation to the interplay of socio-cognitive discourse and narrative ability during middle childhood.

S2
Preschoolers' Emotional Memory in the Context of Close Relationships

Kristen Weede Alexander, Heidi Bortfeld

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The pattern of parent-child interactions during the preschool years forms a foundation for how children think about and recall their experiences. This is particularly important when experiences involve emotion. The present study involved 3- to 5-year-old children and their mothers engaging in a series of emotion-evoking tasks, discussing shared attachment-related events, and completing a variety of memory and individual difference measures. Results indicate that features of the family environment, patterns of emotion talk, and reminiscing style predict children's memory for negative, attachment-related stories. Furthermore, the relations among these measures of the developmental context differ according to age. Findings will be discussed in relation to theories of children's memory development in the context of close relationships.

FA1
Young Children's Word-Learning in Pretend Contexts

Margaret Altschaefl

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The current study examined children's word-learning in a pretend context, focusing specifically on a word's conventionality and categorical scope. In a painting activity, 3- and 4-year-olds were either told that gazzer was "also" a label for a paintbrush, or that they should pretend that gazzer referred to the paintbrush. In both cases, a novel function was given to the paintbrush. Children were asked to produce the label for the object and to select other possible gazzers from an array of paintbrushes. When labeling was accompanied by the suggestion of pretense, children were more likely to evidence comprehension of the novel term and extended the term to a more diverse set of exemplars. These results suggest that children may more readily suspend mutual exclusivity and accept a more expansive category boundary for novel terms learned in pretend contexts.

SA1
Grammatical Gender Influence on Object Perception in Bilingual Speakers

Jissel Anaya, Catharine Echols

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Some languages, like French, Spanish, and German, make use of grammatical gender to organize nouns, verbs, adjectives, pronouns, and articles, in contrast to English, in which these words are gender neutral. The use of grammatical gender has been found to influence the conceptions of both adults and children. The present study examines how bilingualism affects 6-year-old children's gender personification of inanimate objects. After assessment of language dominance, bilingual children were assigned to Spanish Dominant or English Dominant conditions. Half of the Spanish Dominant and English Dominant children were primed in English and half were primed in Spanish. Monolingual English children were only tested in English. Using a game-like task, children were asked to categorize pictures of objects (half masculine and half feminine in Spanish) into either a male or female category. Results will be discussed in relation to the linguistic specificity of effects of language on categorization.

S3
Think Before You Read: When Reading Helps or Hinders Science Learning

Florencia K. Anggoro, Nancy L. Stein, Marc W. Hernandez

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We examined the effects of instructional presentation on 4th-grade children's understanding about the observable and molecular properties of the three states of water. We argue that the vocabulary used to define and describe science concepts is unknown to most children and adults. The cognitive effort devoted to reading takes attention away from learning core concepts and the graphics that illustrate these concepts. We will report findings from a study where we varied when in the instructional sequence reading occurs–before

or after an oral presentation of the content–and examined how these conditions compare with repeated reading or oral presentations. We argue that reading before science concepts are understood is problematic for both decoding and understanding. If reading occurs at the end of an oral presentation, however, it should begin to enhance and further promote comprehension of the science content.

FA2

Investigating the Relationship between Language and Landmark Use

Amber Ankowski, Emily Thom, Aaron Blaisdell, Catherine Sandhofer
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To investigate the role of language in children's landmark use, we used a search task procedure modified from one previously used by MacDonald, Spetch, Kelly and Cheng (2004). Participants were trained to find a toy in the center of a square array of four identical landmarks. After children's performance reached criterion, they received a probe test trial in which the landmark array was expanded. Results revealed that children's ability to use the landmarks relationally was related to age, overall comprehension of spatial relational terms, and whether children were cued with relational language ("middle"). Spatial language had a major impact on children's landmark use, revealing that as children's spatial vocabularies develop and change, so does their ability to navigate the world. The results of this study add to a growing body of research demonstrating that language learning influences children's cognition.

FA3

The Role of Conversational Questions in Children's Vocabulary Learning

Marnie Arkenberg, Brain MacWhinney
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Most investigations of the role of functional questions on children's vocabulary acquisition have focused on questions about causation or labels; they frequently to do not assess the role of conversational question use. This investigation centered on the question of whether seemingly mundane questions such as "What did you say?" are related to preschool-age children's expressive vocabulary knowledge, and whether those types of questions can provide clues about the causes of differences in vocabulary proficiency between low- and mid-SES preschoolers. While conversational question use was positively related to children's expressive vocabulary in both groups, the type of conversational questions used varied: while use of repair questions was positively related to children's expressive vocabulary in both groups, only mid-SES parents and children used significantly more questions designed to maintain conversations. Discussion focuses on the sensitivity needed on the part of the child and the parent to maintain continued dyadic interactions.

F2

How Teachers Talk: Revoicing and Children's Emerging Understanding of Symmetry

Marnie Arkenberg, James G. Greeno, Brian MacWhinney
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Frequently, educational programs are evaluated by individual children's performance on individual assessments. But as a group, children may present as far more knowledgeable about a concept than any individual appraisal might dictate. In this project we investigated the role of teacher language on children's collective understanding of the concept of symmetry. Using transcripts from a second-grade classroom unit on geometry we examined teacher use of recasting to emphasize children's increasingly sophisticated ideas about the meaning of the word 'symmetrical'. As a group, children's understanding moved from more simplistic contentions about the meaning of the word, to more complex claims about its meaning. This change was positively related to teacher use of revoicing as opposed to more rudimentary linguistic moves such as repetition. Thus, the use of language that both highlighted and extended key components of the word helped to underscore its defining features, resulting in group understanding.

S4

When X Doesn't Mark the Spot: Children's Understanding of the Representational Nature of Maps

Andrea Astle, Corrie Vendetti, Erin Jansman, Gal Podjarny, Deepthi Kamawar
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While research has focused on children's ability to understand symbols, little has examined their understanding of maps as representational systems. To further examine this issue, we presented 80 4- to 6-year-olds with modified use-a-map tasks (Myers & Liben, 2008) indicating the location of hidden stickers (e.g., turtles and tigers), measures of inhibitory control, working memory, and the PPVT. Preliminary results indicate that even our youngest children easily use maps to find hidden stickers when the representation matches the referent, however, performance drops drastically when the representation and referent completely conflict (e.g., a turtle indicates the location of a tiger sticker). Currently, we are testing a version with partial conflict (e.g., orange dot indicates a green turtle). The results will be discussed in terms of the role of cognitive factors in using maps as representations as well as the specific demands made when representations are in conflict with their referents.

F3

Categorization of Infant-Directed Speech: Processing Asynchronous Audio-Visual Speech

Kristin Kuhlman Atchison, Kate Georgelas Shepard, Melanie J. Spence
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Previous research findings suggest 6-month-olds categorize infant-directed speech (IDS) when presented auditory IDS only (Moore, Spence, & Katz, 1997; Spence & Moore, 2003) or synchronous audiovisual IDS (Atchison, Spence, & Touchstone, 2009), but not when IDS is paired with a static neutral female face or a dynamic female face not synchronized with the speech signal (Atchison, Spence, & Touchstone, 2008). The current research examined the effect of two types of asynchrony on categorization of approving and comforting IDS by 6-month-old infants. Experiment 1 presented infants with approving or comforting IDS paired with a video of an opposing intent utterance (e.g., approving speech with comforting video). Experiment 2 presented infants IDS paired with alternate utterances from the same intent category as the speech signal. The effects of these two types of audio-visual asynchrony on speech processing will be discussed in relation to the development of IDS categorization.

FA4

Communication and Inhibition in Children with and without ADHD

Kristi Baerg, Elizabeth Nilsen
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Children's inhibition skills have been found to relate to their communicative perspective-taking skills (Nilsen & Graham, 2009), leading to the prediction that children who have inhibition deficits will face more difficulties in their communicative behaviour. In order to assess this prediction, children with, and without, Attention Deficit Hyperactivity Disorder (ADHD) were assessed on measures of inhibition and communication. Boys ages 6-9 years-old with ADHD (n=10) and without (n=10) participated in an interactive referential communication task (where they were required to take the perspective of the speaker), a receptive vocabulary task, and a computerized inhibition task. Parents completed measures of their child's communication skills. Results revealed significant differences between the two groups in inhibitory control and communication as rated by parents. There was a trend toward children with ADHD exhibiting more egocentric interpretations (i.e., stemming from their own rather than the speaker's perspective) in the referential communication task.

S5
Face Discrimination in Preschool-Aged Children

Lorraine E. Bahrick, Melissa A. Argumosa, Hassel Lopez, James T. Todd

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According to the Intersensory Redundancy Hypothesis (IRH; Bahrick & Lickliter, 2002), perception of modality specific information (e.g., facial configuration) is facilitated in nonredundant stimulation, but attenuated in multimodal, redundant stimulation (e.g., synchronous audiovisual), where redundancy competes for attention. Accordingly, Newell, Bahrick, & Sternstein (2007) found that 4-year-olds showed enhanced facial recognition in unimodal visual as compared with multimodal synchronous speech events. The current study extends this investigation to asynchronous audiovisual presentations. Asynchronous audiovisual speech provides the same amount and type of stimulation as synchronous audiovisual speech, but eliminates intersensory redundancy. If redundancy interferes with face discrimination, then 4-year-old children should show enhanced face discrimination for asynchronous speech, similar to unimodal visual speech. Results supported our predictions. These findings extend predictions of the IRH regarding facilitation of attention to modality specific properties in nonredundant stimulation, to naturalistic face perception in young children.

S6
Entrenched Folk Physical Beliefs Held by Typically Developing Children and Children with Autism

Sara Baker, Kim Murray, Bruce Hood

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In folk physics our intuitions may tell us one thing whereas data from controlled systematic investigations often reveal something else to be true. For example under everyday circumstances heavy objects appear to fall faster than light objects because they are more subject to air resistance. Nonetheless the laws of physics instruct us that all else being equal (in the absence of air resistance) heavy and light objects fall at the same rate. Difficulty in physics often arises when abstract theoretical expertise competes with intuitive concepts. We will present work with typically developing children aged 6 to 10 and children with autism, concerning their intuitive beliefs about the relation between weight and speed in vertical freefall. Findings suggest entrenched beliefs influence children's observations even when the beliefs are misguided and counterevidence is available.

S7
Children's Memory for a Dental Procedure: The Impact of Stress and Coping on Remembering

Lynne Baker-Ward, Peter A. Ornstein, Rocio Quinonez, Michael Milano, Hillary Langley, Seungjin Lee

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In this presentation, we explore children's memory for minor operative dental procedures carried out in the context of a University Pediatric Dentistry Clinic. In this clinic, children received one of three procedures: extractions, fillings, or crowns. Initial data suggest significantly greater recall for the children in the extraction group, in comparison to those who received fillings or crowns. This variation in recall across the three dental procedures is examined in the context of individual differences in stress, as assessed by our research assistants using the Behavior Profile Rating Scale (Melamed, Weinstein, Hawes, & Katin-Borland, 1975) and compliance as measured by the dentists using the Frankl Behavior Rating Scale (Frankl, Shiere, & Fogels, 1962). In addition, linkages among measures of children's temperament (Rothbart, 1994), stress and coping strategies, and recall are being explored. The implications of our findings for an understanding of children's testimony concerning stressful experiences will be discussed.

S8
Early Arbitrary Object Memory in Toddlers May Set the Stage for Episodic Memory

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The origins of episodic memory are poorly understood. In adults, episodic memory has been linked to the ability to remember associations between objects. Research by Naveh-Benjamin with elderly subjects reveals deficits in such memory, except when supported by familiar semantic relationships. Perhaps the developmental emergence of episodic memory, which begins to appear after 24 months, is similar, building on an ability to remember increasingly complex associations between objects. Two experiments explore associative object memory in toddlers. In experiment 1, children sort four objects into two containers and, after a five-minute delay, are asked to match each object to its container. In experiment 2, children learn different configurations of objects, using a variety of cues in unique arrays (person, place, objects). Data from both experiments indicate that children as young as 16 months can make arbitrary object-object associations, perhaps reflecting the earliest building blocks of episodic memory.

S73
Specificity in Children's Memory for Negative Social Information

Nicole Baltazar, Kristin Shutts, Katherine Kinzler

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In two experiments, we tested for a negativity bias in preschool-age children's memory for interpersonal acts committed by novel peers. Experiment 1 assessed children's ability to rapidly encode and remember whether individuals were nice or mean. Experiment 2 tested the specificity of children's memory for particular positive and negative actions performed by others. Children demonstrated better and more detailed memory for negative compared to positive

information, providing evidence that like adults, young children show heightened attention to potential threats in their environment. Current studies are focused on testing children's memory for positive and negative acts committed by members of different social categories (e.g., race, ethnicity).

F4
Storytelling and Ownership: Children's Conceptions of Intellectual Property
Jennifer Barnes, Kristina Olson
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While a growing body of research has investigated children's early understanding of physical ownership (e.g. Friedman and Neary, 2008), little is known about the degree to which children see intangible ideas or creative works as things that can be owned. Here, we explore children's conceptions of intellectual property by examining the degree to which they feel proprietary over stories they have created. Four, five, and six year old children were asked to make up a story with imaginative content, and then their stories were retold without their permission to a third party. Participants were either given or not given credit for making up the story, and their reactions were recorded and coded for objections and overall affect. Across age groups, children tended to object more and display a more negative affect when their stories were stolen than when they were simply retold, an effect exacerbated in more competitive contexts.

S9
Developmental Continuity in Numerical Estimation
Hilary Barth, Annie Paladino, Jessica Sullivan
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How do our mental representations of number change over development? The dominant view holds that children (and adults) possess multiple representations of number, and that age and experience lead to a shift from greater reliance upon logarithmically-organized number representations to greater reliance upon more accurate, linear representations. We present a different account of the development of numerical estimation, based on the idea that many numerical estimation tasks entail judgments of proportion. We extend existing models of perceptual proportion judgment to the case of abstract numerical magnitude. Two experiments provide support for these models. This work demonstrates that proportion-judgment models provide a unified account of estimation patterns that have previously been explained in terms of a developmental shift from logarithmic to linear representations of number.

FA5
The Role of Testimony in Solving a Gravity-driven Invisible Displacement Task
Igor Bascandziev, Paul L. Harris
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We asked if 2- and 3-year-olds can benefit from verbal information to overcome the gravity error that they commit on Hood's (1995) tubes task. Children were randomly assigned to one of two conditions. They received verbal instruction on one trial only about how to solve the task in the Testimony condition and they received perceptual information about the correct location of the ball in the Control condition. Only the 3-year-olds in the Testimony condition improved their performance. In a second experiment, we added an additional condition in which the experimenter drew children's

attention to the tubes. However, he did not provide specific information about how to solve the task. Once again, only the 3-year-olds in the Testimony condition improved their performance. These findings suggest that providing relevant verbal information is important in overcoming some entrenched biases about the motion of objects.

S10
Gesture and Moral Development
Leanne Beaudoin, David Walsh, Jennifer Olsen, Bianca Frusa, Laura Pacheco, Susan Goldin-Meadow
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Gesture serves as an index of transitional knowledge (i.e. readiness to learn) for young children learning math concepts. We ask whether gesture can also serve as an index of transitional knowledge for an abstract social concept: Kohlbergian moral reasoning. 30 children, ages 10-11, were videotaped answering questions about a particular moral dilemma. Participants were given a training intervention, where they observed two adults debate a dilemma. Subsequent to training, participants were asked to respond to a final moral dilemma. Speech explanations of the dilemmas and the gestures accompanying those explanations were both coded for level of moral reasoning with the goal of identifying the presence of mismatches between gesture and speech. Preliminary results suggest that gesture-speech mismatches index a readiness to acquire new levels of moral reasoning subsequent to training, demonstrating that gesture-speech mismatches, as indices of transitional knowledge, can be extended to abstract social concepts.

F5
Cognitive Dissonance in Birds
Tamra Beckman, Jennifer Vonk, Stephanie Jett
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Cognitive dissonance has not been studied extensively in children or non-humans. The present study attempts to extend these findings by presenting six members of the parrot (Psittacinae) family with a cognitive dissonance paradigm modeled after Egan Santos and Bloom (2007). In experimental trials subjects were given choices between two equally preferred food items. In control trials subjects were presented with one accessible and one inaccessible option from another triad of equally preferred food items. Next, the unchosen or previously inaccessible item and a novel equally preferred item were presented. The birds showed no significance preference for the novel versus the unchosen option on experimental trials, suggesting that they did not resolve dissonance by devaluing the unchosen option from previous trials. This result is consistent with a previous study in which monkeys, but not black bears, exhibited cognitive dissonance, which suggests that this phenomenon may be unique to primates.

SA2
Changes in Children's Representations of Water-Related Activities in Rural Uganda
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Researchers agree that children's understanding of projects in the developing world designed to enhance community health, such as cleaner water sources, is important for their success (Malone, 2001), yet little is known about how children comprehend and engage in these efforts. Children's participation in cultural practices plays a critical role in cognitive development (Rogoff, 2003). This study investigated how children's understanding of water-related activities

and responsibilities in a community undergoing such change were depicted in representational drawings. Children, ages 9-16, from rural Uganda depicted more traditional images, such as jerry cans and natural watering holes, in their drawings with few images of the new water pumps. Interviews indicated children had knowledge of the pumps being built, however they were not yet incorporated in representations of their daily activities. Follow-up data, collected after the pumps were in use, revealed increasing incorporation of this new water source in the children's drawings.

FA6
One Trial Learning in 16-Month-Olds
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Sometimes learning happens from a one-time experience. Other times, learning is incremental and requires many trials. What creates learning in one trial? Here we show that past learning about events, that is itself incomplete, can set the stage for one trial learning about a new event. Six 16-month-old children were presented with picture-to-picture pairings (association condition) and six other children were presented with the same pictures but in random pairings (random condition). Using the Preferential Looking Paradigm, both groups were tested on trained associations and exposed to one instance of a novel pairing. Despite failure to show complete learning of trained associations, we show that infants learn a novel association in one instance in the association condition only. This suggests that partial past learning that is filled with regularities is enough to create sensitivity to novel regularities and cause learning to happen quickly, in as little as one trial.

S11
Perceptual-Motor Task Demands Affect Young Children's Ability to Inhibit
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Eighteen-, 24-, and 36-month-old typically developing children and 3 children with diagnoses on the PDD spectrum participated in 3 locomotor A-not-B tasks. In one condition, children walked directly to a goal, in another they descended stairs, and in a third they walked 18-cm balance beams. The primary outcome measure was whether participants could inhibit taking the path to the old goal location and take a new path after the goal switched to a new location. Preliminary results suggest that A-not-B tasks may elicit perseveration only when they are processed at a global level, whereby the task is perceived as a choice between goals, rather than processed at the local level, whereby each path is perceived as an undertaking unto itself. Moreover, as infants become more cognitively and motorically proficient, demands that elicit perseverative errors change, suggesting that perseveration is a function of overtaxed resources.

S12
Stop One Thing or Stop Everything: Developmental Trade-offs in Global vs. Selective Inhibition
Katharine A. Blackwell, Nicholas J. Cepeda, Yuko Munakata

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Children are constantly required to inhibit their behaviors. Unitary accounts argue that a single mechanism supports inhibition in many tasks. Multiple pathway accounts argue that there are two types of inhibition: fast global inhibition for stopping all responses, and slower selective inhibition for stopping one response in favor of another. Adults use whichever pathway is more efficient in a given task (Aron & Verbruggen, 2008), but our research suggests a developmental trade-off in ability to use these pathways. Children who are better at selective inhibition (i.e., task-switching) are worse at global inhibition (i.e., stop signal). Specifically, six-year-olds who switched between tasks (N=18) had slower stop signal reaction times (582 ms) than children who perseverated on the first task (N=15, 477 ms, $F(1,30) = 6.3$, $p < .05$). Perseverators may use global inhibition, which supports faster stopping but not switching, while switchers use selective inhibition, which supports switching and slower stopping.

F6
Developmental Increases in Cognitive Flexibility during Middle Childhood
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Cognitive flexibility is the ability to modify thought based on a shift in rules, as well as to consider multiple aspects of a situation simultaneously. The purpose of the current study was to specify the development of cognitive flexibility between 7 and 11 years and to examine the relations between general and specific measures of flexibility. Forty-seven children completed spatial and reading flexibility measures, as well as a modified dimensional change card sorting task, a multiple classification task, and a theory of mind task. As expected, general and reading-specific cognitive flexibilities increased significantly with age. There was also evidence for domain-specific aspects of flexibility. However, contrary to expectations, there was a lack of evidence for domain-generality. These results suggest that cognitive flexibility continues to develop throughout middle childhood. Moreover, these findings support the idea that cognitive flexibility may be domain-specific in nature.

S13
Children's Belief in a Novel Non-Holiday-Related Fantasy Figure
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Belief in fantasy figures, such as fairies and Santa Claus, is a prominent feature of early childhood. Yet children find some figures more believable than others. Holiday-related figures, such as Santa Claus, are considered real by more children than generic figures, such as fairies. This study tested the hypothesis that fewer children would believe in a non-holiday-related novel entity (Candy Floss) than believed in a novel entity associated with Halloween (Candy Witch) in previous research. 53 children (27 4- to 5-year-olds and 26 6- to 9-year-olds) learned about Candy Floss as part of a lesson on healthy eating at school/camp and were interviewed one week later. Parents were given the option of simulating a Candy Floss 'visit' in the intervening week. 82% of younger and 58% of older children believed in Candy Floss, disconfirming the hypothesis. Belief was associated with being visited among older, but not younger, children.

F7
Maternal Elaboration and Behavioral Direction during Reminiscing
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This presentation focuses on new findings from the Durham Child Health and Development Study (DCHDS), a large-scale longitudinal

project tracking typically-developing European American and African-American children and their families (N=206) of lower- and middle-SES backgrounds from birth through the early elementary years. Focusing on mother-child reminiscing when children were 36-months of age, we examined maternal elaborative style using traditional indices to reflect the degree to which mothers utilized elaborative questions and comments in their conversations with their children about jointly-experienced past events. In addition, we developed an innovative coding system to capture maternal direction of child behavior in order to assess the ways in which mothers attempted to maintain children's attention and on-task engagement. Analyses focus on variation in both maternal elaboration and maternal regulation of children's behavior and explore the extent to which this variation is linked to socio-cultural variables.

FA7
Story Time: The Dynamic Organization of New Cognitive Structures
Rebecca Boncoddo, Caitlin Sleight, Lara Shearer, James A. Dixon
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Previous work with preschoolers, as young as three years old, has demonstrated that children discover new representations through their own actions while solving gear-system problems (Boncoddo, Dixon & Kelley, in press). The current study sought to further understand the role actions play in the creation of new cognitive structures. We asked 45 preschool children to solve a series of gear-system problems after experimentally manipulating their understanding of gear-systems by reading them stories. Half the children heard stories that explained the simple physics of the gears, the remaining children heard analogous stories that contained no information relevant to the problems. Motion data was collected as the participants solved the series of problems. Methods from non-linear dynamics were used to analyze the motion data. We show that hearing relevant stories affected their long time-scale dynamic organization, and that these effects propagate across scales in the cognitive system.

S14
The Relation of Magnitude Acuity to Mathematical Ability in Young Children
Justin W. Bonny, Stella F. Lourenco
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Infant's ability to differentiate values of number and size indicates the presence of an early approximate magnitude system (AMS). Over development, number acuity becomes increasingly fine-grained (Halberda & Feigenson, 2008). Recent research has focused on the relation between number acuity and higher-level (symbolic) mathematical abilities. At the center of the debate is whether symbolic mathematical reasoning can be mapped onto non-symbolic representations of number and magnitude information more generally (e.g., size). Investigations testing the relation between numerical acuity and symbolic math achievement scores have produced conflicting results. The proposed study investigates the relation between general magnitude acuity (number and size) and different types of mathematical abilities (symbolic and non-symbolic). Children between 3 and 6 years will complete size and number discrimination tasks along with tests of mathematical understanding. This study seeks to examine how magnitude acuity more generally relates to symbolic and non-symbolic math reasoning.

S15
Children's Interpretive Theory of Mind and Self-Perceptions: Age and Gender Differences
Sandra Bosacki, Janet J. Boseovski, Candace C. LaPan
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This study examined individual differences in the relations among children's interpretive theory of mind understanding and self-perceptions. 125 children 6-11 years (62 males, M = 104.976 mos; 63 girls, M = 103.809) completed tasks concerning self-concept and theory of mind understanding by completed an interpretive perspective-taking (Droodle) task and the Harter Self-Perception Profile. Results from a 2 X 2 (Gender X Age) Mixed ANOVA indicated significant age and gender differences in the Droodle task with older students (10-11 y) scoring higher than younger children (6-7 y). Overall, independent of working memory, compared to boys, girls scored on the self-concept behavioural conduct score revealed that they perceived themselves as more well behaved than boys. Results indicated a positive association between scores on Droodle task and a Sarcasm Task for boys only (r(47) = .281, p < .05, girls ns). Educational implications for developmental social reasoning and self-understanding are discussed.

S16
Neural Correlates of Children's Belief- and Desire-Reasoning: An ERP Study
Lindsay Bowman, David Liu, Henry Wellman
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"Theory of Mind" requires understanding both desires and beliefs, and much evidence suggests that children understand the former before the latter (i.e. Wellman & Liu, 2004). Recent research has begun to examine the neural mechanisms associated with desire- and belief-reasoning in adults. Liu, Meltzoff, and Wellman (in press) recorded ERPs as adult participants performed closely comparable desire and belief reasoning tasks (with physical situation tasks as a control). They found that a late slow wave (LSW) with mid-frontal scalp distribution related to desire- and belief-judgments; however a LSW with right-posterior scalp distribution related uniquely to belief-judgments. A critical question concerns whether such neural dissociation involved in desire- and belief-reasoning occurs in early childhood, or if some circuits become specialized for belief reasoning only later in development. The present study collected ERP data from 7- and 8-year olds (following methods of Liu, Meltzoff, and Wellman) to directly address this question.

S17
Concepts of Ignorance and False Belief in 15-Month-Old Infants
Amanda C. Brandone, Henry M. Wellman
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A key component of mature theory of mind is understanding the asymmetry between ignorance and false belief – between merely lacking some relevant knowledge and possessing a specific but mistaken belief. In the current studies, we explore 15-month-olds' concepts of ignorance and false belief using looking-time procedures comparable to those of Onishi & Baillargeon (2005). We test the extent to which infants differentiate ignorance and false belief by examining how infants respond when ignorant agents and mistaken agents act in ways that are consistent and inconsistent with their beliefs. Findings indicate that 15-month-olds (1) understand that beliefs/ignorance are person-specific (not shared) and (2) respond differently to agents that adults would see as ignorant versus

mistaken. These results will be discussed in terms of how they help clarify the nature of infants' early theory of mind understanding.

F8
The Impact of Pedagogy on Infants' Understanding of a Tool Use Sequence
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Csibra and Gergely (2005; 2006) and Gergely, Egyed, and Kiraly (2007) have suggested that infants respond to cues such as eye contact, name referral, pointing, infant-directed speech, and gaze-shifting by adopting a "pedagogical learning stance" in which they are ready to absorb relevant new information. The present study compares infants' responses to an identical motion stream providing causally relevant tool-use information that is presented in a pedagogical versus nonpedagogical manner. Following this viewing, infants' ability to process and produce causally-relevant aspects of a tool use sequence is analyzed in order to determine if the pedagogical cues enhance their learning. This research has links to other phenomena in infants' learning, such as Kuhl's (2007) social-gating hypothesis, which suggests that information presented within a social context is particularly appealing to the learning system of the infant. Implications for pedagogy theory, social learning, and causal learning in infancy are discussed.

F9
Preschool Engineers?: Young Children Coordinate Material and Design Properties to Judge Functional Capacities
Kimberly Brenneman, Rochel Gelman, Jamie Liberti, Zipora Roth, Christine Massey

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We ask whether preschoolers understand that natural and manufactured materials and objects have specific properties that constrain their uses. Children are asked whether an object with a particular design (bowl or colander) made of a particular material (metal or paper) will serve a specific function (containing water, sand, or gravel). To respond accurately, they must coordinate the relevant properties of the containers and the to-be-contained substances. Sixty-five percent of low SES participants (n=48, M=54 months) met a binomial criterion of p=.05. The group average was 73% correct. Explanations revealed attention to material kind properties (e.g., water in a paper bowl will make a mess 'because it's gonna break the paper') and design (e.g., gravel in a metal colander is 'not gonna fall because it's got little holes'). Follow-up training studies will assess baseline understandings, carefully control learning inputs during intervention, and measure post-intervention understandings.

S18
Infants' Small Number Discrimination: The Role of Featural Information
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The current study was designed to address the role of featural information in infants' number discrimination. Nine-, 11-, and 13-months-olds were habituated to pictures of objects (e.g. bowl, shoe) in either groups of two or three. In the test phase, infants saw both new and old objects in both groups of two and three. The 9-month-olds discriminated number independent of the familiarity of the object. In contrast, the 11-month-olds appeared to discriminate

between the familiar and novel objects. The 13-month-olds discriminated between the familiar and novel object when the number of objects was familiar, but not when the number of objects was novel. These data suggest that number is easily abstracted and that early number representations do not contain featural information. As infants get older, they begin to incorporate featural information into their representations, but they do so in a step-wise fashion, as demonstrated by the 13-month-olds' data.

F10
The Time-course of New Word Learning in Children
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Adult research has demonstrated that newly learned spoken words are accurately recognised immediately after exposure, but do not become fully integrated into the mental lexicon until after sleep (Dumay & Gaskell, 2007). Two experiments examined whether children show a similar time-course in vocabulary learning. Seven-year-old children were familiarized with novel non-words (e.g. biscal) and tested on their ability to recognise and recall these non-words. In Experiment 1, participants were re-tested either the same or the following day, whereas in Experiment 2, all participants were re-tested the following day. Both experiments showed essentially the same pattern: although children accurately recognised the novel non-words immediately after exposure, recall was initially poor, showing improvements only the following day. These findings suggest that children, like adults, show effects of consolidation on the processing of newly learned words.

S19
Effects of Eye Gaze on Imitative Grasping Behaviour in Children and Adults
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Imitation is crucial to children's learning and requires social attention. Social attention can be indicated by eye gaze; that is, where a person looks can be indicative of her thoughts and future actions. The current research examines the effects of eye gaze on motor imitation behaviours in 3- and 6-year olds and adults. It is predicted that when a model's gaze is directed towards one of two objects, grasping of that object will be imitated more accurately than the object not gazed at. Preliminary results demonstrate this effect in 6-year olds and adults, but not 3-year olds. Half of the trials have specific goals. Want and Harris (2002) have shown that children will omit steps of a sequence that they determine irrelevant to the goal. It is predicted that 6-year olds will be aware of the goals, and thus imitate specific grasping actions less faithfully than will 3-year olds.

S20
The Influence of Pedagogical and Statistical Cues on Children's Imitation of Causal Action Sequences
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Recent work in children's imitation of causal actions has presented us with an apparent paradox. On the one hand, children seem to be selective in their imitation, for instance by changing their imitative responses based on the intentions or the success of the actor. On the other hand, children also imitate causally superfluous actions. One possibility is that children may rationally adjust their choice of which

actions to imitate, based on cues such as the statistical relationship between actions and outcomes and the manner in which the actions are presented. For instance, there is evidence that whether the demonstrator takes a pedagogical stance influences children's causal inferences. Here we explore whether different combinations of observed causal relationships, and framing of the demonstration lead to "selective" imitation in some cases, and to "over" imitation in others.

SA3
Why Are Children Consequentialists? Growing into Moral Deontologists
Marine Buon, Jacob Pierre, Dupoux Emmanuel
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Developmental psychologists have observed that it takes several years for children to reach adult moral 'maturity' (Piaget,1932 Kohlberg,1969). In particular toddlers tend to reason in terms of positive versus negative consequences of actions, whereas adults reason in terms of intentions to do bad or good. Here, using non verbal animated cartoon stimuli, we find that 3 to 5 year old toddlers tend to give more weight to consequences than to intentions, contrary to adults who give significantly more weight to intentions. We find however that adults revert to the toddler's pattern when they have to perform a demanding secondary task. In the context of dual process account of moral judgment (Green, 2002, 2004; Cushman,2008) our results supports the claim that adults moral system is composed of the superposition of an early robust consequence-based intuitive system present and a later acquired cognitively demanding intention-based reasoning system.

S21
Exploring Relations between Maternal Book Talk and Children's Temperament
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Parent-child book reading has been advocated as an important context for children's language development. It is important to consider the quality of support that children receive when sharing books with their parents beyond the frequency of reading. Although child temperament is unrelated to whether mothers read to infants (Karrass, et al., 2003), the relation between the quality of maternal support and children's temperament has not been reported. The present study is a preliminary exploration of the relation between the quality of maternal book sharing and children's temperament. Dyads shared wordless picture books when children were 13, 18, 24, 30, and 36 months of age; maternal support was categorized according to the types of statements and questions that were used. Mothers completed the Toddler Behavior Assessment Questionnaire when children were 13, 24, and 36 months of age. Results will shed light on the role of children's characteristics in mother-child book sharing.

SA42
How Do Children Track Change? Further Advances in the Theory of Mind
Emily Burdett, Justin Barrett
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Research over the past 15 years suggests that children younger than 5 years old have a difficult time understanding the thoughts, beliefs, and intentions of other humans. A subfield of theory of mind research focuses on children's understanding of non-human minds, such as dogs and God (e.g. Richert & Barrett, 2005). This subfield attempts to distinguish further limitations and constraints of cognitive capacities in the theory of mind domain. The present research furthers theory of mind research by exploring children's understanding of other agent's perception and memory. Each task asks children to distinguish between non-human and human agents and also to distinguish between each agent's abilities across time. The present research will present cross-cultural data, collected in both Anglican communities in England and Modern Orthodox Jewish families in Israel.

S22
The Role of Visual Cues in 3-year-olds' Rule-Representation in the Dimensional Change Card Sort Task
Aaron Buss, John Spencer
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We present data that sheds light on the nature of 3-year-olds' rule-representation in the DCCS. Zelazo, Frye, & Rapus (1996) first demonstrated a dissociation between children's rule-use and rule-representation in the DCCS. Despite failing to switch rules when sorting cards, these children were still able to answer questions about the rules for the post-switch game (e.g.,"Where do red ones go in the color game?"). Munaka & Yerys (2001), however, showed that children have significantly more difficulty answering questions about the post-switch rules if the questions contain the same amount of conflict as when sorting cards (e.g., "Where do red stars go in the color game?"). Here, we show that children's rule-representation is also dependent upon the structure of cues in the task-space: systematically removing structure from the task-space (i.e., removing target cards or removing the sorting trays) degrades children's accuracy when answering the uni-dimensional questions used by Zelazo et al.

FA9
Pulling out the Data: Adult Framing Helps Children Extract Causal Evidence Embedded in a Complex Scene
Lucas P. Butler, Ellen M. Markman
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Learning causal relationships in a world with many overlapping actions, children must both identify a causal problem and know what components of an event to attend to in order to extract meaningful evidence. In four studies, we demonstrate the importance of adult framing of a causal event ("Which animals make Lion laugh?") in helping children extract the evidence and make the correct inference when it is embedded in a more complex scene. There was no effect of framing when evidence was isolated (Study 1), but children required framing when evidence was embedded in a complex scene (Study 2). Subtler framing that only highlighted the causal problem ("What makes Lion laugh") was sufficient for children to extract the evidence (Study 3). Simply making the causal relationship more perceptually obvious helped, but not as much as framing (Study 4). These results show the importance of adult input in scaffolding children's causal learning.

FA10
Cross-Cultural Differences in Age of Earliest Memories in the Swahili and Maasai of Kenya
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We examined cross-cultural differences in adults' earliest memories in two different ethnic groups in Kenya: the Swahili (n = 17, 9 female) and the Maasai (n = 24, 13 female). Using a questionnaire developed by MacDonald, Uesiliana, and Hayne (2000), adult members of each group were interviewed verbally and asked to describe and date their earliest memories. Maasai adults reported significantly earlier memories (M = 3.6 years, SD = .98 years) than Swahili adults (M = 4.91 years, SD = 1.39 years), t (39) = 3.58, p < .001. Maasai adults also reported significantly more frequent discussions of the past with family members as a child (p < .001), greater importance of remembering and celebrating the past in their culture (p < .001), and more frequent discussions about the past on an average day (p < .01), than Swahili adults.

F11
11-Month-Olds Anticipate Goals
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Work by Falck-Ytter et al. (2006) suggests infants visually anticipate 'goals' by the end of the first year. However, the 'goal' in their study was confounded with the end of the movement. Thus, it is unclear whether infants anticipated movements, or goals. In the current study, 11-month-old infants were tested in an eye-tracking paradigm in which they viewed a hand enter from one side of the screen to grasp one of two toys on the other side. After multiple presentations of this action towards the same toy and location, toy placement swapped (3.5 s). Infants then viewed a 2.5 s test trial in which the hand entered and made a straight reach between the two toys. Anticipatory saccades from the hand were reliably made to the same goal object more often than to the old movement location. This finding suggests visual anticipation was guided by a goal representation.

SA4
Discrete and Continuous Quantities: The Role of Number
Lisa Cantrell, Linda B. Smith
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Research investigating quantity perception has shown that there may be two systems for representing number : a small number system used to encode sets of 1-3 items and a large system used for quantities of 4 or more (Carey, 2001, 2004; Feigenson, Dehaene, & Spelke, 2004; Xu, 2003; Xu & Spelke, 2000). Here we asked whether current theories in number concepts are related to the perception of continuous and discrete entities. We tested children (ages 4-5) and adults who were monolingual speakers of three different languages (English, Spanish, and Japanese) in a novel noun generalization task. Results showed that when objects were presented in set sizes of 1-3 objects, participants across the three languages construed entities as being discrete while collections of 4 or more objects were perceived as parts of a continuous quantity.

S23
Students' Attitudes toward Science: Does Change Predict Behavior?
Elizabeth Carey, Lisa Szechter
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Along with efforts to strengthen formal science education, there is increasing interest in out-of-school, informal learning experiences for sparking children's early interest in, and improving their understanding of, science. Science education centers provide opportunities for hands-on, inquiry-based learning- unique aspects of science education that may be missing from the classroom. We examined school group visits to an informal science education center housed in an active gravitational-wave observatory. Students participated in hands-on experiments, interacted with hands-on exhibits, and learned about ongoing research through movies and presentations by staff scientists. We measured students' attitudes toward science at three different time points before and after their visit, asked students to reflect upon their visit, and videotaped their behaviors at four different exhibits during their visit. Here we report on changes in students' attitudes toward science, and associations found between their attitudes, reflections, and behaviors.

F12
Cross-linguistic Differences in English-, German-, and Korean-learning Infants' Categorization of Support Relations
Marianella Casasola, Soonja Choi, Katharina Rohlfing, Silke Fischer, Youjeong Park, Cheryl Downs, Juyoun Pyoun
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In the present study, we examined whether infants' ambient language influences how they form categorical representations of different support relations. English-, Korean-, and German-learning infants of 14, 18, 21, 24, and 27 months were habituated to three examples of a tight-fit, horizontal support relation (e.g., a Lego man placed on a Lego block). Infants then viewed a new example of the familiarized relation, an event that presented a change in orientation (i.e., VERTICAL support), a change in the tight-fit relation (e.g., LOOSE-FIT support), or a change in the support relation (e.g., horizontal, tight-fit CONTAINMENT). Preliminary findings show a significant difference between English and German infants and between infants of 14 months and those of 24 and 27 months, suggesting both cross-linguistic and developmental changes in infants' spatial categorization of support relations.

SA5
Social Perspective Taking and Learning Disorders: How Learning Disorders Can Affect the Social Realm
Tracy Cassels, Susan Birch, Sherilynn Chan, Samantha Bangayan
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Social perspective-taking (the ability to accurately identify what others' are thinking, feeling, desiring, or believing) is an important facet of development and has been linked to better verbal ability (e.g., Happe, 1995). This relationship has typically been assessed with children who have developmental delays like Autism. Children with learning disorders (LDs) are another group who may have lowered verbal ability but without the other intellectual deficits associated with other developmental disorders. The primary question herein is how children who have been identified as having a LD perform in the social realm. Despite the relationship between perspective-taking and verbal ability, it is unclear if simply having a verbal deficit is enough to impact one's perspective-taking abilities. To test this, children were recruited from a school for LDs and were tested on a battery of social perspective-taking abilities. Results are presented along with a discussion of the potential implications.

F13
Individual Differences in Children's Prospective Memory Performance: Qualitative Change Matters

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Across two sessions, 3-year-olds (N=32, mean age=43.1, SD=5.4, males=12) were asked to complete four prospective memory (PM) tasks, a prosocial and nonsocial task that varied on interest level (high or low), followed by a battery of executive functioning measures, and four tasks to assess belief/desire reasoning about themselves and others. Three-year-olds were most successful at completing the high-interest nonsocial PM task (90%), followed by the high-interest prosocial (84%), low-interest nonsocial (45%), and finally, the low-interest prosocial task (35%), Cochran's Q (N=29, 3)=23.83, p=.000, and required significantly fewer reminders to do so, mean difference=-.714, p<.008. When executive functioning factors were controlled during logistic regression analyses, children's belief-self and belief-other performance uniquely predicted success on low-interest prosocial and low-interest nonsocial tasks, respectively. Qualitative changes in children's theory-of-mind representation accounts for their ability to remind others to carry out delayed intentions of relative low-interest and to carry out these intentions themselves.

S24
The Attentional Basis of Deontic and Moral Reasoning in Social Situations

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Social contract theory suggests that children and adults use deontic reasoning more efficiently in the context of social contracts relative to other contexts (Cosmides & Tooby, 1992; Harris & Nunez, 1996). Cummins (e.g., 1996, 1998) has proposed that this is an innate representation. We argue that this reasoning is more likely the product of an extended juvenile period in which children's attention is sensitive to information relevant in social contracts (Bjorklund & Pellegrini, 2001). A change blindness paradigm is implemented to assess the subtle differences in children's attention to information in scenes depicting social obligation or precautionary rule violations and fulfillments. This study uses a novel paradigm to further our understanding of; (1) the development of proximate mechanisms associated with deontic reasoning in social situations, (2) the breadth (and narrowing) of the social contract domain across development, and (3) children's moral judgments of violators of precautionary rules versus social obligations.

S25
Children's Trust in Testimony: The Roles of Prior Knowledge and Epistemic Authority

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When learning from testimony, we consider not only the characteristics of our informants, but also the state of our existing beliefs and knowledge. In this study, 4- and 5-year-olds matched pictures of artifacts with their functional categories in the context of a computer game. First, children practiced in the presence of a teacher. For specific items, the teacher provided labels that ran counter to the child's existing beliefs. Next, children were videotaped (in the teacher's absence) to 'teach younger children how to play the game'. We discuss the rates of compliance and testimony transmission in children who received unexpected testimony on target items that were straightforward, versus children who received unexpected testimony on target items that were ambiguous. The influence of teachers' epistemic authority (as shaped by the cultural context) is also explored.

FA11
Development of Memory for Object-in-Place Association

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Relational memory refers to a specific type of memory that binds all the information of an event together. A large body of work indicates a critical role for the hippocampus in relational memory tasks (Hannula et al., 2007; Mayes et. al, 2004; Bachevalier & Nemanic, 2008). Little is known, however, about the development of relational memory (and, by extension, the hippocampus) in human infants. The purpose of this project is to modify a task that has been successfully used to examine the role of the hippocampus in spatial relational memory binding in non-human primates to investigate the development of spatial relational memory in human infants. We tested 9- and 18-month old infants in two tasks: Control task for memory of object identity for a group of three objects and object-in-place task for spatial relational memory regarding changes of spatial location within a group of three objects. Our preliminary results indicate that 9-month-olds show a trend in memory for object identity (n = 11; p=.07) but fail to show spatial relational memory (n = 11; p=.55), whereas 18-month-olds show memory for object identity (n = 12; p <.01) and also fail to show spatial relational memory (n = 12; p=.19). We are now testing 24-month old infants to see whether spatial relational memory is present in this older age group.

FA12
Young Children Use Self-performed Actions to Organize Memory

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Adults organize to-be remembered items into thematically similar groups when learning verbally, and by type of action for self-performed actions (Koriat & Pearlman-Avnion, 2003). Four- and 6-year-old children may show a bias towards processing information learned through action even when learning verbally, as they are not yet capable of organizing conceptual information effectively (Bjorklund, 2009). In the present study, children either performed a series of actions or learned them verbally. Self-performed action increased action organization (and decreased thematic organization) to a greater degree than verbal learning increased thematic organization (and decreased action organization), F(1,31) = 10.1, p = .003. These differences in organizational styles suggest that there is an early bias toward memory organization of action that may lay the groundwork for eventual conceptual organization.

FA13
Concurrent Statistical Learning of Words and Categories in Preschool Children

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Previous studies have shown that both adult and infant learners are able to simultaneously keep track of co-occurrence statistics among multiple words and objects across different learning trials. They can

then use this statistical information to establish first-order word-to-object associations. The present study further investigates whether preschool children are sensitive to first-order word-referent associations and second-order rhyme-to-category correlations, which has to be built upon the regularities existent across the instances that are learned. An additional question is whether they can use such features as a cue in categorizing novel objects. Children between the ages of 3 and 5 were tested. The preliminary results indicate that 3-, 4-, and 5-year-old children have comparable performance in the word-referent mapping task. However, only 5-year-olds successfully extract the second-order statistical regularities and generalize them to novel object categorization. The significance of the findings is to suggest a developmental trajectory of children's statistical learning ability.

F14
Linguistic Cues to Conventionality at 14 Months
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We ask whether 14-month-olds understand that labeling an event conventionalizes it, building upon evidence that infants selectively imitate unusual actions (Gergely, Bekkering & Kiraly, 2002). When an experimenter turned a light on with her head, 14-month-olds turned the light on with their heads more often when the experimenter's hands were free than when occupied, indicating that 14-month-olds evaluate behavior for rationality. We modified the original paradigm to investigate whether labeling the unusual action would increase imitation. The experimenter, always with hands occupied, performed the action as in the original study (control), or labeled the action with a novel verb ("I'm going to blick the light") or a neutral phrase ("Look!") before the action. Females, but not males, in the verb condition were more likely to touch the light with their own heads; infants' behavior in the neutral condition did not differ from control. 14-month-old females interpret labeled behavior as conventional.

F15
Sesame Street: Science Learning in the Museum
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Previous research has shown that female high-school students who want to pursue a career in the quantitative sciences report visiting museums more frequently than females who do not choose these careers. These results suggest that early museum visits may be important factors in the motivation of young females' scientific career choices. Museum studies have also shown that parents are much more likely to explain causal relationships during a science exhibit to boys than girls. The present study examined 4 to 8 year-old children and their parents interacting during a Sesame Street Body exhibit. Parent-child interactions were observed during a new (neutral) exhibit and children were later asked to explain to a naive experimenter what they had just learned. Findings will be discussed in terms of gender-linked differences in interactions, parental perceptions of their children, and their roles.

F16
Preschoolers' Free Will Understanding
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Past research has reliably found that our understanding of free will is a largely intuitive and very important concept for moral reasoning.

However, little research has focused on studying the development and early emergence of this concept in children. This study thus investigated four-year olds' reasoning about their own freedom of choice under physically constrained and epistemically constrained circumstances. Experiment 1 showed that children reliably stated that they had the freedom to act differently than they did, but did not have that freedom when they were physically constrained from doing so. Experiment 2 proposes to test children's understanding of freedom of choice under epistemic constraints. That is, children will be asked to reason about their freedom to act in a certain manner both when they were and weren't provided the necessary information to do so. Together, these findings have important implications for young children's understanding of free will and morality.

F17
Progressive Alignment and the Comparison of Events in Verb Learning
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An important problem in verb learning is how to extend verbs to new situations. The study examines how object similarity across events influences children's comparisons of the events, helping them to generalize a verb to new situations. Two-year-old (n = 12/condition) and 3-year-old children were shown either 2 very similar events and then 2 more varied ones ("progressive alignment"), or were shown either only similar events or only more varied events for a single verb. It was predicted that children in the progressive alignment condition would perform more appropriate extensions of the verb to new objects than would children in the other conditions. Results will be discussed in relation to Gentner's (1983; 1989) theory of structural alignment and comparison. In addition, the results will be compared to those from a sample collected in Seoul, Korea. This approach is important because it addresses a central problem in verb learning.

SA6
The Effects of Lexicalization on Korean Children's Inferences about Personal Characteristics
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Lexicalization influences children's inferences about the stability of personal characteristics (Gelman & Heyman, 1999). To examine whether such lexicalization effect is universal, the current research tested Korean children. Five- and 6-year-old Korean children heard about characteristics of a child. Half the children listened to a noun label referring to each character (e.g., "He is a great sleeper"), but the other half were told a verbal predicate (e.g., "He sleeps whenever he wants"). The 6-year-olds who heard noun labels were more likely to predict that characteristics are more stable across time and situation than were those who were told a verbal predicate. However, the 5-year-olds children did not show any difference whether they heard a noun label or a verbal predicate for each character. The results are discussed in terms of language-universal and language specific effects of lexicalization on concepts.

SA7
The Relations between Theory of Mind and Deontic Reasoning in Korean Children

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This study attempts to explore the relation between theory of mind and deontic reasoning in Korean children. The experiment included false belief, moral reasoning, and conventional reasoning tasks, which were developed in Flavell, Mumme, Green, & Flavell (1992). Thirty 3-year and 4-year old children (15 for each group) participated in the experiment. The means of correct responses were analyzed in ANOVA with age as a between-subjects factor and task type as a within-subjects factor. Neither the age nor the task type factor was significant. The correlations among the tasks were also found. The results implied that the reasoning in the theory of mind would be related with deontic reasoning. However, Children judged the moral transgression worse than the conventional transgression, when they were further asked to rate the seriousness of transgression in moral and conventional reasoning tasks. We will discuss these findings from a cross-cultural point of view.

F18
The Impact of Generic vs. Non-Generic Language on Children's Motivation

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Recent evidence suggests that the distinction between generic (e.g., "Boys are good at math") and non-generic (e.g., "Johnny is good at math") sentences has a powerful effect on young children's social cognition. In addition to conveying broad-scope facts that are difficult to falsify, generic sentences imply that the information they express is "deep" and essential (Cimpian and Markman, under review). For example, children think that a novel ability introduced in a generic sentence is more likely to stem from a stable trait (e.g., being smart) than from effort and practice; if the same ability is introduced non-generically, however, children's construal emphasizes effort over traits. The current study (n = 97 4- to 7-year-old children) demonstrates that these cognitive/representational differences translate into differences in children's actual motivation to play a novel game that was described with either generic (e.g., "Boys/girls are really good at this game") or non-generic (e.g., "There's a boy/girl who is really good at this game") language.

S26
Preschoolers Use of Live and Televised individuals as Sources of Information about the Real World

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The current study investigated whether preschoolers would equally rely on information provided by a televised source or a live source. 18 3.5-year-olds and 18 4.5-year-olds were introduced to a live person and a televised person who provided conflicting information about the location of a hidden sticker. To make certain that children realized that the live person was a real person, they met with the live person for a minute before the study began. Children not only said that the televised individual could see the hiding event, but also acted on this belief by searching for the sticker in the location suggested by the televised individual about as often as a different location suggested by the live individual. These results suggest that preschoolers do not believe that distinguishing between live versus televised sources of information is important for making decisions about events in the real world.

S27
A Friend Who Knows What to Do: How Competency and Helpfulness Influence Young Children's Help-seeking Behavior

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We sought to understand whether young children are sensitive to differences in the quality of help provided by two different sources. During an exposure session, 3-year-olds engaged with two experimenters who demonstrated how to operate novel sets of toys that required problem-solving and were designed to be conceptually, but not physically challenging. One experimenter was competent and socially available, whereas the other was incompetent and socially unavailable in demonstrating how to operate the toys. In a subsequent testing session, children had the opportunity to turn to either of the experimenters for help in operating the toys. The dependent measure was the direction of children's help-seeking behaviors. Preliminary results (n= 8) suggest that 3-year-olds can distinguish between the experimenters, and are more likely to turn to the competent and socially available experimenter than to the incompetent socially unavailable experimenter for help (F 1,7=7.99,p=0.026).

S28
Benefits of "Concreteness Fading" for Children with Low Knowledge of Mathematical Equivalence

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A longstanding controversy concerns the use of generalized, abstract symbols versus perceptually rich, concrete materials to facilitate learning. Although recent evidence suggests that concrete materials may hinder transfer relative to abstract symbols, many theorists specifically recommend beginning with concrete materials and fading to the more abstract. We tested this "fading hypothesis" in the context of children learning mathematical equivalence. Children who had low knowledge of mathematical equivalence were given instruction in one of four conditions: (a) concrete only, (b) abstract only, (c) concrete-to-abstract fading, or (d) abstract-to-concrete fading. Children in the concrete-to-abstract fading condition performed significantly better than children in the other conditions on transfer problems designed to assess understanding of mathematical equivalence. These results highlight the importance of "bridging" from concrete to abstract representations. Specifically, children's understanding of mathematical concepts may benefit when problems are presented with concrete materials that are explicitly faded into more abstract symbolic representations.

FA14
Relationship between Inhibitory Control and Drawing Development in Preschool Children

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The present study examines the relationship between inhibitory control and drawing development in preschool children. Three tests were correlated; one test of inhibitory control and two tests of drawing development. In the test of inhibitory control participants crossed out a particular shape on a piece of paper filled with shapes.

In drawing development test 1 participants drew two pictures of a mug. In drawing development test 2 participants were asked to draw a picture of themselves. Both tests of drawing development were scored according to their accuracy to real life. The correlation of inhibitory control (M=8.72, SD=7.294, N=43) and drawing development 1 (M=2.19, SD=.824, N=43) was significant, r(41)=.295, p=0.026, one-tailed test. The correlation of inhibitory control (M=8.72, SD=7.294, N=43) and drawing development 2 (M=5.86, SD=2.651, N=43) was also significant, r(41)=317, p=0.019, one-tailed test. Together these results support the hypothesis which predicted a positive correlation between inhibitory control and drawing development.

SA8
Children's Explanations for Just and Unjust Events
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Children ages 6, 9, and 12 years listened to six stories in which a character performed either a good, bad, or neutral action and subsequently experienced either a good or bad event. Participants were first asked for a spontaneous explanation for the event's occurrence and were then asked to rate their level of agreement with explanations provided by the experimenter. Children of all ages produced more natural explanations (e.g., physical, psychological) than nonnatural explanations (e.g., immanent justice, God, luck). Participants were most likely to provide immanent justice explanations for stories in which the valence of the character's action matched the valence of the event. Unlike previous findings, immanent justice judgments increased with age. Children of all ages agreed more with natural explanations than with nonnatural explanations. However, for the matched valence stories, children showed equally high levels of agreement with immanent justice and natural explanations.

F19
The Role of Testimony in Children's Understanding of Historical and Fictional Figures
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Based on the testimony of others, children learn about a variety of figures that they never meet. We ask when and how they differentiate between the historical figures that they hear about (e.g., Abraham Lincoln) and purely fictional characters (e.g., Huckleberry Finn). Experiment 1 showed that both younger (3- and 4-year-olds) and older children (5-7-year-olds) understand the status of known figures, correctly judging historical figures to be real and fictional figures to be pretend. However, when presented with information about novel figures embedded in either a realistic narrative or a narrative with obvious fantasy elements, only older children used the narrative to make an appropriate assessment of the status of the protagonist. In Experiment 2, 3- and 4-year-olds were prompted to attend to the fantasy elements of the story. This led them to make more accurate assessments of the status of the protagonist but only in the short-term.

F20
Children's and Adults' Scientific Reasoning about Food Allergy
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We present a study investigating scientific reasoning within a food allergy context. Children and adults were given a hypothesis-testing task in which they were presented with two scenarios. In one scenario the outcome was bad (the character in the scenario had food allergy symptoms and had to decide how to find out what food caused them) and in the other the outcome was good (the character had no symptoms because they avoided a food they thought caused them). Participants were asked to choose which of three alternative patterns of food consumption could be used to test the character's belief. Participants were asked to verbalise their decision-making process and give reasons for their answers. We will present the patterns of responses given by children and adults in order to examine the effects of age and type of outcome (good/bad) on scientific reasoning.

F21
The Relationship between Theory of Mind, Categorization, and Understanding the Division of Cognitive Labor
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Preschoolers show a basic understanding of the fact that different people have different areas of expertise, known as the division of cognitive labor, and they choose their sources of information based on this understanding (Lutz & Keil, 2002). However, it remains unclear what kinds of cognitive abilities contribute to this understanding in preschool children and particularly whether this ability is primarily a function of social cognition skills, exemplified by theory of mind tasks, or of skills that are independent of social cognition, such as object categorization. Thus, this study examines the relationship between theory of mind, categorization abilities, and performance on the expertise task developed by Lutz and Keil in children ages 3 to 5. The results demonstrate that, even when controlling for age, there is a significant relationship among these abilities. This suggests that children's developing understanding of the division of cognitive labor is closely linked to other developing abilities.

F22
Developmental Changes in Children's Essentialist Beliefs about Language and Race
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Previous research suggests that young children think one's race and one's native language are inherited traits, brought about by nature rather than nurture. Here we compared children's naturalized understanding of race and language through the concept of growth and development. Children saw events in which they were asked to guess which of two adults a child would grow up to be. When race was pitted against language, such that one adult was a "match" to the target child in race but not in language, and the other a "match" in language but not race, white monolingual 5-6-year-old children chose the language-match. Nine-10-year-old children, in contrast, chose the race-match. Further experiments revealed that experience speaking multiple languages, or being part of a racial minority group, can facilitate this transition. We conclude that language may

hold a privileged status as a marker of group membership early in development.

SA9
Children's Sociolinguistic Judgments about Northern vs. Southern American English

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Previous research demonstrates that language and accent guide young children's social preferences (Kinzler, Shutts, DeJesus, & Spelke, in press). In the present research, children raised in either Illinois or Tennessee were presented with images of individuals paired with voices in English in a Northern or Southern American accent. Five- and 6-year-old children raised in Illinois stated that they would rather be friends with Northern accented individuals, however did not reliably make judgments about individuals' psychological properties based on their manner of speech. In contrast, 9- and 10-year-olds from Illinois professed knowledge of language-based stereotypes (e.g. Northerners as smart, Southerners as nice), that were not present in the younger sample. Thus, younger children exhibit social preferences for more familiar speakers, but do not have knowledge of linguistic stereotypes present in older children. Current investigations are examining children in southern Tennessee.

SA10
Academic Language in the Early Home Environment of Children with Pre- Or Perinatal Brain Injury

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Children with pre- or perinatal brain injury (PL) show remarkable plasticity for language. Nonetheless, most research focuses on the role of lesion characteristics in this plasticity rather than the role of the communicative input children receive. In typically-developing (TD) children, parents' use of Academic Language (AL) predicts children's later language outcomes. We examined whether parental AL input at 30 months predicts the vocabulary skill of children with PL at 54 months, as well as that of TD children. Findings show that the two groups of parents do not differ in their AL use. Moreover, parental AL use is a significant predictor of vocabulary outcomes for both groups of children. We are currently conducting parallel analyses predicting TD and PL children's narrative outcomes. Results suggest that language plasticity is influenced not only by the biological characteristics of children's lesions but also by the language input they receive.

S29
Psychological and Deontic Concepts in Children's Understanding of Promising

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A promise is a social agreement in which a speaker expresses an intention to perform a future act and undertakes an obligation to do so. Thus promising has both psychological and deontic aspects. Previous research has shown that children gradually acquire a concept of promising. Young children focus on the outcome in deciding whether or not a promise was made. This study explored how children understand promising by looking at their explanations for their promise judgments. Five-, seven-, and nine-year-olds heard stories in which promises or predictions were made. Children were asked whether a promise was made and if the speaker was responsible, and gave justifications for their judgments. With age, children referred more frequently to the utterance in their judgment justifications, and used more obligation and intention language in their responsibility judgment justifications. These findings provide insight into how psychological and deontic concepts are integrated in children's social reasoning.

S30
Do Children Gifted in Realistic Drawing Share Perceptual and Personality Traits with Individuals with Autism?

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Autistic individuals show a diminished detrimental effect of perceptual cohesion on Block Design: when designs increase in cohesion, performance of autistic individuals remains unimpaired, showing they use a local processing strategy. Autistic individuals also show superior realistic drawing capacities. We have demonstrated that such a local processing strategy is not specific to autism but extends to typically-developing children gifted in realistic drawing (Drake et al., 2009). A follow-up study with these same gifted children and controls (total n = 43) is underway: children are being tested on a range of local vs. global processing tasks, and presence of autistic personality traits is being assessed with the Childhood Asperger Syndrome Test. If children with drawing giftedness use a local strategy and exhibit some autistic personality traits, we can conclude that certain perceptual and personality traits characteristic of autism are continuous traits extending into the typically-developing population.

S31
The Relative Contributions of Physical Attractiveness and Prosocial Behavior in Preschool Friendship Choices

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Previous research has demonstrated a lifelong preference for physically attractive people across many social contexts. However, direct evidence about someone's prosocial behavior should also affect decisions about affiliation with that person. Little research has explored the relative weight of physical attractiveness and prosocial behavior in friendship decisions. The current study examines children's friendship preferences when physical and social cues conflict. Three- and four-year-old children were asked to choose between a less attractive child in a photo presented with a nice story frame (e.g., helping behavior) and a more attractive child with a mean story frame (e.g., pushing). Three-year-olds of both sexes chose based on attractiveness. Four-year-old boys also preferred attractiveness, but four-year-old girls strongly preferred niceness. These results reveal the developmental origins of an important sex difference in friendship decisions. These early preferences may reflect children's internalization of gender schemas and may influence mate choices later in life.

SA11
In-Group attitudes of Muslim Children

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Although negative stereotypes towards Muslim individuals escalated after the events of September 11th, less is known about how these stereotypes have affected how Muslim children think about their group members. Therefore, the current study examined Muslim children's attitudes towards Muslim and non-Muslim individuals. Muslim children ages 5 to 8 (N=65) engaged in two tasks. In the attribution task, children rated pictures of a Muslim and a non-Muslim on an adjective scale with positive and negative adjectives. In the preference task, participants were asked which individual they preferred as a neighbor, teacher, and same-sex peer. Participants made more positive attributions for Muslims, with young children being more negative in evaluating non-Muslims. Participants also preferred a Muslim as a potential teacher, neighbor, and same-sex peer. It is unclear how they have been able to stay positive despite the presence of such negative stereotypes in their society, suggesting questions for future investigations.

S32
Working Memory and Language: A Longitudinal Study of Trilingual Children

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The aim of the present study was to investigate the contribution of two working memory systems (the phonological loop and the central executive) to children's foreign language learning. A sample of 119 Luxembourgish children, whose native language is Luxembourgish and who learn German and French as secondary languages in school were assessed longitudinally over a 4-year time period. Children were tested in kindergarten (5 years of age), in first, second, and third grade with a one-year interval between each testing wave. Results indicate that individual differences in phonological loop functioning were causally related to foreign vocabulary development. One particular phonological loop measure - the repetition of low wordlike nonwords - was identified as the single best predictor of the acquisition of an unfamiliar foreign language up to two years later, suggesting that this measure may provide a valuable tool for early screening to identify children who are at present and future risk for foreign language learning difficulties.

S33
A Bigger, Better Test of Belief

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Two methods of assessing understanding of beliefs were compared. One method involved correct answers to the traditional unexpected contents false belief task. The other method involved correct answers plus justifications to the traditional unexpected contents false belief task and a new true belief contents task. The latter method was able to distinguish children's use of perceptual access reasoning from their understanding of beliefs. Assessment of 150 4-year-olds by the latter method predicted their social competence (reported by mothers) and school readiness (reported by teachers) at age 6, but assessment by the traditional false belief task did not. These results support the perceptual access hypothesis, and give us a more fine-grained method of assessing the development of belief understanding.

S34
Social Behavior and Object-Related Gestures in Infants with Cochlear Implants

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In hearing infants, production of object-related gestures indicating representational knowledge of object use emergences in connection with sharing, social gestures, and word use. However, the acquisition of object-related gestures in deaf infants without access to an accessible system of language input is unclear. This study investigated the effects of profound hearing loss on social behavior and object-related gestures in 8- to 22-month old infants with profound hearing loss. The purpose of the study was to assess the development of object-related gestures in relation to sharing and social attention in infants with profound hearing loss before and after cochlear implantation.

S35
The Effects of Social Interaction on Word-Object Association

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We examined the role of social interaction in the learning of minimal pair words by fourteen-month-old infants. Previous work has shown that infants at this age fail to learn an association between two novel objects and two words differing in only one sound (Stager & Werker, 1997). We test infants in a similar habituation/dishabituation procedure, using identical objects. However, in our study, an experimenter was present in the room, delivering the auditory stimuli to the infant, making eye contact with the infant, and gazing to the object as well. Overall, infants did not learn to associate the minimal pair words with the novel objects, replicating previous results. However, those infants who shared a greater amount of gaze with the experimenter were successful. Implications for the role of social interaction in word learning are discussed.

S36
Positive and Negative Testing Effects in 1st and 3rd Graders

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As recent policy has increased the frequency with which school-aged children are tested, the need to understand testing and its effects has grown. Research with adults has shown that answering multiple-choice questions has both positive and negative effects (Roediger & Marsh, 2005). Multiple-choice testing increases the number of questions answered correctly on a final cued recall test, but also leads to intrusions of multiple-choice lures. The current experiments examined both the positive and negative effects of testing in 1st and 3rd graders. The children first answered multiple-choice questions. They then took a cued recall test that included new questions as well as previously tested questions. Both age groups showed large benefits from multiple-choice testing, but the older children were more likely to intrude multiple-choice lures on the final test. Additionally, this negative testing effect was largest for errors initially made with high confidence.

S37
Patterns of Parent-Infant DVD Co-viewing
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Our study investigates how parent interactions with younger (12-15mos) and older (18-24mos) infants support viewing behaviors and learning while watching a Baby Einstein word-learning DVD. Half the families viewed the video at home 15 times over 6 weeks, and at the conclusion of the study, we videotaped all families watching the DVD in the lab. We measured children's looking times, engagement in non-DVD related activity (e.g., playing with toys, looking at books) and coded parent and child talk. Our analyses of 65 families' talk revealed that parent talk predicted differences in child talk, but did not show evidence of learning from the DVD. Older children in the No-DVD group said more total DVD words as well as a greater variety of words. Older children in the No-DVD group also had the highest percentage of looking time, while the pattern was reversed for younger children.

F23
Foundations of Analogical Reasoning: Do 7- and 9-Month-Old Infants Understand the Abstract 'Same' and 'Different' Relations
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The ability to attend to relations develops gradually throughout childhood (Gentner, 1988; Vosniadou, 1995; Christie & Gentner, 2007). The current study is designed to examine early developmental antecedents of abstract reasoning that may be available to preverbal infants. We are habituating 7- and 9-month-old infants to various examples of same (a pair of red blocks, a pair of orange blocks, etc) or different (a red block paired with an orange block, a white block paired with a purple block, etc.). We record how long infants look at examples of same and different during the test trials. We also vary the degree of familiarity infants have with the block pairs in order to test the fragility of their abstract representation of same and different relations. This study will provide information about the very early beginnings of abstract reasoning and the availability of analogical reasoning as a learning tool in young infants.

SA12
Transforming Preschoolers' Geometric Shape Knowledge: Exploring Verbalizations & Behaviors during a Categorization Task
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Children start out categorizing shapes by visual similarity and orientation irrespective of geometric properties (Satlow & Newcombe, 1998). Only later in the elementary years do they shift to rule-based classification systems that rely on the number of sides/angles for shape identification. Given that rule-based systems underlie mathematic knowledge and academic achievement, the current study explores whether an instructional intervention can change how preschool children process shapes. Children were taught rule-based definitions for geometric shapes (e.g., triangles, rectangles) while those in a control condition participated in a reading activity. They were then asked to identify whether novel typical, atypical, and nonvalid shapes were 'real' or 'fake.' Verbal descriptions and sorting behaviors demonstrate children in the

experimental group expanded their shape concepts to include abstract forms that met definitional properties, while those in the control group did not. Future research should explore whether rule-based classifications augment foundational math skills in preschool.

FA15
A Computational Model of Infant's Acquisition of Physical Knowledge
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Over the first year of life, infants learn about the physical constraints governing the motion of objects in space. Experiments conducted over the past few decades have shed light on both the progression of infant's physical knowledge, and the mechanisms by which they learn it. We are planning to build upon these empirical studies by constructing a precise, computational model of the mechanisms underpinning infants' ability to learn about support and collision events. The model will be embedded in a simulated "baby robot," situated in a physics-based virtual world, which perceives the world in terms of low-level, continuous-valued input. The learning mechanism will incrementally learn rules that predict changes in the state of attended objects, as well as the high-level object, spatial relation, and event categories the rules are in terms of. We will evaluate the model through in silico replications of classic violation-of-expectation experiments.

SA13
Factors Mediating the Effects of Interactive Media Use on Cognitive Development
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Recent research has indicated that interactive media tools are more available and prevalent in the lives of preschool children. Some have suggested that nearly 50% of children under 6 had used a computer, and 30% had played a video game (Rideout, 2006). However, very little has focused on the parental attitudes that influence the use of these interactive tools. The current research focuses on preschool children's exposure to interactive media in relation to various behavior outcomes from data collected from 250 children under age 5 and their parents. Preliminary findings show that parents see computers as mostly helping learning while they see video games as mostly harming, however much of computer time is spent playing games. Additional analyses will compare parental attitudes to the amount of time children spend with the various mediums and examine the relationship between parental attitudes and cognitive and behavior outcomes.

S38
Germs, Mermaids, and God: Parent-Child Conversations about Absent and Invisible Entities
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Children learn about absent or invisible entities from other people. Previous research shows that children's confidence in the existence of a variety of such entities varies (Harris et al., 2005). The present research used a laboratory parent-child conversation design to examine the discourse strategies that parents use when talking to their children about absent or invisible entities. Preliminary results indicate that parents tend to endorse the existence of scientific entities (e.g., germs), historical people (e.g., Christopher Columbus),

and some invisible beings (e.g., the Tooth Fairy, God), while explicitly denying the existence of other invisible entities (e.g., unicorns). Parents also use different types of explanations when describing the different categories of entities to their children.

S39
Is a Knife a Boy or a Girl? How Grammatical Gender in French Influences Bilingual Children's Conceptualizations in English

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Recent studies have shown that grammatical gender can influence conceptualization (e.g. Sera et al., 2002). However, fewer studies have demonstrated this influence cross-linguistically (Boroditsky, et al., 2003). The present study examines the influence of French grammatical gender on English natural gender conceptualizations. Children were asked to categorize objects as a boy or a girl. In the first study, preschoolers did not demonstrate a systematic influence of grammatical gender on their categorizations. Nonetheless, bilinguals presented less bias towards categorizing the objects as boys in comparison to monolinguals. In the second study, preliminary results indicate that bilingual 9-10-year-olds have a tendency to categorize based on grammatical gender. This influence, in addition to the monolingual boy bias, seems to be stronger for inanimate objects, which are not associated with natural gender. Results thus far indicate that grammatical gender knowledge can cross-linguistically influence natural gender conceptualization and this may become more specific with age.

F24
It Could Taste Like Candy: Maternal Strategies Used to Encourage Children to Eat Familiar and Unfamiliar Vegtables

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This research examines different types of maternal verbal encouragement and their ability to affect children's willingness to try novel and familiar vegetables. Using data from a sample of mothers and their 3- to 5-year-old children in an experimental setting, we coded different types of maternal prompts (e.g., stating facts about the food such as "This is good," or giving opinions about the food "I like artichoke hearts") to see which types of prompts resulted most often in the child taking a bite of the target food. This research will provide descriptive information about the variety and prevalence of these different maternal strategies and will also potentially provide useful information regarding the most effective ways parents can encourage their children to eat healthy foods.

F25
Measuring Mental Rotation in 4-year-olds Using a Nonverbal Touch Screen Paradigm

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Mental rotation constitutes an important domain of spatial cognition; however, little is known about its early development. In this research, we aim to assess individual differences in 4-year-olds' mental rotation abilities. Using a touch screen paradigm, a figure or its mirror image was presented in 8 different orientations. Two holes were presented below the figure. The children's task was to indicate in which of the two holes the object would fit by pointing at the correct answer. Results suggest important individual differences in mental rotation abilities of 4-year-olds. A subgroup of children performed above chance, and these children also showed a linear increase in error rates for increasing angles of rotation. Another group of children showed flat error curves, suggesting that they did not mentally rotate the stimuli. In a condition now being run, we investigate whether brief manual rotation training increases the proportion of children classified as rotators.

S40
Children Use Intentionality to Infer Causation in an Imitation Task

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Despite an understanding of simple causal relationships, preschool children imitate actions that are causally irrelevant to achieving a goal. To investigate if this is due to the intentionality of the actions, irrelevant actions were performed intentionally, accidentally, or without indication. Two- to 5-year-old children were less likely to replicate the irrelevant actions when they were performed accidentally than when they were performed intentionally or without indication, $F(3, 195) = 11.32$, $p < .001$. Additionally, children replicated the irrelevant actions in the intentional and no indication conditions as often as in a control condition that did not include a demonstration. These findings suggest that children understand irrelevant actions as intentional and use an understanding of intentionality to infer causation. Intentional actions are understood as causally relevant while accidental actions are understood as causally irrelevant.

SA14
Two- and Three-Year-Olds Learn Tool Use Best through Observation

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This study compared two different styles of tool-use learning: observation and haptic experience. Children were presented with a series of toy retrieval tasks that varied in their structural complexity. These tasks involved choosing one tool from an array of one functional and three non-functional tools and using this tool to attempt toy retrieval. Prior to making their decision, children watched an adult use each tool, gained haptic experience with the task materials, observed the adult and gained haptic experience, or received no prior experience. If children chose a non-functional tool, they were later given the functional tool to use. Children who only observed the adult were more successful in using functional tools than children in the other three conditions. This finding and the overall pattern of results suggests that observation alone is a most efficient way for two- and three-year-olds to learn tool use.

F26
Children's Participation in Sustainable Community Practices in Rural Uganda

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Health and dietary interventions are foremost in efforts to support children in the developing world. These efforts reorganize children's activities and cognitive development, yet little is known about this process. This research investigated how rural Ugandan children participate in an animal husbandry program to provide a sustainable protein source. Interviews (n=37) revealed that older children and adults remembered many of the animal care procedures. Spot

observations over 5 days (5 children, 1 adult) revealed that 95% of the time children conducted activities instrumental to the project's success, e.g. feeding animals; cleaning, inspecting, and repairing the structure. Adults did not help the children and younger children assumed responsibility with the help of older children. There is need for research on children's participation in such innovative techniques. Learning in practice-based contexts may be especially crucial in rural Africa because not all children attend school but they are engaged in regular subsistence activities.

FA16
Conversations with Parrots: The Effect of the Vocalizing Source on Speech Perception in Infants and Adults

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To what extent does the vocalizing source affect speech perception? Human adults can perceive a sound as speech when it is generated by different sources including humans, computers, and parrots. Are infants sensitive to the source of a potential speech sound? We presented nine-month old infants with a set of speech and non-speech sounds produced by a human or a parrot, in tandem with a visual display: a human face or a checkerboard pattern. Using an infant-controlled looking task, we examined infants' responses to the different sounds. Infants looked longer overall during the presentation of speech. Additionally, infants looked longer when parrot speech was presented with a human face than when presented with a checkerboard pattern. Infants' sensitivity to the speech signal may rely on acoustic and non-acoustic characteristics of a human generating source indicating that infant speech perception is affected by both acoustic information and visual speech cues.

SA15
Using Structural Alignment to Facilitate Learning of Spatial Concepts in an Informal Setting

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We examine whether analogical processes can help children learn in a rich, naturalistic learning environment. Specifically, we presented 6 – 8 year olds with a brief analogical training task exemplifying a key principle of stable construction: diagonal bracing. Then children and their families built skyscraper models together in a free construction activity at the Chicago Children's Museum. Children who received analogical training used more diagonal braces in their buildings than children who did not receive training. Further, children performed better in the transfer task if the analogical pair they received was highly alignable than if the pair was less readily aligned. We conclude that even a single brief analogical comparison can generate insight into a key spatial principle.

F27
Finding the Goals that Structure Events

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In two studies, we examine the nature of information necessary to understand and remember goal-directed events. The first study explores the cues 7-month-olds use to imitate the goal of a claw's reach in a toy-choice paradigm. In previous research, infants of this age imitated the toy-choice of an agent but not a self-propelled box.

We examine how highlighting the relation between either the claw and the infant or the claw and the experimenter (holding the claw) influences infants' imitation of the claw. In the second study, we examine whether information about agency enhances later memory of goal-directed events. Three-year-olds view a sequential event demonstration in picture-book format. An agent is either present or absent in the picture. After a brief delay, memory of the sequence is assessed. Together, these studies provide new insight into the importance of agency in understanding and remembering events at two developmental time points.

F28
The Role of Explanations in Children's Judgments about Improbable and Impossible Events

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This study investigated the role of explanations in 4- to 6-year-old children's ability to distinguish between improbable and impossible events. Results indicate that, contrary to previous research, children's judgments about impossible events differed significantly from their judgments about improbable events. Children judged impossible events as consistently not possible, but were just below chance for the improbable events. When judging the possibility of an improbable event, both 4- and 6-year-olds were more likely to say that the event could happen when they were given a physical explanation for the event than when they received no explanation. Four-year-olds judged impossible events as possible more often when they heard a psychological explanation than when they heard no explanation. Six-year-olds were not influenced by a psychological explanation when judging an impossible event, perhaps because older children have a better understanding of the impossibility of certain violations.

SA16
The Social Cognitions of Children with ADHD: Their Attributions for Parenting Behaviour

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Children's attributions for their parents' behaviour have seldom been examined in children with Attention Deficit Hyperactivity Disorder (ADHD). Twenty-one boys with ADHD (8 – 11 yrs) completed the Child Attribution Measure for their mothers' and fathers' parenting behaviour. Attributions were analyzed in a 4 (attribution type – effort, ability, task, child) by 2 (parent gender) ANOVA. Children attributed positive parenting behaviours most to parent effort and ability and least to task or child factors. They also made more attributions overall for fathers' positive parenting than for mothers'. For negative parenting behaviours there was an interaction of attribution type and parent gender. Fathers' negative parenting was attributed least to ability and mothers' negative parenting was attributed least to child factors. These findings underscore the importance of investigating children's social cognitions regarding their relationships with their parents and considering fathers as well as mothers in parenting research.

F29
Categorization of Grounds in Dynamic Events
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Relational terms like verbs and prepositions are gateways to grammar, requiring discrimination and categorization of language-relevant semantic components in dynamic events. This study extends prior work, by examining whether English-reared infants' categorize grounds represented in Japanese but not in English. Japanese incorporates ground geometry into verbs such that "crossing a road" which has a distinct geometric boundary is codified differently than "crossing a tennis court" which does not. Familiarized to three grounds (e.g., road, street, bridge), 14-month English reared infants at test see either a similar (e.g., railroad) or a different Japanese ground (e.g., tennis court). Results showed that prelinguistic English-reared infants noticed Japanese-relevant distinctions, suggesting that infants are universally prepared to notice a broad range of event components that the worlds' languages represent. Current work indicates that infants then heighten or dampen attention to these components in ways consistent with their ambient language.

FA17
Does Social interaction Facilitate Learning from Video?
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In previous studies, very young children have learned words while "overhearing" a conversation, yet they had trouble learning words from a person on video. Here, 62 toddlers viewed an object labeling demonstration in one of four conditions. In two, the speaker (who was present or on video) directly addressed the child and in two, the speaker addressed another adult who was present or was with her on video. Children were significantly more likely to learn the novel word as onlookers than when they were when directly addressed-- both in the live and video conditions. Additionally, by exploring gender differences, it seems that girls are more likely than boys to learn in the video conditions. A follow-up study suggests that toddlers learn best when they either observe or participate in a social interaction (compared to watching a one-sided demonstration, whether on video or in person).

SA17
Children's Understanding of Physical and Psychological Trait Constancy in Pretense
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Children are continuously confronted with the changing identities of others during pretense. However, the extent to which children understand the identity constancy of the pretender while pretending is not clear. Four and five year old children and adults watched two puppets who differed in physical traits and mood states. One puppet pretended to be the other. Participants were asked whether the pretending puppets actually had the physical or mood states of the puppets they were pretending to be. Age interacted with question type: 4-year-olds responded at chance for physical traits, showing no understanding that one cannot pretend away a physical characteristic. Five-year-olds responded correctly at an above chance level. However, for psychological traits, 4 year olds believed that the pretender took on the emotional state of the character they played, while 5 year old and adults answered at chance. Implications are discussed in terms of children's understanding of identity constancy, pretense, and fictional characters on television and film.

SA18
Passive-Voice Priming in Spanish-Speaking Children: The Evidence of Animacy Effects
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We conducted a study in Bolivia to explore the possibility of priming passive structures in four- to six-year-old Spanish-speaking children. In Spanish, in addition to participial passives (fue-passives), there is an alternative passive structure (se-passives) that emerges earlier in children's speech. We examined whether presenting children with sentences containing fue-passives increased their production of fue-passives and/or triggered the production of se-passives. We were interested in age effects and in potential effects of animacy, which have been documented in English-speaking children. It is possible that Spanish speakers have different preferences for se- or fue-passives depending on the animacy of the patient. We found strong priming effects for fue-passive; moreover, we noticed no age differences. The majority of fue-passives were produced in the condition involving animate rather than inanimate patients. Similarly, se-passives were more likely produced to describe transitive actions involving inanimate patients.

F30
An Investigation of Recollection and Familiarity in Early Childhood
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Dual-process models of recognition memory suggest that recognition memory retrieval relies on the combination of two cognitive processes: familiarity, experienced as ("knowing" that something has been seen before) and recollection, experienced as a ("remembering" associated the contextual details) in which it was encountered. These processes involve separable networks within the brain and have different developmental trajectories. Little empirical evidence is available regarding their development in early childhood as the paradigms typically used to investigate these processes are not appropriate for use with young children due to the high task demands. This study presents a novel paradigm that can be used with for use with young children and that includes both behavioral measures of familiarity and recollection and electrophysiological indices of memory-related processing. In a laboratory setting, children were asked to remember 2 sets of novel items in 2 different contexts. During the test phase, previously-viewed items were presented along with a set of distractor items. Children were asked to behaviorally sort the items according to the appropriate context, yielding indices of both recollection and familiarity. Children's electrical brain responses (event-related potentials) in response to both previously-seen and distractor items were also recorded to index activity of the two underlying neural systems.

S41
The Impact of Instructional Activities on Children's Developing Memory Skills
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A rich literature has characterized the development of children's mnemonic strategies and highlighted the importance of social

contexts, such as the elementary school classroom, for the emergence of these skills. The experiment described here represents an extension of a longitudinal investigation of linkages between teachers' memory-relevant language during instruction and children's developing deliberate memory strategies. Building on the longitudinal work, the "mnemonic style" used during instruction over the course of a week-long science unit is being manipulated, with some children exposed to "memory rich" language and others to "low memory" language. Preliminary findings from this experimental investigation of the impact of mnemonic style on children's strategies and content knowledge will be presented. Moreover, the implications of the findings for the design of school-based interventions in which teachers are trained in the use of specific conversational techniques will be discussed.

F31
Autobiographical Memory in Individuals with Child Abuse Histories: Links to Executive Function and Emotion Regulation
Andrea Follmer Greenhoot, Sarah L. Bunnell
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Models of psychopathology suggest that autobiographical memory may play a role in the onset and maintenance of psychological symptoms, but little is known about why some people form memories with maladaptive characteristics and others do not. In this study, we examine the roles of developmental history and basic cognitive and emotion regulation skills in predicting individual differences in autobiographical memory. Specifically, we look at the joint effects of child abuse history, measures of executive function that may be involved in reconstructive memory processes (e.g., attention switching, memory updating), and measures of emotion regulation on the qualities of older adolescents' and young adults' autobiographical memories. Discussion will center on the implications for models of autobiographical memory and trauma-memory linkages.

FA18
The Development of Numerosity Concepts: Language's Role in Number Knowledge
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Although children are able to distinguish small numbers in infancy, it takes years before they fully grasp the number system. Young children are able to count to much higher numbers than they understand conceptually, suggesting that they have only a partial understanding of numerosity. We predict that some of the confusion in number is based in language, specifically similarities in the syntax of adjectives and number words. This study tests how number-specific syntax (e.g. "here are three of the sheep") can help children succeed at a conservation task with unknown numbers. Three year olds who were able to count to ten were given the give-a-number task to determine known and unknown numbers. Preliminary results suggest that using number specific syntax helps children succeed at number conservation. Number specific syntax may highlight the unique properties of number terms, and thus promote the conceptual understanding of number.

F32
The Potential Benefits of Speaking More Than One Language on Non-Linguistic Cognitive Development
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Visual-spatial and memory benefits exist for adult balanced bilinguals. However, we know little about when such benefits first show up in the course of development. Moreover, there has been no investigation of tasks that combine both visual-spatial and memory components, that is, memory for visual-spatial information. The current research examines whether preschool-aged balanced bilinguals show benefits with tasks that combine these components. Using two visual-spatial memory games, this research examines whether such benefits exist for bilingual preschoolers. Preliminary results suggest that even as early as the late preschool years, balanced bilinguals show a visual-spatial memory advantage over the monolingual counterparts. Such benefits may give children an advantage during cognitive development, as better visual-spatial memory may facilitate learning. These findings have implications for both understanding younger bilingual populations, but also for understanding some of the potential benefits of bilingual education.

S42
Children's Fiction Preferences
Lily Guillot, Kristina Olson, Paul Bloom
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Experiencing fiction is commonplace in the lives of American children. Three studies begin to explore the relationships between several factors in determining children's fiction preferences. We asked children (3-5 years) which stories they preferred, and manipulated whether the main character was a bear or a human and whether it was male or female. We also varied the amount of positive and negative events presented in stories. We found that children were at chance when choosing between a story about a bear and a story about a human character. For stories that were positive, children preferred a character of their own gender. In contrast, children's preference for a protagonist of their own gender was not present for a story in which negative events happen to the main character. The results raise the question of the relative roles of species and gender in children's identification with fictional characters.

F33
Some Types of Parent Number Talk Count More Than Others
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This study investigates differences in the numerically-relevant inputs children receive at home that may help explain early variations in children's numerical knowledge. Children were videotaped interacting with their primary caregiver for 90 minutes at ages 14 and 26 months. Parents' production of number tokens ("one" through "ten") were coded as six different types (cardinal values of present objects, counting present objects, cardinal values without present objects, counting without present objects, number symbols, and other). At child age 26 months, parents' combined production of counting and cardinal values with present objects was a significant predictor of children's cardinal value knowledge at 46 months (measured by the "Point-to-X" task) (r(42)=0.40, p < .01), even when controlling for other measures of parents' SES and amount of

talk. The results suggest that these specific types of number talk may be particularly helpful to children as they learn the cardinal values of the number words.

F34
Mothers' Use of Relative Proximity in Communicating about Location to Young Children
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Children and adults often need to give and follow directions to locate missing objects. We examined how mothers disambiguated identical hiding locations for their 2.5-, 3.0-, and 3.5-year-olds. We varied the absolute and relative proximity of the target and non-target container from a landmark and the mother/child. The experimenter hid a toy in one container while the mother (but not the child) watched. Mothers then attempted to tell the child in which container the toy was hidden without pointing. Children then searched for the toy. Mothers relied on the proximity of the target to self and the landmark when choosing reference frames to describe the location of the target container. In particular, mothers alternated between egocentric and landmark reference frames depending on the location of the target. This systematicity appears geared toward providing the child with the most salient information for disambiguating the containers, suggesting sensitivity to children's cognitive abilities.

S43
The Effects of Elaboration and Rehearsal Strategies on Source Monitoring in 4-year-old Children
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Research to date has focused primarily on retrieval processes in source monitoring development. In contrast, our recent research has shifted the focus to factors that might affect source monitoring accuracy at the encoding phase. Specifically, we examined the role of both instructed strategy and spontaneous strategy use to facilitate binding processes – the ability to link an event or item with a source. In previous research we found that, when prompted, children as young as 6 years of age produced effective elaboration strategies which resulted in superior source accuracy. Instructed rehearsal did not facilitate performance. In the current research we ask two primary questions: whether even younger children (4-year-olds) would also produce elaboration, and whether such elaboration would facilitate source accuracy. We also examined whether instructed rehearsal provided any benefit to this younger age group.

SA19
Abstracting Feature Sequence of the Internally-changing Object
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Our previous study (Haman, 2007 CDS-Poster.) shown that preschoolers need less time to recognize an object identified by a sequence of features that undergoes internally-driven, rather than externally-driven, transformation. It is unclear however, if the dynamic array of the object's features can be abstracted from the holistic event representation. In the present study 4-year-olds were familiarized with the colored shape gradually covered by gray bubbles, either emerging from the object itself (internally-driven

transformation), or "flying" from outside. Finally a small, colored bubble grew-out or landed on the object's center. The participant's task was to decide, which of two new movies fits the previous ones. Both test objects have new shapes, and only one of them replicated familiar sequence of colors. Only in the internally-driven condition participants were systematically biased by the feature sequence, and so indicated abstract representation of the dynamic feature array in internally-driven, biological-like transformation.

S44
Making Connections: Activating Students' Prior Knowledge during a New Lesson
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Students come into the classroom with prior knowledge, which can include informal, real-world experience as well as previous formal instruction. While learning new material, students are able to draw from past experiences that may influence their understanding of the lesson at hand. This study investigates how links to prior knowledge can promote procedural and conceptual knowledge gains. Two experimental studies will address the following questions: 1) Does activating prior knowledge through comparison promote learning of new procedures, 2) What kinds of prior knowledge are better for supporting learning, and 3) Will linking prior knowledge to new procedures lead to gains in both procedural and conceptual knowledge? We anticipate that students who compare conceptually relevant knowledge to procedures within a lesson will show greater gains in procedural and conceptual knowledge than students who are not invited to compare conceptually relevant knowledge. These findings have implications for curriculum and instruction.

FA19
Children's Ability to Override Personal Taste and Source Knowledge in Evaluating Works of Art
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Little is known about the criteria children use to evaluate art. We investigated when children distinguish taste (I like it) from judgment (This is good) and when they evaluate art independently of knowing the work's source. Participants are 4-, 8-, 12- and 16-year-olds and adults. Materials are 30 highly similar pairs of non-representational abstract images, one by an artist, one by a non-human animal (e.g., elephant) or child. Ten pairs are presented without source labels, 10 with correct labels, 10 with switched labels. Participants are asked which they like better and which is the better work of art. It is hypothesized that the ability to distinguish taste from judgment will emerge before the ability to override the false source label, and that only adolescents and adults will override both personal taste as well as false labels to select the images by the actual artists as the better works of art.

F35
Does Inquiry Learning Foster Creativity?
Christy Hedlund, Sarah Handal, Joseph Bond, K. H. Grobman
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Is creative problem solving fostered more by direct-instruction or inquiry learning? Through direct instruction, teachers communicate the subject matter through lecture. Through inquiry learning students construct their own knowledge of the subject matter while being guided and assisted by the teacher. Across three on-going

experiments, we experimentally manipulated teaching method and subsequently measured students' creativity with the domain. Preliminary analyses of study one suggests that college students who learned about conductivity through inquiry learning are more able to overcome functional fixedness to use a tool as a conductor. Experiment 2 may extend these findings to elementary school students with a more simple lesson on conductivity. Experiment 3 may extend these findings to adolescents expressing creativity in charades following dance instruction. Finding instructional methods that foster creativity may help students acquire the skills to invent new solutions to societal problems in the future.

F36
Linking Talk during Events to Children's Consistency in Recall over Time
Amy Hedrick, Priscilla San Souci, Amanda Jones, Catherine Haden, Peter Ornstein
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The analyses presented here explore links among children's conversational experiences during a novel event and their recall consistency across multiple interviews in two distinct studies. The first study included a longitudinal design in which two cohorts of children participated at 36 and 42 months of age with their mothers in novel activities. After delays of 1 day and 3 weeks, children's event reports were obtained. The second study utilized an experimental design to manipulate children's exposure to elaborative language during an event and 1-day later when presented with the opportunity to recall the experience. Memory was then assessed again after 3 weeks using a hierarchically structured interview comparable to the instrument used in the first study. Across both studies, children's recall was examined as a function of consistency across the delay intervals and the subsequent differential patterns of remembering were linked to the adult-child conversational interaction experienced during the event.

S45
Comparing Elicited and Spontaneous Imitation among Children with Autism Spectrum Disorder and Down Syndrome
Mikael Heimann, Josephine Connant, Tomas Tjus
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Imitation, a key vehicle for cognitive and social development, is often regarded as more difficult for children with autism spectrum disorders (ASD) than for children with Down syndrome (DS) or typically developing (TD) children. The current study investigates similarities and differences in elicited and spontaneous imitation among children with ASD (n=19; Mean Mental Age = 44.5, Language Age = 28.7, and Chronological age = 67.3 months), DS (n=20; MA = 31.6; LA = 26.8; CA = 62.7 months) and TD children (n=23; MA = 37.5; LA = 36.0; CA = 35.0). Elicited imitation resulted in significantly lower scores for the children with ASD in comparison with both the other two groups (DS and TD). In contrast, no differences between the groups were noted when spontaneous imitation was observed. These results will be discussed in light of proposed functions for imitation in early development as well as for children with ASD.

F37
A Developmental Study of Science Learning: Comparing 4th and 7th Grade Children and Their Teachers
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Fourth and seventh grade children, as well as a group of elementary school teachers, participated in a physical chemistry study where they learned about melting, freezing, boiling, and condensation. Theories of concept learning, causal-explanatory coherence, and argument were used to create the learning sequence that served as the input for all participants. Two variables were manipulated: dynamic versus static graphics, and learning about only states versus learning about states and state changes. A control group of children who received only their normal science instruction was also included. The results showed that accurate understanding of the molecular properties of states of water was more important than the age of the learner. The dynamic models of state change processes, when compared to the static models, significantly increased physical science understanding. The results show the importance of early learning, prior knowledge, and type of input in predicting science learning across all ages.

F38
Studies of Infant Cognition Using the Continuous Novelty Preference Task
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The continuous novelty preference task has recently emerged as an alternative to the standard habituation-dishabituation procedure. In this task, on each trial infants are presented with a novel and a familiar stimulus, side-by-side, and their preference for the novel stimulus is measured. This task allows a measure of infants' on-line processing of the stimuli. It is therefore possible to determine how infants tested with different stimuli or with different previous experience process the stimuli differently. In this poster, we will present data from several projects collected using this procedure. For example, in one experiment, we compare how 4-month-old infants who do and do not have experience with pets learn about images of cats and dogs. The goal of this poster is to illustrate how this task can be used with a variety of different stimuli to provide understanding into the processes of infants' learning.

F39
Who Do Children Ask for Information? Parents vs. Strangers and Siblings
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Research suggests that conversation gives children important opportunities to learn. Chouinard (2007) found that children ask as many as 2 questions every 3 minutes of their parents; Chouinard & Clark (2003) found that parents give crucial linguistic feedback during conversation. Are children as willing to accept other addressees as sources of information? Several studies find that children interact differently with different addresses (Corriveau & Harris, in press; Rogoff, 1990), so this might not be the case. We examined these issues with two studies involving 148 3- and 4-year-old children, one comparing their conversations with parents vs. an experimenter and a second comparing conversation with parents vs. siblings. Results find that children ask questions of any addressee, and parents and experimenters answer these questions informatively;

however, siblings are less likely answer informatively. Parents and experimenters give linguistic feedback to children; however, siblings are less likely to reformulate children's unconventional language errors.

SA20
THE DEVELOPMENT OF THE SENSITIVITY TO GEOMETRY IN VISUAL FORMS
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Visual form perception has been extensively studied in human children, but it has not been systematically characterized from the perspective of formal geometry. In a first experiment, we explored children's and adults' perception of a vast list of geometric properties (parallelism, inside-outside, middle, right angles) using a deviant detection task over visual shapes. The general pattern of performance showed high invariance over development: the properties that were least detectable by children also posed the greatest difficulty for adults. Experiment 2 used the same deviant-detection task but focused on the perception of angle, length, and sense (the property that distinguishes a shape from its mirror image). Children (4 to 12 years) were found to develop sensitivity to these properties at different rates, responding first to length, then to angle, and last to sense. Geometric competence therefore appears to emerge as an interplay between developmentally invariant, core intuitions and later acquired distinctions.

S46
HOW TEACHERS LINK MATHEMATICAL IDEAS IN CLASSROOM INSTRUCTION
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Teachers routinely use gestures in mathematics instruction. This study examined teachers' use of gestures to link different representations of mathematical ideas during classroom instruction in early algebra. We videotaped twelve middle-school mathematics lessons (two from each of six teachers) and identified episodes during which teachers sought to establish relationships between representations (e.g., between a table of values and a graph). Teachers produced an average of 9.65 linking episodes per lesson. In 80% of these episodes, teachers used gestures to refer to both of the linked representations. However, there was substantial variability across teachers (range 50-100%). Teachers typically gestured to one representation and then the other sequentially; in a small number of cases (8.3%, range 0-22%), teachers gestured simultaneously to both of the linked representations. In ongoing research, we are exploring whether these differences in communicating about links between representations make a difference for students' learning.

S47
STUDENTS' AND TEACHERS' MENTAL MODELS OF VIRUSES
Benjamin D. Jee, David H. Uttal, Amy Spiegel, Judy Diamond
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Although most children in the US are vaccinated against potentially deadly diseases, such as polio, measles, and tetanus, many adults dismiss the usefulness of vaccines, or simply don't bother to get vaccinated. What are the beliefs that influence these important decisions? What do people believe about how viruses work? To investigate this issue, we surveyed 8th and 10th grade students, and conducted in-depth interviews with a smaller group of students and teachers. The questions included, (a) what is a virus?, (b) how do viruses infect living things?, (c) how does the body respond to infection?, and (d) how can viruses be prevented and treated? The survey and interview data was used to identify several distinct mental models of how viruses work. We will report findings on how students' and teachers' mental models are similar and different, how they compare to an expert model, and what sorts of misconceptions are held.

SA21
THE EFFECT OF MENTAL CONTEXT REINSTATEMENT ON THE ACCURACY OF CHILDREN'S REPEATED-EVENT MEMORY
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This study examined the effectiveness of mental context reinstatement (MCR) as a technique to improve children's repeated-event memory. Children (N = 120, 6-7-year olds) participated in repeated laboratory activities and were interviewed after a one- or four-week delay about one occurrence of the activities with either a standard or MCR interview. At this biasing interview, children were asked specific questions about the events; half were suggestive questions that were either consistent or inconsistent with the overall theme of the activity. At a second memory interview, children were asked yes/no questions based on the biasing interview. Children in the MCR condition were more accurate for false consistent suggestions than they were for false inconsistent suggestions. The standard interview led to higher accuracy for true details. Results suggest MCR may be a useful technique for helping children resist incorrect, but theme-consistent, suggestions.

F40
PLANNING DURING A FITTING TASK
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The development of planning when relating objects to other stimuli was studied in a group of toddlers between 17-31 months of age (N=30). The task was to reach for a rod and transport it to a slot located at the midpoint of the table. The rod was presented parallel to the slot in half the trials; in the other half, the rod was presented perpendicular to the slot. To measure angles during transport of the rod, a 3-D motion capture system (Qualysis) was used. As a function of time and distance during the transport of the rod, the results showed that older toddlers match the orientation of the rod to the slot sooner than younger toddlers. The results suggest older but not younger toddlers show prospective adjustments when required to fit a rod into a slot.

F41
CROSS-MODAL RECOGNITION OF SHAPE IN TODDLERS
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In previous research (e.g., Streri & Gentaz, 2003), newborns who grasped a small object in their palms later visually recognized the object by its shape. Here, we ask whether toddlers can do the same. In Experiment 1, 2-year-olds (n=20) held a small, novel, named object in their closed fists inside a box. When asked which of 3 visible test objects had the same name, children chose the shape match at chance. Experiment 2, now in progress, is identical to Experiment 1, except that the matching test as well as exemplar

exploration is conducted in the haptic mode. Significant haptic matching based on haptically-perceived shape similarity will suggest that children in Experiment 1 were unable to transfer shape information across perceptual modalities. Failure to match on shape similarity in both experiments will suggest that toddlers do not obtain haptic information about shape by holding objects in their palms.

F42
When Do Children Learn Conditional Probabilities?

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Two studies explore the conditions under which young children learn predictive relationships. In both studies children encounter stimuli composed of two binary features (e.g., red/blue, circle/square). Study 1 addresses how readily children learn different kinds of relations among the features. Two experiments with 40 4-5-year-olds, 40 7-8-year-olds and 50 adults indicate that young children readily learn a perfect correlation among the features (e.g., all and only circles are blue). Young children especially had difficulty learning simple conditional probabilities in the absence of perfect correlation (e.g., all circles are blue, but some squares are as well). Study 2 investigates how children learn from examples generated in joint activity. Results from 5-6-year-olds and 9-10-year-olds suggest children may learn more from others who disagree with them than from others who generate evidence from a neutral or agreeing position. Future studies are considering the role of cooperative vs. competitive vs. individual generation of examples.

S48
The Effects of Distraction and Task Complexity on Preschoolers' Attention and Performance

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Previous research has shown that distraction impedes performance and attention during the preschool years (Kannass & Colombo, 2007), but little is known about how the complexity of the task affects performance in a distraction context. Others have suggested that distraction may facilitate attention to a task (Ruff & Capozzoli, 2003). This project investigated how the complexity of the task (simple, complex) and the type of distracting event (continuous, periodic, no distraction) affected 3- and 4-year-olds' task performance. 95 3- and 4-year-old children received simple and complex versions of two tasks (puzzles and sorting) during four 3-minute trials (1 task per trial). Participants were assigned to one of three conditions: Continuous distraction, periodic distraction, or no distraction. Task performance, looking to the task, and looking to the distractor were affected by the type of distraction and type of task, with continuous distraction generally being the most disruptive.

FA20
How Do Preschoolers Understand Invisible Agents? As Absent, Hypothetical, Small or Invisible ?

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Invisibility is a cross-culturally recurrent feature of supernatural agents that can reliably be found in religious beliefs and folk-tales. But from what age do children first grasp this derivation from the ontology of a person (e.g., Keil & Norenzayan, 2004) and more importantly, what are the cognitive prerequisites necessary to delineate invisibility from non-visibility? Using a level-1 perspective taking task (Flavell, 1978), we tested children's understanding that a person can/cannot see another person depending on an (un)obstructed line of sight. Using this paradigm with 3- to 6-year old children, we introduced humans and invisible agents called Gozies and asked about their visibility under varying physical conditions (line of sight free/obstructed) and agent-agent combinations (Human/Human, Absent Human/Human, Hypothetical Human/Human, Gozie/Human). Our results indicate that an understanding of invisibility does not coincide with level-1 understanding of human perception but significantly increases from 3 to 6. Analyses of children's justifications behind their answers will be presented.

FA21
The Relationships among False Belief, Emotion, Language, and Social Behavior in Four- and Five-Year-Old Children

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This study investigated the relationships among false belief, emotion, language, and social behavior in four- and five-year-old children. The participants were 30 four-year-old children and 30 five-year-old typically developing children in two kindergartens. The children's abilities were measured by using language tasks, false belief tasks, emotional perspective taking tasks, and the Korean Version of the Social Skills Rating System-Preschool Form (K-SSRS). The results showed that 4-year-old children's false belief performance was significantly correlated with emotional perspective taking whereas 5-year-old children's false belief performance was significantly correlated with complement understanding and social skill scores. The findings also suggest that understanding of false-belief may be separated from understanding of emotion in terms of aspects of social behavior in young children. The results of multiple regression analysis showed that receptive vocabulary predicted social behavior in 4-year-olds, while the false belief performance predicted social behavior in 5-year-olds. In addition, the complement understanding predicted the false belief performance in 5-year-olds. These results suggest that the vocabulary along with the false belief performance is a predictor of social behavior in Korean children, the complement understanding is a predictor of false belief reasoning.

FA22
Children Do Learn from Non-credible Informants

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Much of our knowledge owes to others' knowledge. However, not everyone is a credible source for learning. A critical developmental question is whether young children evaluate others' credibility when they learn from others. In two experiments we examined whether 3- and 5- year olds evaluate informants' credibility when learning from the informants and how they use the information later. We found that although young children learned from credible than non-credible informants a) they are conservative when they generalize information beyond their initial learning task, and b) young children's selective learning from credible informants was not apparent when there was no direct comparison of credibility status between credible and non-credible informants. These findings suggest that young children may learn from non-credible informants especially when they are the only available learning source.

Children's Conceptual Knowledge of Arithmetic: Developmental Progression and Relation with Executive Function

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A judgement task was used to assess 170, 6- to 9-year old Australian children's conceptual knowledge of commutative, associative, and addition-subtraction compliment principles in both numeral and word formats. Children were shown pairs of arithmetic addition problems and were asked to judge whether they could solve one problem by referring to the other, and explain their decision. A 3(concept: commutative, compliment, associative) x 2(format: numerical, word) x 4(Age: 6, 7, 8, 9) mixed ANOVA revealed significant effects of Age and Concept but not of Format. The interaction of Concept x Age on accuracy was significant. Accuracy in judging and explaining conceptual relations followed a logically ordered progression, from commutative relations to additive associative to addition-subtraction compliment principles. The magnitude of the conceptual relation effect declined with age. Individual differences in children's Executive functions of inhibition, working memory and relational processing were related to different profiles of conceptual knowledge.

Ignorance Is Bliss for 3-Year-Olds

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Do children equate ignorance with error (e.g., Ruffman, 1996; Friedman & Petrashek, 2008)? In this study, 3-year-olds, 6-year-olds, and adults saw four familiar objects. One informant professed ignorance about each object's name ("I don't know what it is"), and a second mislabeled each one (e.g., called a comb a "thunderstorm"). Later, the two informants offered conflicting labels for four novel objects (e.g., a T-shaped object was called "fip" by one and a "modi" by the other), and children were asked who was saying the right thing. Three-year-olds responded at chance levels, suggesting that they did indeed equate ignorance with error. In contrast, 6-year-olds and adults endorsed the novel labels provided by the ignorant informant 68% and 70% of the time, respectively. For older children and adults, committing an error is a greater epistemic offense than admitting ignorance.

Do 11 Month Old Infants Understand that Pointing Can Communicate Information about Objects?

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Unlike many communicative gestures, pointing does not map onto a single symbolic meaning. Instead, pointing conveys information by specifying a particular physical referent for the recipient. By 12 months, infants understand that pointing is directed towards objects (Woodward & Guajardo, 2003). At the same age infants show some understanding of the communicative nature of pointing, as they use pointing to indicate the appropriate location of an object that an adult is searching for (Liszkowski, Carpenter, & Tomasello, 2008). Can infants combine these skills to understand how pointing, but not non-deictic gestures, functions in communicative interactions to allow one person to specify a particular object to another person?

We compare infants' understanding of the communicative affordances of gestures to their understanding of how human vocalizations function in a similar communicative context (Martin, Vouloumanos, & Onishi, 2008).

Children's Assessment of Reliability Influences Willingness to Learn Second Labels

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This study examines 3.5-year-old children's willingness to learn novel labels for familiar objects depending on (a) the reliability of the speaker and (b) their assessments of the speaker's reliability. Children interacted with a speaker who presented a series of familiar objects and labeled them either accurately or inaccurately. After establishing reliability, the speaker taught nonsense labels for two additional familiar objects. Half of the children were asked whether the speaker was reliable before the novel labels were presented; half were asked at the end of the experiment. Results indicate that children were more willing to learn a novel label for a familiar object from a previously accurate than inaccurate labeler (F (3, 47) = 8.49, p = .001). Additionally, children who indicated that the speaker had been reliable, regardless of actual accuracy, were more willing to learn the novel labels, $\chi 2$ (2, N=48) = 10.13, p = .01.

Familiarization Boost Retention in Fast-mapping

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Recent research demonstrated that although twenty-four month-olds do well on the initial pairing of a novel object and novel referent in fast-mapping tasks, they are unable to retain the mapping after a five-minute break. The current study examines the role of familiarity with the objects and words on children's retention in fast-mapping tasks. Twenty-four month-old infants were familiarized with either a series of novel objects or a series of novel names prior to the referent selection portion of a fast-mapping task. Children familiarized with the novel objects retained the novel mapping after a delay and extended the novel word to novel instances of the category. Children only familiarized with the auditory component did not These results suggest that part of the difficulty in learning novel words in fast-mapping contexts stems from the need to create representations for objects and sounds and make a link between these quickly.

Just the Facts or Just for Fun: Children's Understanding of and Sensitivity to Memory Sharing Contexts

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Two studies were performed to explore the development of children's understanding of the accuracy expectations in different recall contexts and whether children report events differently when prompted to relay them in either a truthful or fun manner. Results from 151 children suggested that a bias to tell the truth regardless of context emerges between ages 5 and 7 years, but begins to declines after age 8. Moreover, children demonstrated the ability to modify their recollections depending on retelling context, such that instructions to recall an event in a truthful manner compared to a fun manner was associated with an increase in verbatim statements and a decrease in errors. Further results indicated that how children

initially recall an event influences the accuracy and narrative quality of their later reports, and that a strong bias to tell the truth in one context is linked with lower quality memory narratives in another context.

F43

Narrative Elaboration and Suggestibility in a Diverse Preschool Sample

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The present study examines narrative quality and suggestibility in a diverse sample of preschool children. Middle SES children recruited from a private daycare center and low SES children recruited from a Head Start program witnessed a visit from "Jenny Jungle" in their preschool classrooms. Approximately 1 week later, children were interviewed about the event. All interviews included an open-ended free narrative and a series of direct, leading, and misleading questions. In addition, approximately half of the children experienced an experimental interview adapted from the verbal labels procedure which prompted them for additional narrative elements in an unbiased manner. Analyses examined the role of SES, ethnicity, narrative skill, vocabulary, and interview type in relation to children's suggestibility.

S51

The Influence of Children's Interest on Mothers' Art-related Conversations in a Museum

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Children's interest in a domain may serve as a catalyst for parents' learning-supportive conversation. The current study investigated this hypothesis with 117 children (aged 4 to 10) in the context of visiting an art-related exhibit in a museum. Children's art interest was evaluated by mother's report about the child's value, knowledge, skills, and preference for art activities. Parents reported higher interest in art for girls than boys [t (107)=3.71, p<.01]. As family interacted with the exhibit, however, we also found that children's interest in art was related to the frequency of mothers' art-related talk (r = .22, p < .05) and interest in art corresponded to the frequency of mothers' talk about the role of style, expression, interpretation and color in art (r = .21, p < .05). Additional analyses will examine the relations between children's gender and art interest and their effects on mothers' art-related talk.

S52

Object Talk and Movement in Child-Directed Speech

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Children learn language not only through ostensive input, but also indirectly, through everyday communication. However, the content of parents' communication with children and how it may aid in language acquisition are still unclear. We know that parents use child-directed speech tones and patterns when talking to their children, including lilting prosody and elongated vowels. The current study investigated the content of parents' speech to their children, the ways in which parents manipulated objects they talked about, and the communicative gestures of parents while speaking to derive a complete picture of children's linguistic input. Subjects were selected from CHILDES database videos of parent-child dyads

interacting in naturalistic settings. Interactions were coded for variables including talk about present/ absent objects, past/ future events, pronoun use, and congruency of words with actions, gestures, or object movement. This study adds to research on the importance and effects of parental input on children's language acquisition.

S53

Forgetting Common Ground: Six- to Seven-Year-Olds Have an Over-interpretive Theory of Mind

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Four- to 10-year-olds and adults (N = 239) responded to two types of interpretive theory of mind tasks. In the single past experience trials, one character sees a full picture, and this prior experience is necessary to identify the object in an obstructed picture where only an ambiguous part is shown. In the past experience irrelevant trials one character sees the full picture, but this prior experience is not necessary. The window in the obstructed picture shows a clear, identifying part. Results showed that when children demonstrate understanding that two people will interpret ambiguous information differently (around age 6 to 7), they overextend this insight to situations where people should share common ground. Six- to 7-year-olds who passed the single past experience trials performed significantly worse on the past experience irrelevant trials, erring on the assumption that past experience should change perspectives. The ability to recognize common ground developed between 7 and 10 years and between 10 years and adults.

F44

Preschoolers' Strategy Adoption Patterns in a Logical Selection Task: Evidence for a Matching Bias

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Fifty-two children (35 - 67 months) played a problem-solving game in which the aim was to select items from arrays of eight possibilities using tapering information received. They were assigned to four conditions, defined by type of information given (positive vs. negative) and whether visual cues were retained throughout (kept vs. not kept). Children's memory of information they received was tested. Children were given a choice between executing a matching and an elimination strategy. A large majority consistently chose the matching strategy. Children were more likely to make correct selections if they had been given positive rather than negative information, except for a minority who consistently eliminated. Children's recognition memory differed according to the form of information given (positive or negative), but not according to strategy chosen. These findings reveal that some strategies and processes useful for solving problems can be implemented by 3-5-year-olds.

FA25

Preschoolers Know When It's Not the Right Answer: Performance on a Modified Version of Piaget's Hidden-Figure Task

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Sixteen 4- and 5-years-olds completed a simplified version of Piaget's hidden-figure task. In a series of trials they searched drawings of houses that had 6 different hiding places (behind windows, etc.). They had to use the information they found to eliminate choices and

make a selection from 4 possible solutions. Each trial was developed so that if the most efficient search positions were chosen, two searches were needed to solve each problem. The children were poor at recognizing and searching places that contained useful information. However, they were very good at recognizing when possible solutions could and could not be eliminated. Children also recognized that they should eliminate all but one possible solution before selecting a final answer. While children's approach cannot be considered deductive, they showed some elements of an inductive approach. In particular, the eliminated correctly and did not opt for a solution until they were assured that it was necessarily correct.

F45

Linking Children's Earliest Memories and Maternal Reminiscing Style

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There are strong indications that socialization practices, specifically mother-child interactions during reminiscing, provide the foundation for children's emerging autobiographical memory skills. Previous research has linked maternal elaborative style to preschoolers' autobiographical narratives concurrently and over time. In the present study we had a unique opportunity to examine relations between maternal style and the ages of children's earliest memories. When children were 40 months of age, maternal elaborations were assessed during past-event conversations. When the same children were 14 years of age (range 9-17 years), we used an on-line survey to collect their earliest memories. Preliminary results (N = 56) indicate a link between maternal style and age of earliest memory. Children whose mothers were highly elaborative provided significantly earlier memories than children whose mothers were less elaborative, $F(1, 54) = 4.34$, $p < .05$. Thus, maternal reminiscing style could be one of the critical factors that influences the boundary of childhood amnesia.

SA24

The Side-Effect Effect in Korean Children

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This study attempts to examine whether Korean preschoolers would show the side-effect effect (Leslie, Knobe, & Cohen, 2006) in moral reasoning tasks. Thirty 4-year, 6-year old children (15 for each group) and 15 college students participated in the first experiment. The subjects were asked the intention question "Does [actor's name] have an intention to make [other character's name] happy or upset" after hearing stories in the good condition as well as the bad condition. All the subjects including college students did not show any difference between the good condition and the bad condition. The second experiment used the intentionality question "Does [character's name] intentionally try to make [other character's name] happy or upset" after hearing stories in the good condition as well as the bad condition. Only 15 college students were included in this experiment. No difference was found. The third experiment used stories regarding helping environment versus harming environment developed by Knobe (2004). One hundred twenty adults were asked to rate the president's intention on a 5-point scale, presenting an intentionality question or intention question. The difference was found between helping environment and harming environment as well as the intentionality question and intention question. We will discuss this finding from a cross-cultural point of view.

FA26

Do Korean Children Use Morphological Cues in Learning Novel Spatial Nouns?

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In Korean, some spatial terms are lexicalized as nouns (e.g., an [in], wui [on]) which are typically marked with locative case markers such as "-ey." We examined whether Korean 3- and 4-year-olds interpret novel nouns followed by "-ey" as referring to spatial relations. Children first watched two side-by-side videos about an object in a location and heard a sentence including a novel noun, followed by either a locative or nominative case marker. During test, children saw either the same object-different location relation (Object match) or a different object-the same location relation (Location match). They were asked to choose an event including the referent of the novel noun. Four-year-olds, but not 3-year-olds, more often chose the location match when the novel word was followed by the locative case marker. These results suggest that Korean 4-year-olds use morphological cues when learning spatial nouns.

F46

Quantification and Arithmetic: How Are They Related?

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Recent work with children who have difficulties with mathematics has suggested that their ability to quantify small sets is a predictive of the cognitive difficulties that they have with mathematics. Consistently, children with mathematical difficulties are slow to master arithmetic facts; that is, to respond quickly and accurately to problems such as 3 + 4. Quantification of sets of 1-3 items (i.e., subitizing) is fast and accurate – it is described as a pre-attentive process that is related to spatial processing and pattern recognition. In contrast, counting of larger sets is relatively slow and has been linked to working memory and linguistic processing. In the present analysis we examine the relations among subitizing, counting, and arithmetic for approximately 250 typically-achieving children aged 5 through 11 years. Results suggest that subitizing and counting make distinct contributions to the development of arithmetic efficiency.

FA27

Exploring Explanation: Causal Explanation Guides Hypothesis-testing Behavior

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Recent research has examined the kinds of events that guide causal cognition by motivating children to construct explanations (Legare, Gelman, & Wellman, 2009). Support for the proposal that explanation functions in the service of discovery is based on the fact that outcomes inconsistent with prior knowledge trigger causal explanation in children. Their explanations go beyond surface features to include information about causal mechanisms and redefining category membership. Given that inconsistency with prior knowledge triggers children to construct causal explanations, this study was designed to investigate how the process of constructing a causal explanation drives causal reasoning by motivating exploratory, hypothesis-testing behavior. New data indicate that the kind of explanation children provide guides the kind of exploratory behavior they engage in and that children

modify and generate new hypotheses when faced with inconsistent evidence.

SA25
Moderate Vagal Withdrawal Is Associated with Optimal Performance for 3.5-Year-Old Children on Executive Function Tasks

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Vagal tone is a measure of cardiac activity that has been used to assess physiological states of self-regulation. Two measures of vagal tone – baseline vagal tone and vagal withdrawal – are typically employed as indicators of physiological regulation (Calkins, 1994; Porges, 1991). The current study examined how vagal tone is related to performance on Executive Function (EF) tasks in preschoolers. Three-year-old children were administered two EF tasks – the number recall subtest of the Kaufman Assessment Battery for Children (K-ABC, Kaufman, 1983) and The Children's Stroop Test (Gerstadt, Hong, & Diamond, 1994). Vagal tone was measured during a 5 minute video prior to and during the EF tasks. Results showed that children who displayed moderate levels of vagal withdrawal during the EF tasks outperformed children who engaged in extremely high or low levels of vagal withdrawal, suggesting that vagal tone may be an important indicator of EF performance.

SA26
Probing Preschoolers' Event Memory: Combining Electrophysiological and Behavioral Methods

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In order to explain age-related changes in long-term recall, we probed 3- and 5-year-olds' memory representations at different stages in the life of a memory: encoding, consolidation, and retrieval. To examine these processes, children participated in 3 sessions that combined electrophysiological (ERP) and behavioral (imitation) methods to examine memory for 6-step event sequences with different levels of connectivity between actions. During the first session, event sequences were modeled for the child. To assess the success of encoding, we collected ERPs to images of modeled actions (old) and unmodeled actions (new). To assess the success of consolidation, 1 week later we collected ERPs to images of the actions of different old and new events. At the last visit (5 weeks after the first), we used deferred imitation to assess children's recall of the modeled sequences. Using this multi-method design provides a sensitive assessment of children's memory processing, and allows us the opportunity to assess children's recall and recognition of events.

S55
Neural Response to Reasoning about Mental States

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A central question about theory of mind development is whether reasoning about mental states is domain-specific. Are the computations underlying reasoning about people and mental states fundamentally different from reasoning about other domains? One approach to investigating this issue is to determine whether mentalizing is supported by dedicated neural processes. A few functional neuroimaging studies have observed differential neural

activation when adult participants are competing or cooperating in a game with another person versus with a computer (e.g., Gallagher et al., 2002). However, it is unclear why such differences in neural activity were observed or how they develop. For the current EEG/ERP study, we asked children and adult participants to play a competitive game against another person and against the computer and compared their EEG/ERP data in these two conditions.

F47
A Link between Perspective-Taking and Body-Matching in Preschoolers

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Thirty 3- and 4- year olds participated in several tasks designed to test the relation between perspective-taking (both visual and sociocognitive) and self-other body matching. Games included those requiring the child to take another's visual perspective into account, to place a sticker on his own body in response to an experimenter placing one on hers, and a standard Theory of Mind battery. Results support the hypothesis that simpler visual perspective-taking tasks emerge before false belief competency, but that more complex visual perspective-taking tasks (such as those requiring the child to take another's point of view in determining which of two identical objects is the focus of a verbal reference) are still quite challenging even for older children. Associations between tasks remained even when verbal performance (PPVT) was partialled out. Children's pattern of sticker placement on their own body suggests that mirror-matching emerges before same-side matching and may be related to children's perspective-taking competence.

F48
Development of the Featural/Configural Distinction in Human Action Discrimination

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Recent research by Loucks and Baldwin (2009) demonstrated that adults discriminate human actions via distinct sources of featural and configural action information, similar to analogous sources utilized in face processing. In particular, featural action information is selectively attended to over configural action information, despite the fact that featural information takes up a smaller portion of visual angle compared to configural information. Furthermore, configural action processing is disrupted with inversion, while featural action processing is spared. The current research is investigating the development of this form of dual processing, in 6-, 8-, and 10-year old children, as well as adults. The data so far indicate that 6-year-olds do show selective attention to featural information, but in contrast with adults show no inversion effect for configural information. The full sample of all age groups will be complete in 2-3 months, and the development of configural action processing will be explored.

S56
Do 10-month-old Infants Understand Others' False Beliefs?

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As adults, we know that others' mental states, such as beliefs, guide their behavior and that these mental states can deviate from reality. Researchers have examined whether young children possess adult-like theory of mind by focusing on their understanding about others'

false beliefs. The present research revealed that 10-month-old infants interpreted a person's choices of toys based on the person's true or false beliefs about how many toys were present. These results indicate that like adults, even preverbal infants can consider others' mental states when making inferences about others' actions. This early competency suggests that aspects of humans' mind-reading abilities may be innately based.

F49
Is Regularity a Cue to Intentionality? Infants' Use of Statistical Evidence in Agency Attribution

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The goal of this study is to examine whether infants are able to use statistical evidence in agency attribution. Using the violation-of-expectation paradigm, we found evidence that 9-month-old infants attributed agency to a non-random sampling event that was psychologically less probable: when there was great regularity in the sample (e.g., a fixed pattern, AABAABAAB, was repeated multiple times), infants expected to see a human hand as the cause (M = 11.02 s.) rather than a mechanical tool (M = 14.71 s.), as indicated by significant differences in their looking times, $t(15) = 2.68$, $p = .017$. When the sampling was random (e.g., ABAAAABBA), infants did not have such an expectation and they looked equally long at the two possible causes (Ms = 12.11 s. and 11.12 s., respectively). These findings are discussed in relation to an early ability to make rational inferences from statistical evidence in social reasoning.

FA28
The Role of Speaker Gender in Children's Learning from Others

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This study explores children's use of speaker gender in their learning from others. In Exp.1, 4- and 6-year-olds chose between conflicting statements about a novel object from a male versus a female speaker. In Exp.2, children decided which speaker (male or female) they would ask if they wanted to know about a novel object. Some objects were in gender-typing colors (pink or blue), and some were in a neutral color (yellow). When evaluating the testimony of others, half of the children always chose to agree with the speakers of their own gender. When deciding to which speaker they should direct their questions, one third of the children always turned to the speakers of their own gender; another one third made their choices based on gender stereotypes about color preferences. These findings are discussed in relation to how ingroup preference and stereotype attributions might influence children's learning.

F50
How Should My ingroup Behave? 12-month-olds' Expectations about the Social Behaviors of Ingroup and Outgroup Members

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Studies of intergroup bias have suggested that adults evaluate ingroup members more positively than outgroup members (Allport, 1954/1979). Our study examines the development of this tendency. Infants were given the choice between two snacks. Next they were presented with an ingroup puppet who expressed liking for the food the baby had chosen, and expressed disliking for the food the baby

had not chosen. An outgroup puppet showed the opposite pattern. Following preference exposure, infants were shown both the ingroup and outgroup puppets behaving prosocially, or both behaving antisocially, toward a third party. When the puppets behaved prosocially, infants looked longer on trials in which the outgroup acted. When the puppets behaved antisocially, infants looked longer when the ingroup acted. These results suggest that like adults, infants have differential behavioral expectations for the social behavior of ingroup and outgroup members, and assume that ingroup members should be 'nicer' than outgroup members.

S57
The Origins of Intergroup Processing: Exploring the Consequences of Social Groupings in Primates

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A fundamental aspect of human development is that we grow up within the context of social groups. From an early age, children represent individuals as members of different social categories and differentially valence ingroup and outgroup members. By 5-6 years of age, children establish groups based on criteria as trivial as t-shirt color, suggesting that even minimal grouping behavior emerges relatively early. Here, we use a preferential looking paradigm to explore the evolutionary origins of this grouping behavior. Specifically, we explore whether rhesus monkeys (Macaca mulatta) spontaneously associate arbitrary objects with social groups. Our first set of studies demonstrates that monkeys show increased vigilance toward novel objects associated with outgroup members over those associated with ingroup members. Our second set explores whether monkeys also form novel, minimal groups based on these objects. Taken together, this work suggests that some human grouping mechanisms are privileged not just developmentally but also evolutionarily.

SA27
The Effect of Delay on Children's Prospective Memory

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Past research has yielded conflicting results regarding the development of prospective memory (ProM) (e.g. Somerville et al., 1983; Kvavilashvili et al., 2001). This study investigated whether length of delay, number of intentions, and executive functioning influence ProM. Data was collected from 101 children aged four to six. The study included an experimental ProM task (Kvavilashvili et al., 2001) and a naturalistic ProM task. A 2(age) X 2 (delay) X 2 (number of intentions) ANOVA revealed a significant age by delay interaction [F (2, 91)=4.67, p<.05] with 5-year-olds performing better in the long delay and worse in the short delay and 4-year-olds performing worse on the long delay and better on the short delay. The experimental and naturalistic ProM tasks were significantly correlated [r(102)=.190, p=.056]. Results are interpreted in terms of age differences in meta-cognition and introspection.

F51

Teachers' Difficulties at Promoting Text Processing by Kindergarten Children

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This study aims to identify those situations in which teachers were unable to foster children's text comprehension during story reading at Kindergarten. An analysis of teacher-student interaction in twenty six story- reading situations in nine different classrooms was carried out employing the comparative constant method (Glaser & Strauss, 1967). The results show a common factor in these situations: teachers do not attend to text comprehension as a problem solving process on the children's part. Their interventions do not favor the children's processes involved: they focus on isolated information, they allow children to activate knowledge that is not required to understand the text, they do not provide the world-knowledge necessary to make the appropriate inferences the texts require, they overlook the contradictions text – illustrations or the complexity of the narrative structure. The lack of knowledge about the comprehension processes may account for the teachers' performance.

S58

What's the Rule? The Development of Functional Thinking in Elementary School

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Algebra is now integrated as a continuous strand into the K-12 curriculum. However, there exist few empirical models of the development of algebraic understanding. We are constructing a developmental framework and criterion-referenced assessment of Functional Thinking for elementary students. Functional Thinking is a component of algebraic reasoning which deals with relations between two sets of numbers. In particular, we focus on the ability to use and identify a rule that defines the relationship between two sets of data presented in a table. A framework for the developmental progression of this skill set is presented along with preliminary results that support our five-stage model. The earliest stage is recursive thinking, followed by stages of singular functional thinking, rule recognition, verbal rule generation, and finally symbolic rule generation. We have developed an assessment to iteratively refine the model and the assessment itself, so that it can be used in later intervention research.

S59

A Close Link between Production and Perception of Reaching Movements at 12 Months of Age

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To investigate the interrelation of action production and action perception, we used a production and a perception version of the midline barrier paradigm. Six- and 12-month-old infants' ability to reach contralaterally (i.e. across the body midline) was tested in an action production task. In a complementary action perception task, the same infants watched an actor performing ipsi- and contralateral reaching movements while their eye movements were recorded. Results showed that in the action production task, the frequency of contralateral movements increased with age. In the action perception task, 12-month-olds could anticipate the goal of ipsi- and contralateral movements, whereas 6-month-olds showed only

reactive eye movements. Analyses revealed a significant correlation between action production and action perception in 12-month-olds but not in 6-month-olds. These results indicate that the close relationship between production and perception of contralateral reaching movements starts developing in the second half of the first year.

F52

Understanding Language Conventions: The Role of Exposure to Multiple Languages

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We investigate preschool children's understanding that multiple conventional systems of communication exist, and whether exposure to more than one language facilitates this understanding. Children aged 3 and 4 (bilinguals, monolinguals, and children with foreign language exposure) watched a video in which an English speaker and a foreign language speaker each labeled familiar and novel objects. After each trial, they were asked, "What do you call this?" (Control condition) or "What do you call this in Nordish?" (Foreign condition). We predict that bilingual children and children with exposure to a foreign language will be more likely than monolingual children to choose the foreign label for novel objects, particularly in the Foreign condition.

F53

Executive Functions and Theory-of-Mind among Deaf Children: Different Routes to Understanding Other Minds?

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The aim of the present study was to investigate the role of executive functions (EF) in theory-of-mind (ToM) performance in deaf children and adolescents. Four groups of deaf children aged 7–16 years with different language backgrounds at home and at school were given eight ToM and four EF measures. The Estonian bilingually instructed native signers performed at a significantly higher level on the ToM measures than the other groups. On the EF measures there were no significant differences found between any of the groups with one exception – the Swedish bilingually instructed late signers had a significantly shorter average reaction time than the other groups. However the Swedish children's better EF performance was not mirrored in better performance on ToM tasks. Our results indicate that whatever the cause of late signers' difficulties with ToM, poor EF-skills seem to be of minor importance.

S60

Children's Processing of Action Boundaries

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Three- and four-year-old children (n = 20) advanced through a self-paced series of still images taken from equal time intervals of a movie of goal-directed human action. Findings from the adult literature suggest that individuals look longer at images displaying action boundaries relative to images displaying non-boundaries; further, looking time was longest for boundaries marking superordinate goal completion (e.g., finish making a bed while cleaning) in comparison to boundaries marking subordinate goal completion (e.g., finish placing a sheet while making a bed), suggesting hierarchical action processing. In the current study, differences among looking times

were also observed, F (2, 38) = 5.019, p < .05. Contrasts revealed that children looked significantly longer at superordinate goal boundaries (M = 1.03 sec., SD = .761), but the difference between subordinate goal boundaries (M = .77, SD = .42) and within-unit non-boundaries (M = .78, SD = .41) was not significant.

F54

Wait a Second: Using Toddler's Response Times as a Measure of Reflection on an EF Task

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EF studies with children typically focus on accuracy and not on response time. The purpose of this study was to evaluate 2.5-year-olds' use of visual and linguistic cues in a multistep multilocation search task by comparing response times on correct and incorrect trials. The findings revealed that children who searched correctly were significantly slower than those who were incorrect, but only when the locations were demarcated by pictures and labeled by the experimenter or by themselves. This is consistent with the notion that children who search correctly are responding slower as they reflect on the relevant information available to guide responses. In contrast, incorrect children act more impulsively, as if they are actively ignoring the potentially helpful information. The findings have implications for the context and consequences of toddlers' ability to use reflection to guide behavior.

S61

Problem Solving in Preschoolers: Learning from Listening to Others Ask and Answer Questions

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Three experiments examined preschool-aged children's ability to listen to a question-and-answer exchange between two people to infer the right answers to simple problems. Three-, 4-, and 5-year-old children (N=128) engaged in a simple problem-solving task: determining which of two pictures was inside a box. In Experiments 1 and 2, children were instructed to listen to the question-and-answer exchange to solve the problems. In Experiment 3, children were not explicitly told that they needed to listen to the exchange to solve the problems; instead, they had to infer it. Overall, children performed quite well, solving the majority of the problems correctly. Even 3-year-olds were often able to use the answers to another person's questions to solve simple problems, although they struggled more when they were not explicitly told that the questions and answers would help them. Implications for learning will be discussed.

S62

Computational Models of Connective Acquisition

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The acquisition of logical connectives (e.g., AND) is a unique problem in language development because these terms describe the truth or falsity of particular relations (e.g., conjunction). Two computational simulations were used to explore the relation between natural language input and connective representations. Simulated input was created following a coded English-language corpus (Morris, 2008) that determined relative frequency, meanings, syntactic frames, and inferential context for AND and OR. In both simulations, simple neural networks extracted connective

representations from natural language input. The more frequent the connective in simulated input, the faster the acquisition. Yet initial representations were not abstract but most useful in contexts similar to those in the input. With more heterogeneous simulated input (i.e., connectives occurring in various contexts), representations became more abstract, which in turn allowed for more accurate truth-falsity evaluations.

SA28

The Qualitative Learner of Action and Perception: A Model of Action Acquisition

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We have developed a model of action and qualitative distinction acquisition in continuous domains, and we present recent finding from experiments using this model. The model is called the Qualitative Learner of Action and Perception, QLAP. QLAP is a constructivist model. It uses a qualitative representation to discretize the sensory input. Using this discretization, it searches for contingencies, and it converts reliable contingencies into a hierarchical set of actions. We present findings from experiments for different exploration strategies using QLAP, and we propose ideas for how the model might shed light on the importance of critical periods in development.

FA29

The Cognitive Development of a School-refusal Child with High-functioning Autism Using the Landscape Montage Technique

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The purpose of this study was to exam the cognitive development of a school-refusal child with high-functioning autism using LMT. LMT is an art therapy designed by Dr. Hisao Nakai who is a Japanese psychiatrist; it is used as a psychology assessment and psychotherapy in hospitals and educational sites in Japan. At the age of 11 the child expressed unconstructed arrangement type and no moving objects in LMT after one-year art therapy, he could express constructed arrangement type and he could observe his surrounding environment in a fixed direction. As he drew moving objects like a car and salmon, he got a feeling that he wants to change. That means his ability of self-recognition and social skills are developing. At the age of 12 he could go to junior high school. Thus this method provides a way to support school-refusal children with high-functioning autism.

F55

When and How Are Symbols Transparent in Meaning?

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For young children, all symbolic links are arbitrary. They do not 'see' resemblance between symbol and referent, whereas older children are adept at this. How does this development unfold? Our results showed that 3- to 6-year-old children gradually develop insight into the shared features between a gesture symbol and its referent. Younger children can see through the relationship between the gesture and referent, but to do so, they need more support and explanation than older children. Specifically, young children need the symbolic link to be explained to them in terms of matching components between the real-world thing and the symbol. By age 5

or 6 years, and certainly by adulthood, we have sufficient experiences and knowledge so that we see the symbolic link without it being explained to us. Through experience, children gradually learn to 'see through' signs to referents, regardless of whether there are corresponding features.

F56
Competence and Performance in Children's Appreciation of Ownership Transfers
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Preschoolers make a striking error when reasoning about ownership transfers: They often identify the giver of a gift as its owner, instead of choosing the recipient (Blake & Harris, in press; Friedman & Neary, 2008). This poster reports three experiments further investigating children's appreciation of ownership transfers. Experiment 1 demonstrates that children's difficulty persists even at ages five and six. Experiments 2 and 3 reveal that children's difficulty arises from performance demands, rather than from limits in children's competence: When children are given tasks in which they never see the giver physically possess the gift, even 3-year-olds correctly identify the recipient as its owner. These findings suggest that children understand gift-exchanges, but have difficulty overriding a default "first possession" assumption, which leads them to infer that the first person known to possess an object is its owner.

S63
Detection of Angry Faces Predicts Attentional Bias towards Affective Faces
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Recent research has demonstrated a growing interest in children's processing of emotion. Many researchers have examined this topic by studying (1) children's detection of emotional stimuli or (2) children's pattern of attention to emotional stimuli. Few researchers have studied these constructs together. In the current study, children are completing an emotion face detection task and the emotion-face Dot-Probe task. We found that children who can quickly find angry faces in the emotion face detection task show a bias towards emotion faces on the dot probe. In contrast, children who are slow to find angry faces do not show this emotional bias. Speed in finding happy faces did not predict an emotional bias on the dot probe task. These findings demonstrate that speed in detecting threatening versus non-threatening faces may be predictive of children's attentional processing of emotional stimuli.

S64
The Relation between Understanding of Identity Statements and False Belief
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Forty-eight 3;0 to 4;10-year-old children were tested on (a) an identity statements task, in which they had to recognize that a newly introduced person can be the same as a person introduced earlier under a different name or description, and (b) a false-belief task, in which they were asked to predict where a protagonist will look for an object and why. The central goal of the study was to examine whether the understanding of identity statements correlates with false-belief understanding, in support of the argument that both require metarepresentation. Understanding of identity statements

correlated significantly with false-belief explanation even after controlling for age. This correlation cannot be attributed to children's language ability because it remained significant even when control tasks, which were similar in linguistic complexity to the identity task, were partialled out.

F57
Do Children Consider Listener Knowledge When Interpreting Verbal Irony?
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To successfully understand verbal irony, children must appreciate how the context in which the statement is made does not match the literal statement given. The purpose of this research was to investigate whether children, from a third-party perspective, take into account the listener's knowledge state when determining how ironic comments would be interpreted by the listener – or conversely, whether they would conflate their own knowledge of the context with the listener's. Children, ages 6-9 years (n=85), watched 12 videos of puppets interacting, where one puppet makes a literal or ironic statement to another. The listener's knowledge was manipulated so that in half the videos he/she was aware of the context and unaware in the other half. Children evaluated the intentions/beliefs of the characters. Results demonstrated that children recognized that when a listener hears an ironic criticism he/she will perceive the statement as more positive when unaware of the negative context.

S65
Executive Functioning and Temperament in Infants with a Family History of ADHD
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Three distinct pathways to ADHD have been proposed: an initial disruption in executive functioning (EF) and separate temperamental vulnerabilities in impulsivity and emotional regulation. We tested for infant precursors of these three pathways by comparing early EF abilities as well as positive and negative approach temperament in 10-month-old infants, with (n=25) and without (n=29) familial history of ADHD. To objectively compare early EF abilities and activity level, we compared performance on delayed response, A-not-B, and object retrieval tasks. Parents rated infant temperament on the Infant Behavior Questionnaire-Revised (IBQ-R). The parental report and laboratory findings of higher activity level in Family-ADHD infants suggest an early emerging vulnerability along the proposed impulsivity pathway. Supporting a vulnerability in emotional regulation, Family-ADHD infants had lower Falling Reactivity ratings. None of our five EF outcome measures showed differences between groups. The role of temperament in the development of ADHD and associated EF deficits are discussed.

S66
Absent Reference Comprehension in 12-month-old Infants
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The present study looks at the role of the familiarity of a referent in 12-month-old infants' ability to comprehend absent reference. Infants played sequentially with two stuffed animals, one familiar and one new. When a hiding location was not accessible to babies

they did not search for an absent object independently of weather it was familiar to them or not. When the hiding location was made accessible to them, babies searched much more for a new toy than for a familiar one. If babies were familiarized with a toy in one location and tested in another, they were less likely to search for that toy than if they were familiarized and tested in the same location. These findings suggest that infants' ability to understand talk about absent things is influenced by the prior location of objects.

F58
Visual Perspective-Taking Difficulties in Non-Clinical Adults Higher in Autistic Traits
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A plethora of research on emotional and cognitive perspective-taking resoundingly suggests that individuals with autism experience specific impairments in emotional and cognitive perspective-taking. The literature on visual perspective-taking in autism has yielded contradictory results. However, these studies did not all use tasks that tend to prompt a visual perspective-taking strategy. The current experiment used a design involving viewer versus array-rotation instructions crossed with item and appearance questions. Adult participants, high in autistic traits (hi-AQ) and low in autistic traits (lo-AQ, assessed by the Autism-Spectrum Quotient; Baron-Cohen, Wheelwright, Skinner, Martin, Clubley, 2001) were instructed to imagine an array of blocks from a different visual perspective for viewer-rotation, whereas they were instructed to mentally rotate the array into a new configuration for array-rotation. We found that adults higher in autistic traits only performed more poorly than adults lower in autistic traits on the critical test of more complex appearance questions under viewer-rotation.

FA30
Child's Matching Bias on the Disjunctive Selection Task
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The disjunctive selection task is one to reason the truth of a rule in disjunctive form. This task is conducted to investigate a process of hypothesis deductive thought. Participants are asked which counterpart of disjunctive component to confirm from four choices in order to reveal the truth of the "p or q" form rule. Four choices imply the logical values p, not-p, q or not-q respectively. It is thought that matching bias is one cause to make wrong choices. It is a tendency to select choice that matches the lexical content in the rule. Previous studies show however inconsistent to one another. It is therefore necessary to examine cognitive development of thinking process to solve this controversy. This study was designed to analyze child's matching bias on this task. The author shows most over 10-year age Japanese children did not select matching choices calling into question of matching bias.

SA29
24-month-olds Segment Novel Events and Re-enact Action Subcomponents: Preferential Looking and Behavioral Evidence
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Evidence suggests that 8 to 10 month old infants parse familiar actions along intentional boundaries. This research examines how 24-month-olds extend this ability to segment novel sequences of events using two measures: preferential looking and behavioral re-enactment. After observing digitized video of the novel three-step action sequence, participants viewed the test videos with pauses inserted during ongoing action (interrupting) or at the completion of each action (completing). Preliminary results (N=4) suggest that visual attention is recruited when pauses occur at action boundaries. Converging behavioral results indicate that 24-month-olds (N=14) can select a single action from a novel event sequence for re-enactment. After observing the novel three-step action sequence, a significant proportion of children selected a single action from the event sequence for re-enactment. Results indicate that by 24-months, robust segmentation skills may extend to novel events to support intentional inferences in a variety of contexts.

S67
Getting to the Point: Young Children Have Difficulty Inhibiting Expectations about Pointing Gestures
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Even 13-month-olds seem to understand the link between seeing and knowing (Surian et al., 2007). And yet, Povinelli and deBlois (1992) found that 3-year-olds were as likely to search for a hidden object in a location to which the person who hid it was pointing as a location to which someone who had not seen the hiding event was pointing. Perhaps children were unable to inhibit the normally appropriate expectation that people point to locations where things are (Couillard & Woodward, 1998). If the two informants instead used a cue that did not have a history of veridicality, even 3-year-olds might succeed. Indeed, we found that 3-year-olds searched in the location indicated by the hider just 54% of the time when pointing was used, but 71% of the time when the two informants used pictures of themselves to indicate where they thought the object was hidden.

S68
Episodic and Autobiographical Memory: Comparing Recognition in a Photo Paradigm Using ERP
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Episodic memories are of events from a specific place and time. Autobiographical memories are episodic memories with an additional sense of personal involvement. We compared recognition of episodic and autobiographical stimuli by using events that differed only on the encoding experience (with or without personal significance) in 7-11-year-olds and adults. Participants visited a museum and took photographs of specified exhibits (autobiographical encoding). They were asked to attach personal relevance by thinking about how they felt, etc. Then they viewed photographs that someone else took of the same exhibits (episodic encoding). In an event-related potential (ERP) recognition test 1-2 days later, participants classified photos as ones they took, photos someone else took, or novel photos. We observed a clear old/new effect, as well as differentiation of autobiographical from episodic memories. Implications for our understanding of the development of episodic and autobiographical memory, and the neural substrates that support each, are discussed.

FA32
LINKS BETWEEN ATTENTION ORIENTING AND ATTENTION BIASES IN 'HOT' AND 'COLD' CONTEXTS

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There has been growing interest in the role affect may play in moderating a child's ability to control cognitive processes, particularly attention. 'Hot' cognitive tasks often lead to performance decrements. However, much of this work involves children performing single tasks. It is therefore difficult to judge if the observed patterns are limited to the unique demands of a specific context or carry across related domains. In the current ongoing study, children are completing two standard attention tasks (the affective Posner & the emotion-face Dot-Probe), each with an introduced affective component. We found that five- to six-year-old children displaying attentional avoidance to threat during the Dot-Probe had greater difficulty controlling attention in the affective Posner during the neutral condition. The addition of the affective stressor, however, erased this difference. This suggests that impact of emotion on performance may vary with task demands and individual differences in attention mechanisms.

FA33
THE ADAPTIVE NATURE OF CHILDREN'S IMMATURE THINKING: DEVELOPMENTAL TRENDS IN THE JUDGMENTS OF CHILDREN'S EXPRESSIONS

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We presented both adults and children 10- to- 17-years of age with a series of paired vignettes, reflecting different types of mature and immature thinking. Some vignettes reflected agentive cognition, described as expressing a purposive explanation for some behavior or phenomenon. Others reflected nonagentive cognition, such as overestimation or poor inhibition. Children expressing immature cognition for agentive items were rated higher for statements reflecting positive affect (e.g., cute, friendly), and lower for statements reflecting intelligence (e.g., smart, intelligent) than children expressing mature thought for participants 16-years and older. For nonagentive cognition, participants 16-years and older judged children expressing immature thought lower for positive affect and higher for negative affect. Children 15-years or younger consistently rated the mature child higher in positive affect and lower for negative affect. Thus, the adult pattern of viewing children expressing immature agentive cognition positively emerges in middle- to-late adolescence.

FA34
HIGHCHAIR PHILOSOPHERS: THE IMPACT OF ONTOLOGY-RELEVANT SEATING AND YOUNG CHILDREN'S NAMING BIASES

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Children use word-learning biases to simplify the task of learning words. For example, they will generalize names of novel solid objects to new instances by similarity in shape but names for nonsolid substances by material similarity. However, this "material bias" is weaker in toddlers than the "shape bias," possibly due to the disproportionate number of names for solid objects in the language environment compared to names for nonsolid substances. Furthermore, situations in which nonsolids are named and/or

presented differ from those for solids; most early-learned nonsolid names are foods presented in confined settings such as a highchair. We examined effects of context on toddlers' generalization biases for nonsolids. We ask whether presenting toddlers with edible nonsolids similar context to what they typically encounter changes how their categorization. Specifically, we found they categorize nonsolids more systematically (extending novel names by material) when in a highchair than when at a laboratory table.

S69
YOUNG CHILDREN'S THEORY OF PERSONALITY: PERSON OR SITUATION ATTRIBUTIONS?

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Theories of personality understanding have focused on whether people make 'person' or 'situation' attributions to explain the causes of events. In this study, 3- to 6-year-old children were told stories about social interactions with positive outcomes (e.g., a child behaving cooperatively) or negative outcomes (e.g., a child behaving unkindly). All participants received four sets of stories in which the situational information varied (physical health, emotion, physical characteristics, control) to determine the degree to which they would use it to discount the possibility of a positive or negative personality attribution. Overall, with increasing age, participants exhibited a positivity bias in their trait attributions and were more likely to use situational information to discount person attributions for negative outcomes. In addition, participants were more likely with age to predict generalization of behavior in the future after hearing about positive than negative outcomes.

F59
LINGUISTIC MEDIATION OF YOUNG CHILDREN'S SYMBOLIC UNDERSTANDING IN A MODIFIED DELOACHE MODEL TASK

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A major accomplishment of early childhood is learning to use symbols and symbolic artifacts. The current study investigated how language, particularly label use and linguistic scaffolding, mediates children's symbolic abilities. Children, ages 2;6 to 3;6, were presented with a modified model task in which they observe an object hidden in a stack of four boxes, and were then asked to retrieve a similar object in the same location in a set of "target" boxes. Each box was identified with a different object sitting on a small shelf in front of it. In a 2X2 design, language use was manipulated by a) providing linguistic scaffolding (standard v. naming) and b) using objects to identify the boxes whose names were either known or unknown to the children (labels v. control). Preliminary analyses indicate a main effect of linguistic scaffolding, $F_{(1, 6)} = 24$, $p < .005$. This supports the claim that language mediates children's symbolic development.

FA35
DEVELOPMENT OF SEMANTIC AND DECODING SKILLS IN YOUNG READERS

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This purpose of the present study is to investigate the development of two cognitive skills that are imperative for children to understand the meaning of a written word: namely, the development of orthographic skills (decoding the written form of a word), and the

development of semantic skills (linking meaning to that orthographic code). Although it is necessary for successful reading that orthographic decoding and semantic comprehension function in tandem (Gough & Tumner, 1986), it is by no means certain that they follow the same developmental trajectory. The present study, therefore, aims to disentangle the timing and development of these two cognitive skills in order to investigate reading development and semantic processing in children in the first through the fourth grade.

F60
Infants Understand that False Beliefs Can Be Corrected by Perception

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Recent research suggests that infants can attribute false beliefs to others when tested with the violation of expectancy procedure. However, infants might use a simple rule, such as "people will look for an object where they last saw it" to succeed on this task. In order to address this issue, the present study administered a false-belief task to a group of 18-month-old infants (N= 36). The procedure was identical to the one used before except that two transparent boxes replaced the opaque boxes. Results indicated the reverse pattern of results, that is, infants in the empty box condition looked longer during the test trial (M= 11.81, SD= 8.61) than infants in the full box condition (M= 7.01, SD= 5.04), t(34) = -2.04, p < .05. These results suggest that infants are not using a simple behavioral rule when predicting the search behavior of the agent in the false belief task.

F61
Children's Natural Conversations Following Exposure to a Rumor: Linkages to Later False Reports

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Research shows that children naturally propagate overheard false rumors and that the circulation of such information can induce children and their peers to wrongly recall actually experiencing rumored-but-nonexperienced events. The present study extends this work by recording 3- to 6-year-olds' naturally-occurring conversations following exposure to an erroneous rumor. Results indicate that compared to children who overhear rumors spread by adults, those who pick up rumors from peers during natural interactions engage in deeper and more inventive rumor mongering. Moreover, the degree and originality of rumor propagation was linked with various qualities of children's subsequent recollections at both a 1-week and 4-week delayed interview. Further, compared to 3- and 4-year-olds, 5- and 6-year-olds naturally transmitted more novel and coherent embellishments of the rumor to their peers, and more of their false narrative reports during the interviews overlapped with their own and their peers' utterances transmitted soon after the rumor was planted.

F62
Mother Knows Best! The Role of Parent Input in Children's Spatial Language Development

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Recent research reveals substantial individual differences in young children's production of spatial terms (Pruden, Levine, and Huttenlocher, 2009). Few studies have investigated whether these individual differences in children's spatial language use are related to parental input. In the present study, we examine whether the development of children's spatial language is tightly coupled to frequency of parent usage. Fifty-eight parent-child dyads were studied longitudinally in their homes and videotaped for 90 minutes at nine time points between 14 and 46 months. Three spatial language categories were targeted: Dimensional adjectives: describe the size of objects, people, and spaces; Shapes: describe the standard form of enclosed two- and three-dimensional objects and spaces; Features and properties: describe the features and properties of 2D and 3D objects, people, spaces, and the properties of their features. Results suggest that parent input early in development plays a significant role in children's spatial language acquisition.

S70
Children's and Adults' Understanding of the Impact of Nutrition on Growth and Mood States

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Four studies examined whether preschoolers and adults recognized that non-germ related biological factors such as nutrition could affect biological processes such as growth (height and weight) and mood states on a short and long-term basis. The results suggested that preschoolers thought that both healthy and unhealthy nutrition would make a person grow taller or fatter on a short-term basis but they reasoned that eating healthy foods on a long-term basis is more likely to make them grow tall. Adults judged that eating healthy foods is more likely to make a person grow tall and eating unhealthy foods is more likely to make a person grow fat on a short and long-term basis. Preschoolers did not think that nutrition influenced mood states but adults reasoned that eating healthy foods on a short and long-term basis would result in positive mood states whereas eating unhealthy foods would result in negative mood states.

SA30
Taking A Step Up; How Parents Perceive Their Infant's Ability to Climb-up a Step

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Successful caregiver-child interactions require that the caregiver be able to predict the child's motor abilities. This project investigated caregivers' expectations about their own and their children's ability to climb-up a step. Parents of 14 to 24 months old infants adjusted the height of a step to the maximum height they and their infant would be able to walk-up without support (perceived ability). A staircase procedure was employed to estimate the maximum height parents and infants could climb without support (actual ability). Accuracy in estimation was calculated as the ratio between perceived and actual ability. Results showed that parent's accuracy in estimating their own and their child's abilities were not correlated. Estimations for the child varied depending on walking experience and birth order. In all, results showed that parents of younger— more inexperienced—children overestimated their child's climbing ability (particularly first-time parents), while parents of older—more experienced—children underestimated their child's ability.

F63
Where Do We Come From? Representations of Sources in Infants' Event Representations

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Twelve-month-old infants encode endpoints in preference to starting points when viewing motion events involving intentional, goal-directed action (e.g. - a duck moves out of a bowl and onto a box; Lakusta et. al., 2007), but not when encoding events involving motion by an inanimate object (e.g. - a balloon) (Lakusta & Carey, 2008). Motivated by linguistic analyses (Dowty, 1990), the current study tested the hypothesis that making the starting point objects causal (e.g. - a cannon shoots a beanbag onto the box) would lead infants to encode starting points in preference to endpoints. This hypothesis was not supported; instead, infants continued to show a robust bias for endpoints. The results will be discussed in terms of how causal reasoning may be related to intentional reasoning early in development, as well as to how pre-linguistic representations reflect linguistic representations.

S71

Teaching Children Where They Learned Information: A Test of Two Techniques

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Source-monitoring is important for children to differentiate credible and non-credible sources and to ensure accuracy in forensic investigations. Thus, successful source-monitoring training would be valuable. It is unclear why children benefited from source-monitoring training in some studies but not in others. The present study addresses this issue by extending previous methodologies to examine developmental differences in the type of training required. Children aged 3 to 4 and 7 to 8 will learn about the human body from two similar sources (DVD and live demonstration) and 4 to 7 days later will be randomly assigned to receive either a) a set amount of training, b) training until a specified criterion is reached, or c) no source-monitoring training. It is expected that source-monitoring training will benefit older children, but not the younger children unless criterion is met. These results would suggest developmental differences in children's "readiness" to benefit from source-monitoring training.

F64

Measuring Infants' Learning through Anticipatory Eye Movements

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Many researchers are currently interested in measuring infants' anticipatory eye movements to understand cognitive skills like categorization, rule learning and language processing (e.g., McMurray & Aslin, 2004; Kovacs & Mehler, 2009). In the present study we investigated how closely 10-month-old infants' eye movements tracked the statistics of the input they were given. We presented infants with a simple anticipation task in which a central audiovisual cue predicted the location of a reward movie. There were three between-subject conditions based on the reliability of the central cue: Deterministic, Probabilistic and Random. We found that infants exposed to Deterministic contingencies made fewer anticipatory eye movements than those exposed to Probabilistic contingencies. Surprisingly, infants whose reaction times decreased the most during training showed the least accurate anticipatory looking later in test, suggesting an important role for individual differences in how infants approach the anticipatory looking task.

F65

Children's Talk about Future Events. A Study in Marginalized Urban Commmunities of Buenos Aires, Argentina

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The study is part of an investigation into the linguistic and cognitive development of children from marginalized urban neighborhoods in Buenos Aires, Argentina. The present study analyzes the interactional situations in which 4-year-old children spontaneously talk about future events with others. The data consists of 120 narratives of future events produced by 15 children (ages 4:2 to 4:11) in interactions with others in their families or from their communities. Each child was observed during 12 hours and their interactions were audio-recorded. The units of analysis are interactive episodes that include a child contribution of at least two temporally related utterances, that refer to a future event. Results show differences in the ways in which children's contributions fit functionally into the context of social interaction as well as differences in the strategies and in the linguistic resources that they use to plan the future event.

F66

Hierarchical Chunking in 13-month-old Infants Increases Working Memory Capacity

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The study is part of an investigation into the linguistic and cognitive development of children from marginalized urban neighborhoods in Buenos Aires, Argentina. The present study analyzes the interactional situations in which 4-year-old children spontaneously talk about future events with others. The data consists of 120 narratives of future events produced by 15 children (ages 4:2 to 4:11) in interactions with others in their families or from their communities. Each child was observed during 12 hours and their interactions were audio-recorded. The units of analysis are interactive episodes that include a child contribution of at least two temporally related utterances, that refer to a future event. Results show differences in the ways in which children's contributions fit functionally into the context of social interaction as well as differences in the strategies and in the linguistic resources that they use to plan the future event.

SA31

The Development of Children's Inequity Aversion

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Inequity aversion underlies cooperation and other social competencies, yet little is known about its development. This study examined 142 3.5-8 year-olds' responses to inequity in the presence of a same-sex, same-age peer. A 3x4 factorial design was used with independent variables exchange rate and age group and dependent variables feelings about trade and willingness to trade. Young children (ages 3.5-5) did not discriminate between high- and low-exchange rates, but 5.5-6.5-year-olds expressed sadness over low-exchanges, even as they remained willing to trade. Like adults, 6.5-8 year-olds expressed sadness over unequal exchanges and also showed higher rates of refusal, preferring not to trade rather than accept low-exchange rates. Results are consistent with a developmental model involving (a) awareness of inequity, (b) caring

enough about inequity to react, and (c) willingness to sacrifice personal gains given inequity. Results provide strong evidence of cognitive and emotional interactions underlying the development of children's inequity aversion.

F67

Variability in Infant Visual Orienting: A Dynamic Field Account of the IOWA Task

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Orienting responses were collected using the Infant Orienting with Attention (IOWA) Task, designed to capture within and between group differences in 5.5- 7.5- and 10-month-old- infants' visual orienting ability. Infants fixated a central stimulus, followed by a 100 ms peripheral cue that was either spatial and predictive (20%), spatial and non-predictive (40%), non-spatial and non-predictive (20%), or no cue (20%). Older infants were significantly more likely to make incorrect eye movements for spatial, non-predictive cues, and more likely to make correct eye movements for spatial, predictive cues relative to all other cue types, indicating increased saccade planning efficiency, and/or increased reliance on spatial cues. These developmental effects are being modeled using Dynamic Field Neurons, enabling us to describe infants' visual orienting behavior based on: 1) age of infant, 2) individual differences, and 3) task history.

F68

Measuring Vocabulary Sophistication from Parent-Child Interaction

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In this study we examine the most rare words that parents and children use during interactions to determine: 1) what kinds of words make up the rare words used by parents and children at different ages, 2) the relation between parent and child use of rare vocabulary words, and 3) whether a measure of rare word use (for parents and children) can tell us more about children's later vocabulary skill than other early measures of vocabulary size or diversity. The data come from transcripts of 90-minute parent-child interactions from 60 families followed longitudinally every four months between child ages 14 and 46 months (9 visits per family), as well as follow-up vocabulary comprehension scores (PPVT) at 54 months. Results suggest that there is added value in looking at vocabulary sophistication (for both parents and children) in addition to diversity in understanding the course of lexical acquisition.

SA32

Contextual Factors in Early Comprehension and Production of Pictures

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A wide variety of sociocultural practices organizes children's knowledge and constrains symbolic development. This research investigates age-related and socioeconomic differences in pictorial competence. Middle and low SES children from 30 to 60 months were assessed for their pictorial comprehension (own and the experimenter's drawings) and production (free and model drawing). Middle SES children comprehended experimenter's drawings at 30 months; at 42, when children produced representational drawings in the model task, they also understood their own drawings; at 48 months children succeeded in all tasks. In low SES children pictorial

comprehension and production appear later: at 42 months children understood the experimenter's drawings; at 60 they passed both comprehension tasks, but their production was representational only in the model task. Low SES children were also assessed for their comprehension of photographs. Results show that these children used photographs symbolically earlier than drawings, at 36 months, probably due to iconicity.

F69

Electrophysiological Indices of Memories for Emotional Events among Children and Adults

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We used event-related potentials (ERPs) to examine the neural processing of emotional events among children aged 7-10 years and adults. Using a cue-word procedure, participants were asked to generate memories of past events for each of 30 emotionally-neutral cue words. For the first 10 words, no mention of emotion was made. For the remaining 20 words, participants provided memories of events that made them feel angry, sad, or upset (n = 10), or events that made them feel excited, cheerful, or glad (n = 10). Immediately after memory elicitation, ERPs were used to test whether neural processing differed among affectively charged versus more affectively neutral memories. Differences in the processing of emotional and neutral event memories are apparent. These effects are discussed in terms of the relation between emotional arousal and the maintenance of specific event memories in childhood and adulthood.

FA36

Less Is More: Performance of Children with Autism on an Executive Function Task

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The Less is More (LIM) task has been used to assess executive function (EF) in young children. Because of the social component of the original task, it was inappropriate for use with children with autism. A newer version without this social component and nonfood rewards ("Lite Brite" version) was developed, and as expected, there was a significant age effect in typically-developing children (4s > 3s), but no overall difference compared with the standard task or a nonsocial-food version. We are currently conducting a study using this Lite Brite LIM task in children with autism. We predict that children with autism will perform significantly worse than chronological and verbal-mental-age matched peers given their EF deficits. Further studies may look at the effect of symbolic distancing on EF in children with autism in comparison to typically developing peers.

F70

Group Bias, Statistical Reasoning, and Social Judgments

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The human tendencies to behave altruistically and exhibit bias towards outgroups emerge early in childhood. Children approve of prosocial behavior, tending to like generous over stingy individuals. The current study examines how young children respond to observations of generous and stingy individuals from their own and another group. Children (4-6 years old) were assigned to one of

two artificial groups and rated how much they liked puppets from each group. Children then watched videos in which ingroup and outgroup puppets were sharing candy in a generous or stingy manner. Finally, children rated how much they liked new puppets from each group and had the opportunity to share with the puppets. Our results indicate that children's liking of the outgroup is greatly reduced after observing negative outgroup behavior. However, observing negative ingroup behavior had no effect on liking of the ingroup. Children shared equally with both groups regardless of observed behavior.

S72
Transitive Inferences Revisited: Can Preschoolers Make Congruent Guesses about Arbitrary Correlations?
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There is disagreement about whether young children are constrained by transitive inferences of the form 'if A=B and B=C, then A=C'. Some research reports surprising competence, notably when A, B, and C refer to correlating physical dimensions. However, other research finds pronounced difficulty with this type of reasoning, for example when A, B, and C pertain to single items. To address this controversy, a setting was used in which the relations among A, B, and C were arbitrary correlations among dimensions. Preschoolers and adults were asked to learn two correlations (e.g., that (1) darkness of a cloud was correlated with depth of a bowl, and (2) depth of a bowl was correlated with the size of a creature), and they had to guess the third correlation (e.g., between darkness and size). Results show a complex pattern of responses, suggesting that transitivity constrains children's inferences only as long as the two to-be-learned relations have intermediate difficulty.

SA33
Investigating What Preschoolers Understand about Visual Perception: A Training Study
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Researchers have shown that preschoolers cannot report where someone is looking based on eye direction alone. We investigated whether training and feedback about the role of eyes in visual perception would improve children's performance. At pre-training, 71 children completed a "gaze reporting" task (Doherty & Anderson, 1999). Children who were correct on less than three trials were divided into groups (Training + Feedback; Feedback-Only; Experience-Only, and Control). Following two training sessions the "gaze-reporting" task was again administered. All children except those in the control group passed the "gaze-reporting" task, but not other tasks of visual perception. The results suggest experience was sufficient for improving the performance of some children; however, training and/or feedback was more effective. Discussion will focus on levels of visual perception required to complete different tasks.

F71
Children as Philosophers: Differing Conceptualizations of Free Will at Ages 4 and 6
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Do young children believe that we must act on our desires, or that we can choose to refrain from desired actions? In this study, 4 and 6 year old children viewed a doll go on a 'series of adventures.' She would either display a desire to act (wanting to eat the cookie; curiosity about looking in the closet) or a desire not to act (fear of looking in the box, thinking the cracker tastes yucky). Children were then asked whether they thought the character could refrain from her desired choice, and to explain their position. Results indicate that 4 year olds have an action bias; people can perform an action despite misgivings, but cannot inhibit desires to perform an action. In contrast, 6 year olds appealed to more abstract notions of personhood to justify one's ability to choose either course of action.

SA34
The Role of Novelty in Cognition: An Evolutionary Approach
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Numerous studies have elucidated the effects of experiences with novelty on cognition. Here the authors discuss correlations of novelty and cognition spanning various developmental stages. The relationship between need for cognition and novelty was explored empirically. Participants completed Need For Cognition and Arnett Inventory of Sensation Seeking scales respectively. Results suggested positive correlate for participants' need for cognition and novelty. In accompaniment with theoretical findings, results indicate reward and age dependent nature of novelty seeking behavior. By placing emphasis on the concept that the human memory system employs information from the past to envisage information relating to the future, the authors propose that encounters with novel cognitive stimuli increases the number of inferences an individual could make. The authors propose that need for novelty in cognition is an evolved adaptation.

SA35
Niche Fitting: Do Children Understand that Size Can Be Relevant to Function?
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Early humans used tools that were often flexibly modified to fit a particular task or niche. If an ability to modify tools was sufficiently beneficial, there may have been selection pressure for humans to recognize the fit between a tool's form and its function to enable easier tool modification. If this is true, even young children may have some knowledge about the relationship between tools and the size of the problem tools are operating on. To test this idea, we asked 3.5 year old children to help an adult achieve several different goals (E.g., unscrewing a bolt) by choosing between two tools–one that had previously achieved the goal and a similar tool type that would now achieve the new goal (E.g. unscrewing a bigger or smaller bolt). Children selected the tool that achieved the new goal.

F72
Parent-Child Interactions with Artifacts in Everyday Activities
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How do children learn about tools, their conventional uses in helping us solve problems, and the range of ways they can be used creatively? Previous research suggests that children understand artifacts in terms of the designers' intentions. In contrast, I argue that children learn conventional and creative uses of artifacts and that this learning is supported by parent-child interactions in everyday activities. In this study I take a deeper look at the actual

social settings where children are learning about how everyday objects are used. Parents and their preschool-aged children participate in a cooking activity. Focus is on parent-child interactions with objects that are conventional or unconventional objects for that activity. Using this design, I investigate what parents actually say and do in such interactions with their children. Further, this study explores how these interactions may be a source of children's early learning about the functions of artifacts.

S74
The Effects of Relational Language and Executive Control on Children's Analogical Ability
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The ability to learn by analogy is a hallmark of human cognition (Gentner, 2003; Penn et al., 2008). This research investigates how this ability develops. Early in development, young children tend to focus on object similarity over relational similarity (Gentner, 1988). Why do children exhibit this bias, and how do they move beyond it to become adult-like reasoners? The present studies examine the influence of relational language (Gentner, 2003) and executive control (Richland et al., 2006; Zelazo, 2004) on children's ability to match objects based on their role in a relation, rather than their object identity. The results show that three-to-five-year-olds are better able to match on the basis of relations when they hear relational language describing the common event. Preliminary results using an independent assessment of children's executive control suggest a possible effect of this as well.

F73
Infant and Adult Face Discrimination Beyond Primates: Perceptual Narrowing of Facial Identity
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At birth, perception is broadly tuned, allowing infants to discriminate a wide array of stimuli. Infants who have not yet undergone perceptual narrowing–whereby perception narrows as a function of experience–should have broad face recognition abilities, and therefore, should recognize faces of both humans and non-humans equally well. To test this model, facial identity discrimination was measured in 4-6-month-olds (N=60), 9-11-month-olds (N=30), and adults (N=60), for the faces of three species: humans, capuchin monkeys, and sheep. A visual paired comparison task revealed that 4-6-month-olds discriminated all species' faces equally well (p>.05), while adults were best at discriminating human faces (p<.05). We are currently collecting data from 9-11-month-olds who we expect to perform as the adults do. This study explores human infants' transition from being face generalists–broadly discriminating facial identity for numerous species–to being face specialists–becoming experts in discriminating human faces.

F74
Children's Use of Perceptual and Conceptual Information in Three Inferential Tasks
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One core question of cognitive development has to do with the nature of the knowledge children use to make inferences. This research investigates how children use perceptual and conceptual information in three inferential tasks: novel noun generalization, ontological kind extension, and novel inference making. Seven-year-old children learned novel image categories presented with cues to animacy; perceptual visual cues and conceptual verbal cues were crossed to create congruent and incongruent indications of animate and artifact. Results indicate that participants used perceptual information preferentially to extend novel names, used conceptual information preferentially to extend ontology, and used both kinds of information to make novel inferences. These results suggest that children rely on different sources of information to different extents in different tasks, perhaps because of the past usefulness of those cues in a particular task.

S75
Emerging Executive Functions in Preschoolers
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There is growing interest in the development of executive functioning skills throughout the lifespan. The development of executive functioning and the component shifting and sustaining attention for the purposes of goal directed action (Blair, Zelazo & Greenberg, 2005), appears to be particularly rapid in early childhood and may play a critical role in successful school adjustment and cognitive/social development (Carlson, 2005). A task developed by Blumberg et al (2003, 2005) may help us better understand emerging aspects of executive functions in preschoolers. This study seeks to identify the relationship between preschoolers' daily performance of executive functions (based on BRIEF-P ratings) and their accuracy and use of selective attention strategies on the Blumberg (2003, 2005) task (when controlling for age and IQ).

S76
Preschoolers Focus on Harm, Not Just Emotions, in their Moral Judgments
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When preschoolers make moral judgments, do they rely on victims' emotional reactions or on whether harm was done? To answer this question, Study 1 asked preschoolers to judge the severity of six actions, crossing transgression type (Moral, Conventional, None) with reaction (Crying, No Crying). Children's judgments were not affected by emotional reactions, suggesting that harm is more important to moral judgments than its visible consequences. Study 2 tested this hypothesis by asking preschoolers to judge the severity of moral transgressions directed at four types of victim, according to a 2 (Is Hurt, Is Not Hurt) x 2 (Cries, Does Not Cry) scheme. Preschoolers judged that harm to victims that could not feel pain was less wrong than harm to others, and there was a strong correlation between harm judgments moral judgments. Preschoolers thus make a mature distinction between genuine harm and crying behavior, using primarily the former for moral judgments.

F75
The Pretend-Reality Boundary: Thinking Outside the Box
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We know that observing filmed aggressive acts on a doll leads to children later imitating those acts. Do asocial pretense acts 'leak out' into real world contexts, and if so, to what extent might they generalize? To investigate this, we randomly assigned 30 four-year-

olds to pretend play conditions in which the child's doll engaged in acts of kindness (e.g., helping to build a tower) or maliciousness (e.g., knocking down someone's tower). As compared to children who engaged in prosocial pretense, children who engaged in asocial pretense subsequently made significantly more hostile attributions on a preschool version of the Dodge Task and were significantly less likely to donate a toy to a sick child. Extending the pretend-reality boundary literature from its focus on objects in boxes (Bourchier & Davis, 2000), these results suggest that an antisocial attitude nurtured in pretend play leaks into reality and generalizes to different contexts.

F76
Evidence from the Supernatural: How People Evaluate Non-Scientific Explanations
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Access to scientific and supernatural explanatory frameworks is a universal psychological experience, and coordinating these distinct belief systems is a general cognitive problem. One approach to investigating the relationship between natural and supernatural explanatory frameworks is to study contexts in which they are used to interpret the same events. Constructing explanations for existentially arousing topics such as biological origins, illness, and death provide just such an opportunity (Evans, Legare, & Rosengren, in press; Legare & Gelman, 2008). In our research we are investigating the cognitive bases for reasoning about and reconciling supernatural and biological explanations. More specifically, what kind of evidence is used to evaluate supernatural versus biological explanations? We will present new data that speaks to this question from research in Brazil, a cultural context in which both supernatural rituals or "recipes" and Western biomedicine are readily used to solve everyday problems and provide explanations.

FA37
Is Knowledge Subjective? A Sex Difference in Adults' Epistemic Intuitions
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Justified true beliefs are usually instances of knowledge. However, contemporary philosophy provides a class of examples, termed "Gettier cases", which describe circumstances in which a justified true belief should not count as knowledge. We demonstrate a major sex difference in how adults reason about such cases. Whereas males agree with philosophers' intuitions that people in these situations do not possess knowledge, females judge that they do. In two experiments we demonstrate that this sex difference does not result because women are generally prone to attributing knowledge, nor because men are generally skeptical. One interpretation of these findings is that women more often take the perspective of another, and accordingly put more emphasis on mental states than on objective reality when deciding whether to attribute knowledge.

S77
Gender Differences in Sustaining Interests in Science and Math
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To better document gender differences in the physical sciences, we carried out an interview with 5th and 8th graders, half of whom had been enrolled in our developmental study on learning in the physical sciences. We gathered data on students' learning of physical science concepts, vocabulary and spatial skill, interests in science, and knowledge of professions that required math and science. The results showed that girls equaled boys in scientific learning scores at both grade levels. They also equaled boys' in their interests in math and science at 5th grade. By 8th grade, girls' interests in math and science had dropped significantly compared to boys. Their desires to participate in social activities and courses in math and physical science had also dropped significantly. The results are explained in terms of input girls receive from parents, teachers and peers about the appropriateness of girls pursuing the physical sciences.

F77
Toddlers' Word Learning from an Interactive-style Video Presentation
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This research explores reasons for toddlers' less efficient learning from video than from a person who is present. One hypothesis is that toddlers view events on television as distinct from real life. In Study 1, children watched an actress on video label a novel object. When asked to identify the modi, children pointed to the correct object on TV but did not transfer the label to the real object. In previous research, toddlers did apply information from video to real situations after people on TV interacted with them (via closed-circuit video–Troseth et al. 2006; Nielsen et al., 2008). In Study 2, children were exposed to an "interactive" show in which the actress made eye contact with the camera, asked the viewing child objects, asked questions, and waited for a response, or to a non-interactive video. Children who watched the interactive program more often used information from a test video to guide their behavior with real objects. Giving toddlers experience with video that mimics social interaction they encounter in real life may help them view video as a relevant learning situation.

F78
The Effects of Cue Availability and Frequency on Cross-Situational Word Learning
Sumarga Suanda, Nassali Mugwanya, Laura L. Namy
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A wealth of previous research has identified a host of social, attentional, and linguistic cues that help word learners constrain the hypothesis space regarding possible word meanings when the referent of a label is ambiguous (see Golinkoff, Hirsh-Pasek, et al., 2000). Recent research, however has demonstrated that learners may also solve the word-learning puzzle by tracking cross-situational statistics (e.g., Yu & Smith, 2007). In the proposed study, we use adults as model word learners to further examine the nature of cross-situational word learning. As in Yu and Smith (2007), participants must discover word-object pairings across many ambiguous trials. However, we manipulate the availability and frequency of unambiguous trials that provide direct cues to word-object pairings, investigating the effects on rates of learning. Of particular interest are the effects of unambiguous trials on learners' sensitivity to the fine-grained statistical information conveyed by lower-level probabilities between words and objects.

Cognitive Underpinnings of Preschoolers' Ability to Learn from Others

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According to cultural learning theory (Tomasello, Kruger, & Ratner, 1993), advances in self-regulation and social cognition allow preschool children to uniquely engage in social learning. The current study examines how these achievements contribute to developmental differences in young children's ability to learn from others in a problem-solving situation. Forty-four children (M = 4.4-years-old) observed either correct only (C-only) or incorrect + correct (I+C) instructions to solving the trap-tube task. Children's performance on false belief and inhibitory control measures were expected to predict performance on the trap-tube task for those in the I+C condition due to the conflicting representations presented by I+C instruction. Preliminary results suggest for children in the I+C condition, inhibitory control predicted successful performance, whereas, age predicted performance for those in the C-only condition. These initial findings suggest cognitive development influenced developmental differences in children's ability to learn from others under different types of instruction.

Children's Trust in Different Sources of Information

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Recent research has shown that young children learn more from picture books with more realistic images than less-detailed cartoon images. Further, children's trust in different sources of verbal testimony has been shown to vary according to many factors. In this study, we examined the nature of children and adults' trust in different sources of visual information: cartoons versus photos and photos versus text. Overall, 4-year-olds, 6-year-olds and adults preferred photos over cartoons as a source of information. When comparing photos vs. text, 4-year-olds who could not read preferred photos in all cases; however, 6-year-olds who were beginning readers and adults who were expert readers preferred photos in some contexts and either photos or text equally in other contexts. Children's and adults' explanations for their preferences were also coded.

How Children Learn to Form Supra-ordinate Categories: A Training Study

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This research investigates how children learn to categorize familiar objects in supra-ordinate categories. As a base-line, Experiment 1 showed that 6-years-olds were able to form supra-ordinate categories, whereas 3-years-olds were not. Then, a pretest-posttest training study (Experiment 2) assessed whether 3-years-olds' failures in categorization at higher-order levels could be turn into successful categorization within a child-adult collaborative context. This training study compared the performance of 3-year-olds in three conditions: no-instruction, comparison and conceptual-based conditions. As predicted, only the groups who received instruction about the objects to be compared (comparison instruction) or the properties to be inferred (conceptual-based instruction) arrived at a satisfactory categorization in the posttest. The results raise two issues

about the status of social interaction in category development: a) instruction as a precondition for developmental changes and, b) the dependence on social interactions as a possible explanation of why higher-order categories are acquired rather later in development.

Social Cognition during the Transition between Infancy and Preschool

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What happens during the transition from infant social cognitive abilities (such as joint attention, reading others' intentions, and perceiving contingency with another) to preschoolers' social cognitive abilities (such as theory of mind)? Does there seem to be a gradual transition and building up of social understanding or a major shift at some point during the toddler or early preschool years? This study follows twenty children, monthly over six months each, during the 12 to 35 month age range, examining toddlers' use of social cognitive behaviors during everyday interactions in child care. Behaviors that show evidence of social understanding or cognitive processing of social information were identified and then tracked over this age range. A model of social cognition during everyday interactions in the transition years between infancy and preschool will be presented.

Developmental Differences in Memory for Events Observed from Different Media

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Three- to 4- and 5- to 6-year-olds observed familiar and unfamiliar science events from 1 of 3 media of presentation: live, on video, or from a storybook. After a short delay, their recall and recognition memory was tested. For familiar events, no effect of event medium was found. For unfamiliar events, the 3- to 4-year-olds in the live group recalled and recognized more correct central details than 3- to 4-year-olds in the story and video groups, whose memory performance did not differ. The 5- to 6-year-olds in the live and video groups recalled more correct central details than did those in the story group. But no difference in the recall of older children in the live and video groups was found. Lastly, no difference in the older groups' recognition memory was found. These results suggest interesting developmental trends in memory for events experienced live, on video, or from a story.

The Development of Rapid Word Learning

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Around the age of two, many children enter a period of rapid vocabulary growth — sometimes called the 'Naming Boom' —that is commonly conceptualized as an increase in the rate of word learning across all categorical domains. However, recent research has suggested that the development of rapid word learning may occur within specific categorical domains as the result of previous experience learning words within the domain. The current study further tested this idea by analyzing patterns in children's vocabularies at the onset of the Naming Boom. Children's vocabularies were assessed; words that each child knew were sorted according to categorical domains (such as animals or vehicles). Most vocabularies exhibited a pattern of domain "clumping": children

knew many words in some domains, but few words in others. Results lend further support the to idea that rapid vocabulary growth develops within, rather than across, categorical domains.

SA37
Uncovering A Differentiated Theory of Mind in Children with Autism and Asperger Syndrome
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Metarepresentational Theory of Mind (ToM) was studied in children with autism and Asperger syndrome. This research challenged the prominent view that ToM is a single, integrated cognitive ability, wherein reasoning about the mental states of self and others are one and the same. The current work aimed to investigate if ToM abilities in children with autism and Asperger syndrome differentiate into Social and Intrapersonal ToM, as proposed by the Functional Multilinear Socialization Model. A second aim was to determine if ToM differentiation patterns were different for children with autism versus Asperger syndrome. Participants were 39 children with autism and 32 children with Asperger syndrome aged 8-14. Theory of Mind differentiated into Social ToM and Intrapersonal ToM for all participants with all obtaining lower composite Social ToM scores than Intrapersonal ToM scores. The difference between Intrapersonal ToM and Social ToM was greater for children with autism than children with Asperger syndrome.

F80
Cultural Variability in Early Executive Function Task Performances
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A number of Executive Function Tasks (EF tasks) have been used to study the development of executive control. It has been suggested that this controlling capacity measured by these tasks correlates with early academic readiness/performances, and also more recent studies report that this controlling can be advanced at an early stage among bilingual children. Because of the wide range of the use and application, the participants' cultural background is becoming rapidly diverse. In the present study, four of the most frequently cited EF tasks that measure switching skills, conflict inhibition, and delay inhibition were used along with other cognitive measures such as productive vocabulary and parental reports to compare the performances of child participants from three different cultural groups. Forty-five three-year-old participants participated in U.S., Argentina, Japan, and Vietnam. The results indicate the culturally sensitive nature of one of the EF tasks; delay of gratification, while other task performances and the cognitive measures did not differ across the groups. The result will be discussed with some cultural expectations specific to Asia.

S82
Mechanisms for Overcoming Reality Status Biases
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Children use many cues to differentiate reality from fantasy, including context, testimony from others, and physical evidence in the world around them. However, due to individual differences, some children hold strong reality status biases that interfere with their ability to infer reality status from these cues correctly. This research identified two general cognitive skills, inhibitory control and a metacognitive understanding of certainty, which serve as mechanisms for overcoming biases to infer reality status. In general, children with high interests in fantastical play and older children with poorer developed inhibitory control skills are more likely to display reality status biases. Additionally, children with reality status biases are more likely to overcome them to infer reality status correctly when they have a better metacognitive understanding of certainty and better developed inhibitory control. This research informs both the fantasy/reality literature and the scientific reasoning literature in demonstrating how biases can affect children's judgments.

S83
Sex Effects, Age Effects, and Malleability in Spatial Navigation
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There are many cues in the environment that allow an organism to maintain a sense of orientation during navigation, such as geometric (e.g relative distances) and feature (e.g. color) cues. It has been theoretically debated whether the ability to use geometric cues is innate or malleable. Here we test these divergent positions by housing young and adult mice (Mus musculus) in either geometrically or featurally enriched environments. For young mice, the reliance on both feature and geometric cues depended on the rearing environment. This flexibility was retained for geometric, but not featural, cues in adult mice. Overall, we found that young mice were more likely to depend on feature cues, while adult mice readily used both geometric and feature cues. Lastly, male mice were quicker to use geometric cues, while female mice were better at using feature information. This parallels the gender differences found with rats and people.

S84
Storytelling and Gesture Practices Support Cultural Differences in Folkbiological Thinking
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Although there has been a recent surge in psychological research that focuses on cultural variation, little is known about the practices that support this variation. The present research involves an examination of discourse practices that support cultural variation in mental models of nature. Earlier research has shown that Menominee Native Americans are more likely than rural European American individuals to think of humans as a part of nature and to think about ecological relations in nature (e.g., Bang et al., 2007; Medin et al., 2006). The present research shows that for Menominee and European American adults, both verbal (storytelling) and non-verbal (gesture) discourse practices are highly related to these 'psychologically close' mental models of nature. Interviews conducted with children from these communities reveal a similar pattern and show that children as young as 5 years of age are sensitive to the cultural input available within their communities.

F81
Trusting Trickers: Young Children Are Blinded by the Prize
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People must often rely on others to provide information, but sources of information are not always reliable. Given this predicament, studies show that young children can use prior reliability to determine how knowledgeable a particular source is (Koenig and Harris, 2005). However, given that a source is knowledgeable, how do children judge whether it is also trustworthy? This study examines what cues five- and six-year-old children (N=68) use to judge the reliability of previously helpful speakers over previously deceptive speakers. Results suggest that even when young children judge a source is dishonest, their trust may be unduly influenced by extraneous situational cues (such as seeing a prize). This suggests that even when young children recognize a source is unreliable, they may fail to understand the implications of this knowledge, or how to apply it effectively to behavior.

FA38
The Role of Implicit Learning and Experience in Children's Word and Category Learning
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Although past research has documented that prior experience can promote learning, much of this work has focused on more efficient strategy use with increases in experience. However, few studies have investigated the relationship between past experience and implicit learning in which strategy choice is less likely to be a factor. In this study, we examined the role of varying degrees of prior experience on children's ability to learn novel words and categories. Two-year old children were in one of three conditions: one-week, one-day, or no prior experience. Participants were exposed to novel textures and were later tested on their ability to generalize the words and categories. Data suggest that participants with more prior experience with categories were better able to learn and generalize novel labels. Results are discussed in terms of the role of implicit learning in generalization tasks.

FA39
Which Motionese Parameters Change with Children's Age?
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In this study, we analyzed parental behavior towards infants of three different age groups: prelexical (8 – 11), early lexical (12 – 24) and advanced lexical (25 – 30 months olds). The parents' task was to demonstrate the function of an object to their infant and to another adult. We compared these two conditions using objective measurements of hand trajectories providing data about their shape and structure. Results suggest that actions chosen to attract attention by providing less roundness and more range can primarily be found in younger infants, whose attention needs more guidance. Interactions with older children seem to benefit either from the increase of children's attention abilities or that parents use other means (such as the language) to attract their attention. In contrast, parameters that appear to be more in charge of structuring the action by organizing it in motion pauses seem to persist over the age and verbal capabilities.

SA38
First Order Relational Matching in Chimpanzees (Pan Troglodytes)
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Two adult male chimpanzees were presented with a match-to-sample task on a touch-screen computer in which they were required to match images based on whether they were the same shape or color as the sample. Each session consisted of 18 trials, nine color-match and nine shape-match trials, in random order. The stimuli were three different geometric shapes in three different colors each. Incorrect comparison images did not match the sample on either color or shape. Criterion was set at 83.33% correct for four consecutive sessions, which neither chimpanzee achieved in over 175 sessions. This result is in contrast to Vonk (2003) in which four orangutans and one gorilla performed above chance on a first and second order relational matching task in fewer than twenty sessions. However, the result is consistent with other research showing that relational matching with only two items in the stimulus array is extremely difficult for non-humans.

S54
Children's Knowledge of Various Dialects of English
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This study investigated children's knowledge of regional varieties of English. Recent work (Kinzler et al. 2007) suggests that some accent differences (e.g. native vs. foreign accent) guide children's social preferences. However, little is known about which language varieties children can distinguish or how they do it. Seventy-seven children (μ= 72 months) were tested on their comprehension of non-local speech styles (British-English, Indian-English, or Russian), their ability to identify speakers of these styles as well as local Central-Ohio English, and were also asked to make social judgments about speakers of different styles. The results suggest that children's knowledge of various Englishes—both in terms of identification and social preference—can be arrayed along a continuum, with Central-Ohio English being closer to British-English than Indian-English. Moreover, the local dialect acts as a critical anchor for organizing children's representation and understanding of other speech styles, enabling better identification overall.

F82
Investigating Childrens' Essentialist Beliefs in the Context of the Digital Age: The Case of Artificial Life
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Research in psychological essentialism has indicated that both children and adults are predisposed to privilege internal structures when judging the ontological status of entities. The present research investigates the extent to which these "folk" biological assumptions are being altered by our increasing interaction with artificial life. Three tasks were designed to insert computational objects (e.g., humanoid robots) into traditional essentialism tasks in order to assess whether participants remained consistently biologically essentialist when confronted with objects that resemble humans but which have distinct internal properties. While adults behaved in a manner consistent with essentialist predictions, children (aged 6-7 & 9-11) violated essentialism and did not judge artificial life to be

fundamentally distinct from humans. These findings suggest that cultural exposure to artificial life may have a causal effect on conceptual development, leading to a shift away from folk biological theories and towards a functionalist heuristic that leads to the categorization of these objects as human-like.

S85
The Influence of Learning about Causal vs. Non-Causal Relations between Shape and Function on Children's Categorization
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Prior research shows that object functions help children form artifact categories by directing their attention to shared properties. We recently showed that function exerts an even greater effect on category learning by highlighting property dimensions that generally differentiate categories. We gave 17-month-olds longitudinal experience with categories of objects bearing causal relations between their shapes and functions. This led participants to precociously use shape to categorize novel objects. We argued that a conceptual appreciation of the causal relations between shape and function embodied in artifacts motivated this effect, but could not rule out the possible involvement of a lower level associative mechanism. Therefore, in the current work, we examined 17-month-olds' categorization after experience with non-causal correlations between shape and function. Preliminary findings show that non-causal function experience facilitates shape-based categorization more so than receiving no function training, but not to the extent that causal function training does. Thus, only learning that shape and function are causally linked serves to facilitate children's "shape bias," suggesting the influence of higher level conceptual mechanisms.

F83
Failure on Equivalence Problems Is Not Universal
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A great majority of North American children from Grades 2-5 fail to solve equivalence problems (e.g., 2 + 4 + 5 = 3 + __) despite having the requisite addition and subtraction skills. One hypothesis is that their misunderstanding is superficial and can be resolved quickly with targeted instruction. To test this hypothesis, 199 Canadian children in Grades 2 and 4 were given one of three types of instruction. Contrary to the hypothesis, posttest success was limited. A second hypothesis is that poor performance reflects fundamental developmental processes in reasoning and therefore is likely to be universal. This hypothesis was also refuted: 104 Taiwanese children performed much better (means 51-86% for Grades 1-4) than Canadian students (7% and 17% for Grades 2 and 4). Thus children are capable of success on symbolic equivalence problems, but pervasive differences in instructional environments make these problems especially challenging for North American students.

F84
Relations between Life Story Episodes and Attachment Security
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Recent research on personal narratives and autobiographical memory has emphasized the construction of a narrative that captures an individual's personal experience over time. Researchers such as Dan McAdams have emphasized the importance of a coherent and optimistic life story for long-term adjustment. He and others have documented individual differences in personal narratives and have argued greater optimism (and redemptive themes) arises in the responsive caregiving associated with secure attachment. In contrast more negative (contamination) themes arise in the absence of secure attachment. The current poster investigates this relation in 40 college students who completed both the Waters & Waters (2006) attachment script assessment and the McAdams Life Story Interview. Findings support the hypothesis with attachment script scores positively related to redemptive themes and negatively related to contamination themes expressed in the Life Story Interview.

SA39
Science Fair Judging: What It Reveals about Scientists' and Adolescents' Understanding of Science
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Science fairs provide students with the opportunity to learn-by-doing in a way that has long-term implications for their interest in science. To understand scientist's intuitions about what constitutes good high school science, we developed a science fair rubric by interviewing judges about intuitive dimensions (i.e., a project could be good in one way but bad on another dimension) and benchmarks (i.e., distinguishable steps from worst to ideal within dimension). Judges from diverse scientific fields recognized creativity as the pinnacle of achievement within dimensions (e.g., creative method, creative hypothesis) in contrast with prior rubrics where creativity is isolated from the science. Fisher Z comparisons of correlations show that the new rubric increased inter-rater reliability over the traditional rubric. On-going research using surveys of judges and students examines if students and judges share understandings of science. Future research may show if adolescents acquire scientific understanding through their science fair involvement.

F85
Theory of Mind and Emotion Understanding among Bilingual Children
Amy Weimer, Cheryl Barton, Katrina Meza, Cynthia Valenzuela, Jessica Sims, Andrea Fernandez
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The development of children's theory of mind and emotion understanding was examined among 45 bilingual (English and Spanish-speaking) children (19 girls and 26 boys) between the ages of 4 and 6 years (M= 69.73 months). Children were administered tests of picture vocabulary, false belief, and emotion understanding. Measures were administered in English and Spanish in two counterbalanced testing sessions. Preliminary results have indicated that differences in vocabulary and family demographics (e.g., number of siblings, parental education level, and amount of household income) positively relate to performance on theory of mind and emotion understanding tasks. Furthermore children's understanding of false belief and emotion were positively and significantly correlated, even after controlling for vocabulary. Implications of the results will be discussed.

F86

FACILITATIVE EFFECTS OF PRETEND PLAY ON INHIBITORY CONTROL IN YOUNG CHILDREN

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Certain measures of pretense and executive function are positively correlated, but the source of this relation is unknown. Pretense is likely to facilitate executive function, in part, by promoting one's ability to mentally disengage from misleading or irrelevant stimuli, thus reducing inhibitory task demands. To test this hypothesis, 40 children (M age = 41.3 months) were randomly assigned to one of two experimental conditions using the Less is More task of inhibitory control. In the Pretense Priming condition, children heard and enacted a story about Planet Opposite, "a silly place where everything is backwards" before completing Less is More. Children in the Standard condition heard a task-irrelevant story. Following a manipulation check, children in the Pretense Priming condition performed significantly higher on Less is More than children in the Standard condition, suggesting that pretense may have a facilitative influence on the development of inhibitory control. Follow-up studies are planned.

F87

PARENT-CHILD CONVERSATIONS ABOUT OBJECTS AND MUSEUM-BASED LEARNING

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This study focused on encouraging elaborative talk about objects in a museum setting, so as to foster children's learning and remembering. Adapting an experimental design, a sample of 80 children (M age = 4.9 years) and their caregivers were randomly assigned to one of four "pre-exhibit" conditions that varied as to whether families were presented with exhibit-related objects (e.g., arrowhead), conversation cards suggesting questions that could be asked about the target objects (e.g., What was this tool used for?), both Objects and Cards, or no exhibit-related materials. Preliminary analyses suggest that the pre-exhibit experiences of the "Objects and Cards" group lead them to engage with objects more frequently in a functional manner and to ask more open-ended questions in the exhibit relative to the others. Additional questions concerning the transfer of learning across exhibits, and memory for the museum visit will also be addressed in this presentation.

S86

RELATION BETWEEN CHILDREN'S SPATIAL WORKING MEMORY PERFORMANCE AND ATTENTION BEHAVIORS IN EVERYDAY CONTEXTS

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In an extension of the current data from Schutte et al. (2008) evaluating tendencies in children's spatial working memory performance, the present study examines the relation between children's attention behaviors in an everyday context as measured by a parental survey and their spatial working memory performances both with and without a distracter. These data show that children's higher levels of attention correlate with higher results on spatial working memory. Consequently, spatial working memory could be beneficial to identifying children at risk of developing attention disorders such as Attention deficit/hyperactivity disorder

(ADHD). These types of disorders have received increasing attention and awareness as they are making a large impact on many children's success in and out of the classroom. Early indicators are important so that interventions and treatments can be utilized as early as possible, giving the child the best tools possible to succeed.

SA40

YOUNG CHILDREN'S UNDERSTANDING OF OTHERS' EMOTION, DESIRES AND PROSOCIAL BEHAVIORS

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This study examined how children understand the relationship between others' emotions, desires and prosocial behaviors. Five- to 6-year-olds listened to stories and then were asked how the protagonist would feel (happy, sad, or "just okay"). The stories varied on (1) whether the protagonist's desire was fulfilled and (2) whether the protagonist shared a desired object with the other story character. The children reasoned that the protagonist would be happier when her desire was fulfilled than when her desire was not fulfilled. When her desire was fulfilled, children thought that she would be happier when she shared her desired object with the other character than when she did not. When her desire was not fulfilled, the children did not think that her emotion would be affected by her sharing behavior. The results demonstrate children's understanding that others' emotions can be affected by others' prosocial behaviors as well as others' own desires.

F88

CHUNKING INCREASES WORKING MEMORY CAPACITY IN 7 MONTH-OLD INFANTS

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While previous studies have demonstrated that 14 month-old infants can chunk items in working memory (WM) to expand their capacity (Feigenson & Halberda, 2004, 2008), it remains unclear whether this ability also exists in younger infants whose capacity has not yet asymptoted to adult-like levels. Using a looking-time procedure, we investigated whether 7 month-old infants, who cannot represent 3 homogenous objects hidden behind one screen (Experiment 1), could use spatial, featural, and perceptually-available chunking cues to increase their WM capacity. Given all of these cues, infants represented all 3 hidden items (Experiment 2). Infants could also represent 3 items with only spatial and featural cues (Experiment 3), but only when these cues were redundant (Experiment 4). In addition, neither of these cues alone proved sufficient to increase WM capacity (Experiments 5 and 6). Taken together, these studies demonstrate that chunking is a strategy available before WM capacity is fully matured.

SA41

EXAMINING THE RELATIONSHIP BETWEEN TEMPERAMENTAL EFFORTFUL CONTROL AND COGNITIVE INHIBITORY CONTROL ABILITIES

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The present study investigated how teacher ratings of temperamental effortful control are related to individual differences in cognitive inhibitory control among 3- to 4-year-old children in Singapore. Effortful control score was calculated by combining 8 subscales of CBQ (Children's Behavior Questionnaire) that yielded sufficiently strong loadings from the factor analysis of our data. To

examine whether effortful control predicts performance of both non-verbal and verbal DCCSTs (Dimension Change Card Sorting Task), multiple hierarchical regressions were conducted with effortful control entered in step 2 after controlling for age, gender, SES, and PPVT (an index of verbal abilities) in step 1. Consistent with the previous studies that showed positive relations between parent-rated effortful control and measures of executive attention, teacher-rated effortful control significantly predicted performance only on the non-verbal DCCST. Our results provide evidence for links between temperamental and cognitive control abilities. Both theoretical and cultural implications were discussed.

F89
Infants' Learning about Motion Events with Multiple Dynamic Correlations: Behavioral and Simulation Findings

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Infants can only develop concepts for the static and dynamic properties of objects if they attend to certain correlations in the input and ignore others. In this experiment, we examined how 14-, 18-, and 22-month-old infants learn correlations between the moving parts of an object and its global motion when faced with complex events with multiple correlations. Infants were habituated to two objects that traveled along different trajectories, each with one part that moved constantly and one that moved only when the object moved. Based on work by Rakison (2005, 2006), it was predicted that the age groups will show an inverted u-shaped trend in the correlations they will learn. Preliminary findings support this prediction in that 18-month-olds learned the relation between object motion and the constantly moving part. A PDP model of these data will show that associative mechanisms are sufficient to account for infants' behavior.

S87
A Question of Flexibility: Children's Cross-Classification and Gender Stereotyping

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Children's cross-classification abilities and their gender stereotypes represent a contradiction in their cognitive flexibility. This study examines the relationship between cross-classification and gender stereotyping in 4-year-old children. In this study, children are asked to cross-classify target people along the dimensions of gender and hobby/occupation. This is achieved by presenting children with picture triads consisting of a target, a gender match alternative, and a hobby/occupation alternative. Depending upon the condition, the targets are either stereotypical (e.g. a male football player) or counter stereotypical (e.g. a female football player). A stereotype measure is administered both before and after this cross-classification task. It is predicted that children will report lower levels of gender stereotyping on the stereotype posttest in the counter stereotypical condition. Ongoing data collection reveals a trend supporting this prediction. The results will be discussed in the context of children's cognitive flexibility.

F90
Bilingual Children's Integration of Multiple Cues to Understand Referential intent

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The intonation speakers use when asking where something is influences how we interpret their intention. When speakers look at an object and ask where x is in a serious tone they indicate what they are looking at is not what they want. However, if they ask in a playful, pedagogical manner, they indicate what they are looking at is really the one they mean for the child to find. Based on past research, we expected bilingual children to be better able than monolingual children to integrate the semantics of "where", eye-gaze, and the intonation of the speaker. We examined 58 monolingual and bilingual preschoolers' use of these cues. As predicted, bilingual children were better than monolingual children in identifying the object as the one the actor was looking at when asked in a playful, pedagogical way and as the one actor could not see when asked in a serious manner.

S88
Similarities between Adolescents' and Mothers' Autobiographical Narratives

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Previous research finds that children and parents tell independent stories about the same event with similar narrative structure (Peterson & Roberts, 2003), but it is unclear whether this reflects that for shared experiences, parents and children have converged on a similar story through shared co-constructions, or whether children have adopted their parents' narrative style. As part of a larger family narratives project, we previously reported that 14- and 16-year old adolescents tell stories about their mothers' childhood similar in style and content to their mothers' stories about those same events. Here, we examined whether these same adolescents tell self-selected positive and negative personal narratives in ways similar to how their mothers narrate self-selected positive and negative personal narratives. Strikingly, we found no relations, suggesting that although parents and children may converge on similar stories through co-construction, children may not internalize their parents' narrative style for non-shared, personally experienced events.

S89
Teaching through Gesture: The Effects of Training on False Belief Tasks

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Gesture has been shown to pave the way in development in a number of domains from language acquisition (Rowe and Goldin-Meadow, 2008), understanding of conservation (Church & Goldin-Meadow, 1986) and the development of mathematical knowledge. (Goldin-Meadow & Singer, 2003). The current study expands these findings to determine the effect of gesture training on theory of mind development. In our study, 24 children between the ages of 3 and 5 years were trained on content false belief tasks. Not surprisingly, we found an effect of age on performance, with children over four years old showing the highest levels of proficiency. However, only the children who received iconic gestures as part of their training were able to generalize their understanding to a second type of false belief task, a location task. These findings suggest that gesture may have a role in the promoting the development of Theory of Mind.

Capturing U-shaped Developmental Patterns in Spatial Bias with Dynamic Field Theory

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Hund and Plumert (2003) report that people remember categorically related objects as closer together than they really are. Moreover, there is a U-shaped pattern over development: categorical bias decreases from 7-11 years of age but increases again for adults. Here, we use Dynamic Field Theory to provide a neurally plausible account of this pattern based on changes in stability of working memory and in perceived similarity of related objects. The model consists of six interconnected layers that share excitation and inhibition. A feature-space field encodes the locations of specific objects and sends activation to long-term memory. Broad working memory profiles cause imprecision in memory traces, leading to more categorical bias. Profiles narrow over development, accounting for decreased bias. Although adults have more precise working memory profiles, they also form stronger categorical associations between related objects. This blending of long-term memory traces along the feature dimension causes increases in categorical bias.