NORA S. NEWCOMBE

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U**Education**U

Ph.D. 1976, Harvard University, Cambridge, Massachusetts.

B.A. 1972, Antioch College, Yellow Springs, Ohio.

U**Employment**U

2014- Laura H. Carnell Professor, Temple University

2003- James H. Glackin Distinguished Faculty Fellow, Temple University

1987- Professor, Department of Psychology, Temple University.

Director, Undergraduate Studies, 1981-86; Associate Chair, 1986-89;

Director, Cognitive Division, 1995-99; Coordinator, Cognitive Neuroscience, 2008-12.

1981-87 Associate Professor, Department of Psychology, Temple University.

1976-81 Assistant Professor, Department of Psychology, The Pennsylvania State University.

U**Other Appointments**

2018- Adjunct Professor, University of Canberra

2014-15 Visiting Scholar, Center for Cognitive Neuroscience, University of Pennsylvania.

2003-04 Visiting Scholar, Spatial Cognition Group, Wissenschaftskolleg, Berlin

1999-00 Visiting Scholar, Department of Psychology, Princeton University.

1993-94 Visiting Scholar, Department of Psychology, University of Pennsylvania.

1986-87 Visiting Scholar, Department of Psychology, University of Pennsylvania.

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**UHonorsU**

2019 Howard Crosby Warren Medal, Society of Experimental Psychologists

2017 William Evans Fellowship, University of Otago, New Zealand

2016 Research and Creative Achievement Award, Temple University

2015 Distinguished Scientific Contributions Award, Society for Research in Child Development

2014 William James Fellow Award, Association for Psychological Science

2014 George A. Miller Award for an Outstanding Recent Article in General Psychology, Division 1 (Society for General Psychology), American Psychological Association (2nd time won)

2011 Keynote Speaker, Psychonomic Society

2010 Invited Participant, Ernst Strüngmann Forum, Frankfurt, Germany

2008 APS Student Council Champion of Psychology

2008 Elected to the Society of Experimental Psychologists

2007 G. Stanley Hall Award for Distinguished Contribution to Developmental Psychology, Division 7 (Developmental Psychology), American Psychological Association

2006 Elected to the American Academy of Arts and Sciences, Cambridge, MA

2006 Award for Distinguished Service to Psychological Science, American Psychological Association

2006 Women in Cognitive Science Mentorship Award

2006 G. Stanley Hall Lecturer, Division 2 (Teaching), American Psychological Association

2004 Paul W. Eberman Faculty Research Award, Temple University

2004 George A. Miller Award for an Outstanding Recent Article in General Psychology, Division 1 (Society for General Psychology), American Psychological Association

1999 James McKeen Cattell Fellowship

Fellow, American Association for the Advancement of Science; American Psychological Association,

 Divisions 1 (General Psychology), 3 (Experimental), 7 (Developmental) and 35

 (Psychology of Women); Association of Psychological Science; Cognitive Science

 Society; Psychonomic Society

**External Funding**

2019-21 NICHD: Between Encoding and Retrieval: Behavioral and Neural Indices of Reactivation

 in Children’s Memory Development, Co-I; PI: Ingrid Olson

2018-23 National Science Foundation: Developing STEM Achievement and Motivation: The Role

 of Spatial Skills and Parent-Child Interactions, Co-I; PI Elizabeth Gunderson

2018-20 National Science Foundation: Supplement to Exploring Links between STEM Success

 and Spatial Skills from Integrative Strategies for Understanding Neural and Cognitive

 Systems, PI

2017-20 National Science Foundation: Exploring Links between STEM Success and Spatial Skills,

 PI

2016 National Science Foundation: International Mind, Brain and Education Society (IMBES):

 2016 Biennial Conference Support, PI

2015-18 National Science Foundation: MRI: Acquisition of a 3-Tesla Magnetic Resonance

 Imaging (MRI) Scanner, Co-PI

2015-18 Dept. of Education: Network for Cognitive and Educational Science Postdoctoral Training

 Grant, PI

2014-15 National Science Foundation: REU Site Grant: Spatial Intelligence and Learning, PI

2013-16 National Science Foundation: REESE/REAL: Sketching and Self-Explanation for Diagram

 Comprehension in Math and Science, Co-PI

2012-16 National Science Foundation: SAVI (SILC Supplement), Thematic Network in Spatial

 Cognition, PI

2011-16 National Science Foundation: Spatial Intelligence and Learning Center (SILC), PI

2008-13 Dept. of Education, The 21st Century Center for Cognition and Science Instruction, Co-PI

2008-11 National Science Foundation: Teaching Effective Use of Diagrammatic Reasoning in Biology, Co-PI

2006-11 National Science Foundation: Spatial Intelligence and Learning Center (SILC), PI

2004-07 National Science Foundation, Research on Learning and Education (ROLE):

Understanding and Teaching Spatial Competence, Co-PI

2004-07 National Science Foundation: Differing Interpretations of Young Children’s Geometric

 Skills, PI

2000-03 National Science Foundation, Research on Learning and Education (ROLE):

Understanding and Teaching Spatial Competence, Co-PI

1999-2002 National Science Foundation: The Development of Spatial Coding, PI

1999-2000 American Psychological Association: Scientific Workshop Grant, PI

1999-2000 National Science Foundation: Blue Ribbon Panel Report on Transitions of Children to the Workforce, PI

1999-2000 James McKeen Cattell Fellowship

1997-2000 National Science Foundation, Learning and Intelligent Systems Initiative (LIS): Understanding and Fostering Spatial Competence, Co-PI

1996-99 National Science Foundation: The Development of Spatial Coding, PI

1994-99 National Science Foundation: Center for Excellence in Teacher Preparation, Advisory Committee

1994-95 National Science Foundation: Conference on the Cognitive Science Bases of Mathematics and Science Education, PI

1993-96 National Science Foundation: The Development of Spatial Coding, PI

1988-92 National Institute of Child Health and Human Development: The Development of Spatial Coding, PI

1984-87 National Institute of Mental Health: Timing of Puberty and Spatial Ability, PI

1979-80 National Institute of Mental Health: Determinants of Sex Differences in Spatial Ability, PI

1973-76 Canada Council Doctoral Fellowship

* 1. Harvard University Fellowship

**Publications**

# 0B

# **Scholarly Book Authored**

Newcombe, N. S. & Huttenlocher, J. (2000). *Making space: The development of spatial representation and reasoning*. MIT Press.

**Textbook Authored**

Newcombe, N. (1996).*Child development: Change over time*. New York: HarperCollins. (8th edition of *Child development and personality* by P. Mussen, J. Conger, J. Kagan & A. Huston.)

# **Scholarly Books Edited**

Hölscher, C., Shipley, T.F., Belardinelli, M.O., Bateman, J. & Newcombe, N.S. (Eds.) (2010). *Spatial cognition VII*. Berlin: Springer-Verlag.

Freksa, C., Newcombe, N.S., Gardenfors, P. & Wolfl, S. (Eds.) (2008). *Spatial cognition VI: Learning, reasoning and talking about space*. Berlin: Springer-Verlag.

Liben, L.S., Patterson, A.H., & Newcombe, N. (Eds.) (1981). *Spatial representation and behavior across the life span*. New York: Academic Press.

# 1B

# **Chapters in Edited Books**

Newcombe, N.S., Benear, S., Ngo, C.T. & Olson, I. (in press). Memory in infancy and childhood. In M.

 Kahana & A. Wagner (Eds.), *Oxford handbook on human memory.*

Newcombe, N.S. (2020). Early knowledge about space and quantity.Chapter in J. Lockman & C.

Tamis-Lemonda (Eds.), *Cambridge* *handbook of infant development.*

Newcombe, N.S., Booth, J.L. & Gunderson, E. (2019). Spatial skills, reasoning, and mathematics. In J.

 Dunlosky & K. Rawson, *Cambridge handbook of cognition and education* (pp. 100-123).

 Cambridge University Press.

Resnick, I., Newcombe, N.S. & Jordan, N. C. (2019). The relation between spatial reasoning and

 mathematical achievement in children with mathematical learning difficulties. In A. Fritz, V.G.

 Haase & P. **Räsänen (Eds.),** *International handbook of learning difficulties* (pp. 423-435).

 Springer.

Jirout, J. & Newcombe, N.S. (2019). Relative magnitude as a key idea in mathematics cognition. In

 K.S. Mix & M. Battista (Eds.), *Visualizing mathematics: The role of spatial reasoning in*

 *mathematical thought* (pp. 3-24). Springer.

Newcombe, N.S. (2018). Categorical influences on spatial bias. In T. L. Hubbard (Ed.), *Spatial biases*

 *in perception and cognition* (pp. 249-260). Cambridge University Press.

Newcombe, N.S. (2018). Three kinds of spatial cognition. In J. Wixted (Ed.), *Stevens’ handbook of*

 *experimental psychology* *and cognitive neuroscience, 4th edition* (pp. 521-552). Wiley.

Newcombe, N. S., Möhring, W. & Frick, A. (2018). How big is many? Development of spatial and

 numerical magnitude understanding. In A. Henik & W. Fias (Eds.), *Heterogeneity of function in*

 *numerical cognition* (pp. 157-176). San Diego: Academic Press.

Newcombe, N.S. (2017). Cognitive development in comparative perspective: Exploring the role of

 language acquisition in spatial, quantitative and memory development. In Call, J. (Ed.), *APA*

 *handbook of comparative psychology* (pp. 403-425). Washington, DC: APA Books.

Mix, K. S., Levine, S.C. & Newcombe, N.S. (2016). Development of quantitative thinking across

 correlated dimensions. In A. Henik (Ed.), *Continuous issues in numerical cognition: How many or*

 *how much* (pp. 3 – 35)*.* San Diego: Academic Press.

Newcombe, N.S., Weisberg, S.M., Atit, K., Jacovina, M.E., Ormand, C.J. & Shipley, T.F. (2015). In

 Glanzberg, M., Skilters, J., & Svenonius, P. (Eds.), The lay of the land: Sensing and representing

 topography. *Baltic International Yearbook of Cognition, Logic and Communication, Vol. 10.*

<http://dx.doi.org/10.4148/1944-3676.1099>

Newcombe, N. S & Shipley, T. F. (2015). Thinking about spatial thinking: New typology, new

 assessments. In J. S. Gero (ed.), *Studying visual and spatial reasoning for design creativity* (pp.

 179-192). Springer.

Newcombe, N.S. (2014). Teaching space: What, how and when. In D. R. Montello, K. Grossner, K., &

 D. G. Janelle (Eds.), *Space in mind: Concepts for spatial learning and education* (pp. 323-334).

 Cambridge, MA: MIT Press.

Olson, I.R. & Newcombe, N.S. (2014). Binding together the elements of episodes: Relational memory

 and the developmental trajectory of the hippocampus. In P. J. Bauer & R. Fivush (Eds.),

 *Handbook on the development of children’s memory, Vol. 1* (pp. 285-308).Wiley-Blackwell.

Newcombe, N.S., Uttal, D.H. & Sauter, M. (2013). Spatial development. In P. Zelazo (Ed.), *Oxford*

 *handbook of developmental psychology, Vol. 1: Body and mind* (pp. 564-590). New York: Oxford

 University Press.

Holden, M.P. & Newcombe, N.S. (2012). The development of location coding: An adaptive combination

 account. In Nadel, L. & Waller, D. (Eds.), *Handbook of spatial cognition* (pp. 191-209).

 Washington, DC: APA Books.

Newcombe, N.S., Lloyd, M.E. & Balcomb, F. (2011). Contextualizing the development of recollection:

 Episodic memory and binding in young children. In S. Ghetti & P. J. Bauer (Eds.), *Origins and*

 *development of recollection: Perspectives from psychology and neuroscience* (pp. 73-100)*.*

Oxford University Press.

Wiener, J., Shettleworth, S., Bingman, V.P., Cheng, K., Healy, S., Jacobs, L.F., Jeffery, K.J., Mallot, H.A.,

 Menzel, R. & Newcombe, N.S. (2011). Animal navigation: A synthesis. In R. Menzel & J. Fischer

(Eds.), *Animal thinking: Contemporary issues in comparative cognition* (pp. 51-76). Strüngmann

Forum Report, Vol. 8, J. Lupp, series ed. Cambridge, MA: MIT Press.

Newcombe, N.S. (2010). On tending to our scientific knitting: Thinking about gender in the

 context of evolution. In J. Chrisler & D. McCreary (Eds.), *Handbook of gender research in*

 *psychology* (pp. 259-274). Springer.

Learmonth, A.E. & Newcombe, N.S. (2010). The development of place learning in comparative perspective. In F. Dolins & R. Mitchell (Eds.), *Spatial cognition: Mapping the self and space* (pp. 520-538). Cambridge University Press.

Newcombe, N.S. (2010). What is neoconstructivism? In Johnson, S.P. (Ed.), *Neoconstructivism: The*

 *new science of cognitive development* (pp. v-viii)*.* New York: Oxford University Press.

Newcombe, N.S., Ratliff, K.R., Shallcross, W. & Twyman, A. (2009). Is cognitive modularity necessary

 in an evolutionary account of development? In L. Tommasi, L. Nadel & M.A. Peterson (Eds.),

 *Cognitive biology: Evolutionary and developmental perspectives on mind, brain and behavior*,

 Vienna Series in Theoretical Biology (pp. 105-126). Cambridge, MA: The MIT Press.

Oakes, L.M., Newcombe, N.S. & Plumert, J.M. (2009). Are dynamic systems and connectionist approaches an alternative to “good old-fashioned cognitive development”? In J.P. Spencer,

M.S.C. Thomas & J.L. McClelland (Eds.), *Toward a unified theory of development? Connectionism and dynamic systems theory re-considered* (pp. 268-285). Oxford University Press.

Lloyd, M.E. & Newcombe, N.S. (2009). Implicit memory in childhood: Reassessing developmental

invariance. In M.L. Courage & N. Cowan (Eds.), *The development of memory in infancy and childhood (*pp. 93-113).Hove and New York: Psychology Press.

Newcombe, N.S., Lloyd, M.E. & Ratliff, K.R. (2007). Development of episodic and autobiographical

memory: A cognitive neuroscience perspective. In R.V. Kail (Ed.), *Advances in child development*

*and behavior* (Vol. 35, pp. 37-85). San Diego, CA: Elsevier.

Newcombe, N.S. & Ratliff, K.R. (2007). Explaining the development of spatial reorientation: Modularity-

plus-language versus the emergence of adaptive combination. In J. Plumert & J. Spencer (Eds.), *The* e*merging spatial mind* (pp. 53-76). Oxford University Press.

Newcombe, N.S. & Crawley, S.L. (2007). To have and have not: What do we mean when we talk about long-term memory development? In L.M. Oakes & P.J. Bauer (Eds.), *Short- and long-term memory in infancy and early childhood: Taking the first steps toward remembering.* Oxford University Press.

Newcombe, N.S. (2007). Taking science seriously: Straight thinking about sex differences. In S.

Ceci & W. Williams (Eds.), *Why aren’t more women in science? Top gender researchers debate*

*the evidence* (pp. 69-77)*.* Washington, DC: APA Books.

Cheng, K. & Newcombe, N.S. (2006). Geometry, features, and orientation in vertebrate animals: A pictorial review. In M.F. Brown & R.G. Cook (Eds.), *Animal spatial cognition: Comparative, neural & computational approaches*. Comparative Cognition Press. H<http://www.pigeon.psy.tufts.edu/asc/>

Newcombe, N.S. & Huttenlocher, J. (2006). Development of spatial cognition. In D. Kuhn & R.S. Siegler

 (Eds.), *Handbook of child psychology* (6th edition, pp. 734-776). John Wiley and Sons.

Dziembowski, Z. & Newcombe, N.S. (2005). Transfer of mathematical problem-solving procedures acquired through physical science instruction: When you don’t see it, why not? In J. Mestre (Ed.), *Transfer of learning from a modern multidisciplinary perspective* (pp. 337-356). In *Current Perspectives on Cognition, Learning and Instruction*, Greenwich, CT: Information Age Publishing.

Newcombe, N.S. (2005). Evidence for and against a geometric module: The roles of language and action. In J. Rieser, J. Lockman & C. Nelson (Eds.), *Action as an organizer of learning and development*. Minnesota Symposia on Child Psychology, Vol. 33 (pp. 221-241). Mahwah, NJ: Lawrence Erlbaum.

Newcombe, N.S. & Learmonth, A.E. (2005). The development of spatial competence. In P. Shah & A. Miyake (Eds.), *Handbook of visuospatial thinking* (pp. 213-256). Cambridge University Press.

Newcombe, N.S. & Sluzenski, J. (2004). Starting points and change in early spatial development. In G. Allen (Ed.), *Remembering where* (pp. 25-40). Lawrence Erlbaum.

Newcombe, N.S. (2003). Development. In L. Nadel (Ed.), *The encyclopedia of cognitive science* (pp. 955-959. Nature Publishing Group, Macmillan Publishers Ltd. (UK).

Newcombe, N.S. (2002). Biology is to medicine as psychology is to education: True or false? In D.F. Halpern & M.D. Hakel (Eds.), *Applying the science of learning to university teaching and beyond* (pp. 9-18). New Directions for Teaching and Learning series, Number 89. San Francisco: Jossey-Bass.

Newcombe, N.S. (2002). Spatial cognition. In D. Medin (Ed.), *Cognition Volume, Stevens’ Handbook of Experimental Psychology*, third edition (pp. 113-163). New York: John Wiley.

Newcombe, N. S., Mathason, L. & Terlecki, M. (2002). Maximization of spatial competence: More important than finding the cause of sex differences. In A. McGillicuddy-De Lisi & R. De Lisi (Eds.), *Biology, society and behavior: The development of sex differences in cognition* (pp. 183-206). Westport, CT: Ablex Publishing.

Newcombe, N.S. (2000). Early experience matters for spatial development (but different kinds at different times). In N. A. Fox, L. A. Leavitt & J. Warhol (Eds.), *The role of early experience in infant development* (pp. 165-186). Pediatric Round Table, Johnson and Johnson Pediatric Institute.

Newcombe, N. (1997). New perspectives on spatial representation: What different tasks tell us about how people remember location. In N. Foreman & R. Gillett (Eds.), *Interacting with the environment: A handbook of spatial paradigms and methodologies* (pp. 85-102). Psychology Press.

Newcombe, N. (1989). The development of spatial perspective taking. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 22), (pp. 203-247). Academic Press.

Newcombe, N. & Baenninger, M. A. (1989). Biological change and cognitive ability in adolescence. In G. Adams, R. Montemayor, & T. Gullotta (Eds.), *Advances in adolescent development* (Vol. 1), (pp. 168-191). Newbury Park, CA: Sage.

Branch, C. W. & Newcombe, N. (1988). The development of racial attitudes in black children. In R. Vasta (Ed.), *Annals of child development* (Vol. 5) (pp. 125-154). Greenwich, CT: JAI Press.

Newcombe, N. & Dubas, J.S. (1986). Individual differences in cognitive ability: Are they related to timing of puberty? In R.M. Lerner & T.T. Foch (Eds.), *Biological-psychosocial interactions in early adolescence: A life-span perspective*, (pp. 249-302). Hillsdale, NJ: Lawrence Erlbaum.

Newcombe, N. (1985). Methods for the study of spatial representation. In R. Cohen (Ed.), *The development of spatial cognition*, (pp. 277-300). Hillsdale, NJ: Lawrence Erlbaum.

Huttenlocher, J. & Newcombe, N. (1984). The child's representation of information about location. In C. Sophian (Ed.), *Origins of cognitive skills*, (pp. 81-111). Hillsdale, NJ: Lawrence Erlbaum.

Newcombe, N. (1982). Sex-related differences in spatial ability: Problems and gaps in current approaches. In M. Potegal (Ed.), *Spatial abilities: Development and physiological foundations*, (pp. 223-250). New York: Academic Press.

Newcombe, N. (1982). Spatial cognition and cognitive development. In R. Cohen (Ed.), *Children's conceptions of spatial relationships*, (pp. 65-81). (New Directions for Child Development series). San Francisco: Jossey-Bass.

Newcombe, N. (1981). Spatial representation and behavior: Retrospect and prospect. In Liben, L.S., Patterson, A.H., & Newcombe, N. (Eds.), *Spatial representation and behavior across the life span*, (pp. 373-388). New York: Academic Press.

**Refereed Journal Articles**

Begolli, K., Booth, J., Holmes, C. & Newcombe, N.S. (in press). How many apples make a quarter? The

 challenge of discrete proportional formats. *Journal of Experimental Child Psychology.*

Green, C.S. & Newcombe, N.S. (in press). Cognitive training: How evidence, controversies, and

 challenges inform education policy. *Policy Insights from the Behavioral and Brain Sciences.*

Ngo, C.T., Horner, A., Newcombe, N.S. & Olson, I.R. (2019). Development of holistic episodic

 recollection. *Psychological Science, 30,* 1696-1706*.*

Nazareth, A., Huang, X., Voyer, D. & Newcombe, N.S. (2019). A meta-analysis of sex differences in

 human navigation skills. *Psychonomic Bulletin & Review, 26,* 1503-1528.

Canada, K., Ngo, C.T., Newcombe, N.S., Geng, F., & Riggins, T. (2019). It’s all in the details: Relations

 between young children’s developing pattern separation abilities and hippocampal subfield

 volumes. *Cerebral Cortex, 29,* 3427-3433*.*

Ngo, C.T., Newcombe, N.S. & Olson, I.R. (2019). Gain-loss framing enhances mnemonic

 discrimination in preschoolers. *Child* *Development, 90, 1569-1778.*

Ngo, C.T., Lin, Y., Newcombe, N.S. & Olson, I.R. (2019). Building up and wearing down episodic

 memory: Mnemonic discrimination and relational binding. Journal of Experimental Psychology:

 General, 148, 1463-1479.

Nazareth, A., Newcombe, N.S., Shipley, T.F., Velazquez, M. & Weisberg, S.M. (2019). Beyond small-

 scale spatial skills: Navigation skills and geoscience education. *Cognitive Research: Principles*

 *and Implications*, *4***,**  doi:10.1186/s41235-019-0167-2

Weisberg, S.M., Newcombe, N.S. & Chatterjee, A. (2019). Everyday taxi drivers: Do better navigators

 have larger hippocampi? *Cortex, 115,* 280-293.

Newcombe, N.S. (2019). Navigation and the developing brain. *Journal of Experimental Biology, 222:*

 *jeb186460*.

Verdine, B.N., Zimmerman, L., Foster, L., Marzouk, M.A., Golinkoff, R.M. Hirsh-Pasek, K. & Newcombe,

 N.S. (2019). Effects of geometric toy design on parent-child interactions and spatial language.

 *Early Childhood Research Quarterly, 46,* 126-141.

Jirout, J.J., Holmes, C.A. & Newcombe, N.S. (2018). Scaling up spatial development: A closer look at

 children’s scaling ability and its relation to number knowledge. *Mind Brain and Education, 12,* 110-

 119.

Atit, K., Miller, D., Newcombe, N.S. & Uttal, D.H. (2018). Teachers' spatial skills across disciplines and

 education levels: Exploring nationally representative data. *Archives of Scientific Psychology, 6,*

130-137.

Holmes, C.A., Newcombe, N.S. & Shipley, T.F. (2018). Move to learn: Integrating spatial information

 from multiple viewpoints. *Cognition, 178,* 7-25.

Weisberg, S.M. & Newcombe, N.S. (2018). Cognitive maps: Some people make them, some people

 struggle. *Current Directions in Psychological Science, 27*, 220-226.

Keresztes, A., Ngo, C.T., Lindenberger, U., Werkle-Bergner, M. & Newcombe, N.S. (2018).

 Hippocampal maturation drives memory from generalization to specificity. *Trends in Cognitive*

 *Sciences, 22, 676-686.*

Twyman, A. D., Holden, M.P. & Newcombe, N.S. (2018). First direct evidence of cue integration in

 reorientation: A new paradigm. *Cognitive Science, 42,* 923-936.

Ngo, C.T., Newcombe, N.S. & Olson, I.R. (2018). The ontogeny of relational memory and pattern

 separation. *Developmental Science, 21,* e12556.

Ngo, C.T., Olson, I.R., Metoki, A., Alm, K., Hampton, W., Newcombe, N.S. & Riggins, T. (2018). White

matter structural connectivity and episodic memory in early childhood. *Developmental Cognitive*

 *Neuroscience, 28,* 41-53.

Schunn, C.D., Alfieri, L., Cromley, J.G., Massey, C. & Merlino, F.J. & Newcombe, N.S. (2018). Using

 principles of cognitive science to improve science learning in middle school: What works when

 and for whom? *Applied Cognitive Psychology, 32,* 225-240.

Nazareth, A., Weisberg, S.M., Margulis, K. & Newcombe, N.S. (2018). Charting the development of

 cognitive mapping. *Journal of Experimental Child Psychology*, *170*, 86-106.

Harris, J., George, N., Hirsh-Pasek, K. & Newcombe, N.S. (2018). Where will it go? How children and

adults reason about force and motion. *Cognitive Development, 45,* 113-124.

Möhring, W., Frick, A., Newcombe, N. S. (2018). Spatial scaling, proportional thinking, and numerical understanding in 5- to 7-year-old children. *Cognitive Development, 45,* 57-67.

Galati, A., Weisberg, S.M., Newcombe, N.S. & Avraamides, M. (2018). When gestures show us the

 way: Co-thought gestures selectively facilitate navigation and spatial memory. *Spatial Cognition*

 *and Computation, 18,* 1-30.

Blacker, K.J., Weisberg, S.M., Newcombe, N.S. & Courtney, S.M. (2017). Keeping track of where we

 are: Spatial working memory in navigation. *Visual Cognition, 25,* 691-702.

Newcombe, N.S. (2017). Harnessing spatial thinking to support STEM learning. *OECD Education*

 *Working Papers*, No. 161, OECD Publishing, Paris. <http://dx.doi.org/10.1787/7d5dcae6-en>

Holmes, C.A., Marchette, S. & Newcombe, N.S. (2017). Multiple views of space: Continuous visual

 flow enhances small-scale spatial learning. *Journal of Experimental Psychology: Learning,*

 *Memory, and Cognition, 43,* 851-861.

Xu, Y., Regier, T. & Newcombe, N.S. (2017). An adaptive cue combination model of human spatial

 reorientation. *Cognition, 163,* 56-66.

Resnick, I., Davatzes, A., Newcombe, N. S., & Shipley, T. F. (2017). Using analogy to learn about

 phenomena at scales outside of human perception. *Cognitive Research: Principles and*

 *Implications, 2:21,* 1-17.

Resnick, I., Davatzes, A., Newcombe, N. S., & Shipley, T. F. (2017). Using relational reasoning to learn

 about scientific phenomena at unfamiliar scales. *Educational Psychology Review. 29,* 11-25.

Resnick, I., Newcombe, N.S. & Shipley, T.F. (2017). Dealing with big numbers: Representation and

 understanding of magnitudes outside of human experience. *Cognitive Science, 41*,1020-1041.

Verdine, B.N., Golinkoff, R.M., Hirsh-Pasek, K. & Newcombe, N.S. (2017).Links between spatial and

 mathematical skills across the preschool years. *Monographs of the Society for Research in Child*

 *Development, 82, 1, Serial Number 124*.

Cromley, J.G., Weisberg, S.M., Dai, T., Newcombe, N.S., Schunn, C.D., Massey, C. & Merlino, F.J.

 (2016). Improving middle school science learning using diagrammatic reasoning. *Science*

 *Education, 100,* 1184-1213.

Atit, K., Weisberg, S.M., Newcombe, N.S. & Shipley, T.F. (2016). Learning to interpret topographic

 maps: Understanding layered spatial information. *Cognitive Research: Principles and*

 *Implications, 1,* 2, 1-18.

Möhring, W., Newcombe, N. S. & Frick, A. (2016). Using mental transformation strategies for

 spatial scaling: Evidence from a discrimination task. *Journal of Experimental Psychology:*

 *Learning, Memory, and Cognition, 42,* 1473-1479.

Newcombe, N.S. (2016). Thinking spatially in the science classroom. *Current Opinion in Behavioral*

 *Sciences, 10*, 1-6.

Möhring, W., Ramsook, K.A., Hirsh-Pasek, K., Golinkoff, R.M. & Newcombe, N. S. (2016). Where

 music meets space: Children's sensitivity to pitch intervals is related to their mental spatial

 transformation skills. *Cognition, 151,* 1-5.

Miller, B.W., Cromley, J.G. & Newcombe, N.S. (2016). Improving diagrammatic reasoning in middle

 school science using conventions of diagrams instruction delivered in electronic warm-ups.

 *Journal of Computer Assisted Learning, 32,* 374-390.

Weisberg, S.M. & Newcombe, N.S. (2016). How do (some) people make a cognitive map? Routes,

 places and working memory. *Journal of Experimental Psychology: Learning, Memory, and*

 *Cognition, 42,* 768-785.

Ngo, C.T., Weisberg, S.M., Newcombe, N.S. & Olson, I.R. (2016). The relation between navigation

 strategy and associative memory: An individual differences approach. *Journal of Experimental*

 *Psychology: Learning, Memory, and Cognition, 42,* 663-670.

Verdine, B.N., Lucca, K.R., Golinkoff, R.M., Hirsh-Pasek, K. & Newcombe, N.S. (2016).The shape of

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Newcombe, N.S. (2018). If neuroscience needs behavior, what does behavioral science need? *APS*

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Newcombe, N.S. (2017). Building spatial skills in preschool. *British Psychologist*, April Issue, 48-51

Newcombe, N.S. (2016).Hand-wired not hard-wired: Natural selection for babies who can learn. In K.

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Weisberg, S.M. & Newcombe, N.S. (2013). Navigating in a three-dimensional world. (Commentary on

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 timing shape the development of attention and influence classroom learning?. *Annals of the New*

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Newcombe, N.S. (2013). Seeing relationships: Using spatial thinking to teach science, mathematics, and

 social studies. *American Educator*. 26-31, 40.

Newcombe, N.S. (2013). Educating to use evidence in thinking about education. *Mind, Brain and*

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Newcombe, N.S. (2012). Two ways to help students with spatial thinking in geoscience. In Kastens,

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 robots. (Introduction to special issue). *Neural Networks.* 939*.*

Fischer, K.W., Goswami, U., Geake, J. and the Task Force on the Future of Educational Neuroscience

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Newcombe, N.S. (2010). Picture this: Increasing math and science learning by improving spatial

 thinking. *American Educator,* 29-35, 43.

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 how information is encoded through the integration of cognitive, behavioral, and neuroscience

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Newcombe, N.S. & Bouton, M.E. (2009). Masked reviews are not fairer reviews. *Perspectives in Psychology, 4,* 62-64.

Newcombe, N.S. (2007, November). Psychology’s role in math and science. *Monitor on Psychology*, 8.

Newcombe, N.S. (2007, October 19). The truth of the Mommy Wars. *Chronicle of Higher Education*, 54, B20.

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Newcombe, N.S. (2003). Some controls control too much. (Commentary on NICHD Early Child Care Research Network article). *Child Development, 74*, 1050-1052.

Newcombe, N.S. (2002). Beyond the blank slate: Can sociobiology come of age as an empirical science? *Chronicle of Higher Education,* December 13, B10-B11.

Newcombe, N.S. (2002). Five commandments for APA. *American Psychologist, 57*, 202-205.

Newcombe, N. S. (2001). A spatial coding analysis of the A-not-B error: What IS "location at A"?

(Commentary on Thelen et al.) *Behavioral and Brain Sciences, 24*, 57-58.

Newcombe, N.S. (2000). So, at last we can begin. (Commentary on D. Uttal, Seeing the big picture: Map use and the development of spatial cognition.) *Developmental Science, 3,* 276-278.

Newcombe, N. S. (2000). Beginning the decade of behavior (Editorial). *Journal of Experimental Psychology: General, 129*, 1.

Baenninger, M.A. & Newcombe, N. (1996). Sauce for the goose, sauce for the gander. (Reply to commentaries on Baenninger & Newcombe, 1995). *Learning and Individual Differences, 8*, 65-68.

Newcombe, N. & Baenninger, M.A. (1996). Sexual-selection accounts of human characteristics: Just-so stories or scientific hypotheses? (Commentary on paper by D. Geary). *Brain and Behavioral Sciences*.

Newcombe, N., Drummey, A.B. & Lie, E. (1995). Children's memory for early experience. (Introduction to special issue on early memory.) *Journal of Experimental Child Psychology, 59*, 337-342.

Hawkins, J. & Newcombe, N. (1994). Developing a new research agenda to facilitate innovation in the teaching and learning of science and mathematics. Report to the National Science Foundation

Newcombe, N. & Baenninger, M. A. (1988). Nature/nurture in male/female mathematical giftedness. (Commentary on paper by C. P. Benbow). *Behavioral and Brain Sciences, 11*, 206.

Ray, W.J. & Newcombe, N. (1980). Interpreting sex differences in lateralization. (Commentary on paper by J. McGlone). *Behavioral and Brain Sciences, 3,* 246.

**Conference Participation**

**Invited Talks**

Newcombe, N.S.. Science of learning: What have we learned? Master Lecture, *American* *Psychological*

 *Association*, Chicago, IL August 2019.

Newcombe, N.S.. Science of learning: What have we learned? *Association for Psychological Science*,

 Washington, DC May 2019.

### Newcombe, N.S. The mathematical brain: Lessons for math education? In International State-of-the-Art

### Symposium: Recent Connections between Brain, Neuroscience, and Education. *American*

### *Educational Research Association*, Toronto, ON, April 2019.

Newcombe, N.S. Cognitive maps: Some people make them, some people struggle. *XR Advance Webinar*

 *Series*, April 2019.

Newcombe, N.S. Making space. Howard Crosby Warren Medal Award Address, *Society of Experimental*

 *Psychologists*, Rutgers University, March 2019.

Newcombe, N.S. Relational binding and pattern separation across the life span. *iSCAN, 2nd DZNE*

 *Interdisciplinary Symposium on Spatial Cognition in Aging & Neurodegeneration*, Magdeburg,

 Germany, November 27-29, 2018. .

Newcombe, N.S. Assessing individual differences and malleability in navigational skills. *2nd*

 *Interdisciplinary Navigation Symposium*, Mont Tremblant, Canada, June 2018.

Newcombe, N.S. Cognitive maps, real maps and STEM learning. *Latin American Summer School for Education, Cognitive and Neural Sciences.* San Esteban, Chile, June 2018.

Newcombe, N.S. Development of episodic memory: A componential approach. *Context and Episodic Memory Symposium*, Philadelphia, May 2018.

Newcombe, N.S. GPS in our heads: What do behavioral and neural data on navigation offer to geography educators? *American Association of Geographers*, New Orleans, April 2018.

Newcombe, N.S. Navigation and the developing brain. *The Company of Biologists*, Plaka Litochoro, Greece, March 2018.

Newcombe, N.S. Spatial bases of elementary mathematics. *SERC Spatial Reasoning Conference*, University of Canberra, Australia, January 2018.

Newcombe, N.S. Developmental origins of cognitive mapping. *Society of Experimental Psychologists*, Nashville TN, March 2017.

Newcombe, N.S. Do people form cognitive maps? An individual differences approach. *1st Interdisciplinary*

 *Navigation Symposium*, Bad Gastein, Austria, June 2016.

Newcombe, N.S. Thinking about quantity: The intertwined development of spatial and numerical

 cognition*. Heterogeneous Contributions to Numerical Cognition*, Ghent, Belgium, June 2016.

Newcombe, N.S. Using neuroscience in education: Are we ready? *Center for School Study Councils*,

 Philadelphia, May 2016.

Newcombe, N.S. Science of learning. *Education Writers Association*, Boston, April 2016.

Newcombe, N.S. Development of episodic memory: Which dog did I see, where and when? *Society of Experimental Psychologists*, New York City, April, 2016.

Newcombe, N.S. Modeling adaptive combination in reorientation: What is the role of language? *Spatial*

 *Language Workshop*, San Diego, CA, January 2016.

Newcombe, N.S. New ways of thinking about cognitive development: Implications for teaching. *38th*

 *Annual National Institute on the Teaching of Psychology*, St. Petersburg Brach, Florida, January

 2016.

Newcombe, N.S. Evidence-based teaching in the earth sciences: Where are we now? *Earth Educators’*

 *Rendezvous*, Boulder, CO, July 2015.

Newcombe, N.S. Enhancing spatial learning for success in the STEM disciplines. *International*

 *Symposium on Science for Education,* Rio de Janeiro, July 2015.

Newcombe, N.S. Picture this: Teaching and learning mathematics using spatial thinking. *Ontario*

 *Association for Mathematics Education*, Toronto, May 2015.

Newcombe, N.S. Smart babies, not-so-smart children: What’s up? *Midwestern Psychological Association*, Chicago, May 2015.

Newcombe, N.S. Relations between episodic memory and spatial memory development. In “New Ideas

 About Memory Development”, *Psychonomic Society*, Long Beach CA, November 2014.

Newcombe, N.S. Remembering spatial location: Extending the category adjustment model to the real

 world. *Spatial Cognition 2014*, Bremen, Germany, September 2014.

Newcombe, N.S. Space, development, spatial development. *Perspectives on Spatial Cognition: 10th*

 *International Symposium of Cognition, Logic and Communication.* University of Latvia, September

 2014.

Newcombe, N.S. Spatial development. *Vespucci Institute on Brain and Space*, Lisbon, Portugal,

 September 2014.

Newcombe, N.S. Thinking about quantity: The intertwined development of spatial and numerical

 cognition. *Workshop on Making Models: Spatial Visual Reasoning in the Classroom and in*

 *Educational Research.* Fields Institute, University of Toronto, August 2014.

Newcombe, N.S. Thinking about quantity: The intertwined development of spatial and numerical

 cognition. *European Association for Research on Learning and Instruction, Special Interest Group*

 *on Educational Neuroscience*, Gottingen, Germany, June 2014.

Newcombe, N.S. Resolving the nativist-empiricist debate: A neoconstructivist approach to cognitive

 development *Association for Psychological Science*, San Francisco, CA, May 2014.

Newcombe, N.S. Spatializing the curriculum from preschool through college. In Presidential Symposium

 “Science of Learning, the Education Sciences—Strange Bedfellows or All in the Family?”

 *American Educational Research Association*, Philadelphia, PA, April 2014.

Newcombe, N.S. Enhancing spatial learning for success in the STEM disciplines. *Latin American Summer School for Education, Cognitive and Neural Sciences.* Punta del Este, Uruguay, March 2014.

Newcombe, N.S. Challenging spatial terms in learning science and mathematics. *Spatial Language*

 *Workshop*, San Diego, CA, January 2014.

Newcombe, N.S. Studying development comparatively. *Comparative Cognition Society*, Toronto,

 November 2013.

Newcombe, N.S. Lecture series on spatial development*. International Spatial Cognition Summer*

 *Institute*. UC-Santa Barbara, August 2013.

Newcombe, N.S. Lecture series on spatial development*. 20th International Summer School in Cognitive*

 *Science*, New Bulgarian University, Sofia, Bulgaria, July 2013.

Newcombe, N.S. Enhancing spatial learning for success in the STEM disciplines. *LearnLab’s 2nd Annual*

 *Learning Science Workshop: Research and Innovation for Enhancing Achievement and Equity*.

 Pittsburgh, PA, June 2013.

Newcombe, N.S. The development of magnitude estimation. *Translating Mind, Brain and Education*

 *Across Disciplines, Cultures and Contexts*. Quito, Ecuador, June 2013.

Newcombe, N.S. Training spatial thinking and reasoning skills in students for success in STEM. *Learning*

 *and the Brain*. Arlington, VA, May 2013.

Newcombe, N.S. Improving science learning in middle school. *Congressional Briefing: From the Lab to*

 *the Classroom: IES Research to Improve Our Nation's Math and Science Achievement.*

Washington, DC, May 2013.

Newcombe, N.S. Remembering spatial location: Adaptive combination models. *Spatial Memory: Bayes*

 *and Beyond*. Richmond, VA, May 2013.

Newcombe, N.S. Adaptive combination in spatial development. *Views by Two* with Elizabeth S. Spelke,

 chaired by Lynn S. Liben, “**Starting Points and Change in Spatial Development: Contrasting**

 **Perspectives”.** *Society of Research in Child Development*, Seattle, WA, April 2013.

Newcombe, N.S. Spatial skills and success in STEM: Thinking about gender differences. *2013 Chicago*

 *Symposium Series on Excellence in Teaching Mathematics and Science: Research and Practice*.

 Chicago, February 2013.

Newcombe, N.S. Remembering spatial location: Bayesian models. *Spatial Language Workshop*, San

 Diego, CA, January 2013.

Newcombe, N.S. Developing an integrated mind: Strong beginnings, stronger endpoints. *Deutschen*

 *Gesellschaft fur Psychologie*, Bielefeld, September 2012.

Newcombe, N.S. Play and educational outcomes. In *Workshop on Play, Attention, and Learning: How*

 *Does Play and Timing Shape the Development of Attention and Facilitate Classroom*

 *Learning?* New York Academy of Sciences, June 2012.

Newcombe, N.S. From lab to school, and school to lab: Spatial extent, spatial scaling, measurement skills and more. Talk in *Realism to Relevance: An Ecological Approach to*

 *Perception, Action, and Cognition A Festschrift to Honor the Scientific and Mentoring*

 *Contributions of Herbert L. Pick, Jr.* Minneapolis, June 2012.

Newcombe, N.S. Defining core knowledge: Relative magnitude estimation. In *Workshop on Core*

 *Knowledge, Language, and Culture*, Lorentz Center of Leiden University, May 29-June 1 2012.

Newcombe, N.S. Spatial skills and success in STEM: Thinking about gender differences.

Plenary talk at *National Center for Women & Information Technology (NCWIT*), Chicago, May

 2012.

Sinton, D. & Newcombe, N.S. Space, place and relationships: Exploring spatial cognition in 2012 and beyond. *NCGE Seminar*, April 2012.

Newcombe, N.S. Barriers to evidence-based education. *Latin American Summer School for Education, Cognitive and Neural Sciences.* Calafate, Argentina. March 2012.

Newcombe, N.S. Spatial learning and education. *Latin American Summer School for Education, Cognitive and Neural Sciences.* Calafate, Argentina. March 2012.

Newcombe, N.S. What is neoconstructivism? *Latin American Summer School for Education, Cognitive and Neural Sciences.* Calafate, Argentina. March 2012.

Newcombe, N.S. Developing an integrated mind. Keynote Address, *L.O.V.E. Conference*, Niagara Falls, ON, February 2012.

Newcombe, N.S. Increasing spatial learning in formal and informal settings. Innovation in education:

 Connecting how we learn to educational practice and policy. *NSF-OECD Conference*, Paris,

 France, January 2012.

Newcombe, N.S. Geometry: A neoconstructivist view. *Neurospin*, Saint-Aubin/Saclay, France, January 2012.

Newcombe, N.S. Developing an integrated mind. Keynote Address, *Psychonomic Society*, Seattle, November 2011.

Newcombe, N.S. Spatial learning in development. Invited talk at the *6th Annual Eleanor M. Saffran Cognitive Neuroscience Conference*, Temple University, September 2011.

Newcombe, N.S. The development of spatial representation and reasoning. Plenary address at the *Conference on Spatial Information Theory* (COSIT 2011), Belfast, Maine, September 2011.

Newcombe, N.S. Using research on analogical reasoning, diagrammatic reasoning, and prior knowledge to improve middle school science outcomes. In Invited Symposium on Applying Cognitive Principles to Improve Science and Math Curricula. *Society for Research on Educational Effectiveness*, Washington, DC, September 2011.

Newcombe, N.S. Some generalizations about spatial development. *Geographic Thinking Workshop*, Washington, D.C. June 2011.

Newcombe, N.S. The future of psychology. EPA Past Presidents’ Panel, *Eastern Psychological Association*, Cambridge, MA, March 2011.

Newcombe, N.S. The whys, whats and wherefores of spatial development. *Episteme-4*, Mumbai, India,

 January 2011.

Newcombe, N.S. Early education for spatial learning. *Spatial Cognition 2010*, Mount Hood, Oregon,

 August 2010.

Newcombe, N.S. The geometric module debate. *Transregional Collaborative Research Center SFB/TR 8*

 *Spatial Cognition* (U Bremen, U Freiburg) and *International Quality Network on Spatial Cognition*.

 June 18, 2010.

Newcombe, N.S. Early education for spatial intelligence: Why, what and how. *Haus der Wissenschaft*,

 Bremen. June 17, 2010.

Newcombe, N.S. Thinking about spatial thinking: New typology, new assessments. Workshop on

 *Studying visual and spatial reasoning for design creativity: Design science, computer science,*

 *cognitive science and neuroscience approaches: The state of the art*. Aix-en-Provence, June 14-

 15, 2010.

Newcombe, N.S. The nativist-empiricist controversy in the context of recent research on spatial development. *12th Annual Undergraduate Summer Workshop in Cognitive Science and Cognitive Neuroscience*, University of Pennsylvania, June 6-19, 2010.

Newcombe, N.S. Spatial navigation and episodic memory: Clues to linkage from early development? *Society of Experimental Psychologists*, Philadelphia, April 30, 2010.

Newcombe, N.S. A. Shared and unique processes in spatial development. Paper presented as part of invited symposium on Darwin’s legacy, *Psychonomic Society*, Boston MA 2009.

Newcombe, N.S. So many myths, so little time. Presentation to the Gordon Conference, *Visualization in Science & Education: Revealing Nature, Generating Insight*, Oxford, United Kingdom, July 2009.

Newcombe, N.S. Educating spatial intelligence: The right questions, and some answers. Keynote address at the *International Mind, Brain and Education Society*, Philadelphia, PA, May 2009.

Newcombe, N.S. Women hate maps, men won’t ask for directions: Fact or myth? Psi Chi Distinguished Lecture, *Association for Psychological Science*, San Francisco, CA, May 2009.

Newcombe, N.S. Improving spatial visualization: The search for mechanism. Invited Talk at the *Spatial Thinking and Science Learning Conference*, Evanston, IL 60201.

Newcombe, N.S. Educating students to use evidence in thinking about developmental psychology. Plenary Address at the 2009 SRCD Developmental Science Teaching Institute. *Society for Research in Child Development,* Denver, CO, April 2009.

Newcombe, N.S. Increasing spatial intelligence and learning: How, why and how much? Presidential Address to the *Eastern Psychological Association*, Pittsburgh, PA, March 2009.

Newcombe, N.S. Educating spatial intelligence. Invited Talk to the *National Geographic Society*, *Workshop on Spatial Learning in Geography*, October 2008.

Newcombe, N.S. Uses and abuses of evolutionary psychology. Keynote Address, *Western Pennsylvania Undergraduate Psychology Conference*, Erie, PA, April 2008.

Newcombe, N.S. Uses and abuses of evolutionary psychology. G. Stanley Hall Lecture, *Western Psychological Association*, Irvine, CA, April 2008.

Newcombe, N.S. Spatial adaptation: Origins and development. In Invited Symposium: Mechanisms of

 cognitive development: Domain-general learning or domain-specific constraints? *Psychonomic*

 *Society*, Long Beach, CA, November 2007.

Newcombe, N.S. Uses and abuses of evolutionary psychology. G. Stanley Hall Lecture, *New England Psychological Association*, Danbury, CT, October 2007.

## 6BNewcombe, N.S. How minds develop: Cutting the nativist knot. G. Stanley Hall Award Talk, *American*

## 7B *Psychological Association*, San Francisco, August 2007.

## 8BNewcombe, N.S. Modularity vs. adaptive combination: Approaches to the development of mind in cultural

## 9B and neural context. Presentation to *Workshop on Culture, Mind, Brain and Development*,

## 10B Rensselaerville Conference Center, June 2007.

Newcombe, N.S. Are men better spatial visualizers? In Invited Symposium on Learning Principles—What We Know About Learning. *Association for Psychological Science*, Washington DC, May 2007.

Newcombe, N.S. Male/female responsiveness to spatial training. Talk given to the *Spatial Skills Curriculum Workshop*, Michigan Technical University, Houghton, Michigan, May 2007.

Newcombe, N.S. Uses and abuses of evolutionary psychology. G. Stanley Hall Lecture, *American Psychological Association*, New Orleans, August 2006.

Newcombe, N.S. Objects, locations, and the binding problem. Talk given at the 14th Altenberg Workshop in Theoretical Biology, *The New Cognitive Sciences: Bring Evolution and Development to Bear on Mind and Brain*. Konrad Lorenz Institute for Evolution and Cognition Research, Altenberg, Austria, June 15-18, 2006.

Newcombe, N.S. The role of action in children’s adaptive combination of spatial information. In Invited Symposium on How Symbols and Actions Influence Spatial Thinking. *Midwestern Psychological Association*, May 2006.

Newcombe, N.S. What I did one summer vacation (and beyond). *The Art of Science: A Festschrift in Honor of Janellen Huttenlocher*. Chicago, September 2005.

Newcombe, N.S. How education shortchanges spatial intelligence: A problem and its remedies. Division 3 Invited Address, *American Psychological Association*, Washington, DC, August 2005.

Newcombe, N.S. So, what’s the question, Nora? A belated answer. Talk invited by Division 7 for the Mentor Award symposium for Dr. Jerome Kagan, *American Psychological Association*, Washington, DC, August 2005.

Newcombe, N.S. Back to basics: What’s actually wrong with good old-fashioned cognitive development? Conference on *Connectionism and Dynamic Systems Approaches to Development: On the Cusp of a New Grand Theory or Still Too Distributed?* June 21, 2005, Iowa City, IA.

Newcombe, N.S. What do we mean when we say modularity? Master Lecture, *Society for Research in Child Development*, Atlanta, GA, April 2005.

Newcombe, N.S. A new paradigm for teaching cognitive development: Beyond Piaget and his critics. First Biennial SRCD Developmental Science Teaching Institute, *Society for Research in Child Development*, Atlanta, GA, April 2005.

Newcombe, N.S. Recent evidence regarding modularity in human spatial orientation. Paper in Presidential Integrative Symposium: Interdisciplinary perspectives on spatial learning and cognition. *Eastern Psychological Association*, Boston, March 2005.

Newcombe, N.S. Developing reorientation: Modular or not? Paper presented in invited symposium, Putting perspective in things: The role of point of view in spatial reasoning. *Psychonomic Society*, Minneapolis, November 2004.

Newcombe, N.S. Statistics, assumptions and day care: Why it can be hard to use evidence to make policy decisions. Part of Presidential Symposium, The Day Care Scare, *American Psychological Association*, Honolulu, August 2004.

Newcombe, N.S. One round in the nativist-empiricist debate: Is there a geometric module? George Miller Award talk, *American Psychological Association*, Honolulu, August 2004.

Newcombe, N.S. Invited symposium: Current status of the nativism-empiricism debate. Organized symposium and gave paper entitled: Claims of a geometric module: Squaring theory and evidence. *Conference on Human Development*, Washington, DC, April 2004.

Newcombe, N.S. Cracking the code: The enigma of sex differences in sociobiology. Plenary address at the *American Psychological Association*, Toronto, August 9, 2003.

Newcombe, N.S. Some unanswered questions about a sociobiological theory of sex differences in spatial ability. Invited address to the *Eastern Psychological Association*, March 2003.

Newcombe, N.S. Evidence for and against a geometric module: The roles of language and action. Presented at Minnesota Symposium on Child Development organized by J. Rieser, J. Lockman & C. Nelson, *Action as an organizer of learning and development*, October 2002.

Newcombe, N.S. Some unanswered questions about a sociobiological theory of sex differences in spatial ability. Division 7 Presidential Address, *American Psychological Association*, Chicago, IL, August 2002.

Newcombe, N. Invited speaker for “Science in the public eye: Issues and controversies in the communication of scientific findings.” *Journal Editors' Consortium Meeting*, March 26-28, 2000.

Newcombe, N. S. Sex differences in cognition: Belief, theory and current knowledge. Invited talk for symposium series on *The Developing Child: Brain and Behavior*, sponsored by the Erikson Institute and the University of Chicago, March 3, 2000.

Newcombe, N. Emergentism in cognitive development. Invited address, *Inaugural Meeting of the Cognitive Development Society*, Chapel Hill, NC, October 1999.

Newcombe, N.S. Making space: Taking cognitive development one domain at a time. Invited address as part of the *Mind, Brain and Behavior* symposium series, APA, August, 1999, Boston, MA.

Newcombe, N.S. Developments in research on memory for early childhood. Invited presentation to Research Experience for Undergraduates Program, Skidmore College, June 28-29, 1999.

Newcombe, N.S. The future of cognitive development. Invited presentation at conference on "Stability and change in developmental psychology", held to celebrate the career of Professor Jerome Kagan, Cambridge, MA, May 21, 1999.

Newcombe, N.S. Invited paper at Specialists' Meeting of the Varenius Project's *Conference on Cognitive Models of Geographic Space*, sponsored by the National Center for Geographic Information and Analysis, NSF. February 18-20, 1999, Santa Barbara, CA.

Newcombe, N.S. Invited paper at the *Johnson and Johnson Pediatric Round Table 1999: The Role of Experience in Infant Development*. Jan. 6-10, 1999, Palm Beach, Florida.

Newcombe, N. Remembering our early childhoods: When, how and why (or why not). Invited address to the *American Psychological Society*, May 1998.

Newcombe, N.S. Starting points and change in the study of spatial development. Invited address to Division 7, *American Psychological Association*, Chicago, August 1997.

Newcombe, N. Development of spatial representation. Part of invited symposium organized by N. Newcombe, "Origins of cognitive competence", *Psychonomics Society*, St. Louis, November 1994.

Newcombe, N., Bullock, A. & Lie, E. Children's early memories: How similar is "infantile amnesia" to real amnesia? Invited paper at the *Midwestern Psychological Association*, Chicago, May 1994.

Newcombe, N. The paradox of proximity in early spatial representation. Invited presentation to *Conference on Landmarks in the Development of Spatial Representations*, Arizona State University, February 1988.

Newcombe, N. & Baenninger, M. A. Gender and spatial ability: Biological and experiential hypotheses. Paper presented as part of invited symposium, "Gender and cognitive skills: Cross-cultural and ecological perspectives." *American Association for the Advancement of Science*, Boston, February 1988.

Newcombe, N. & Dubas, J.S. Biological-psychosocial interactions in the development of sex-related differences in spatial ability. Invited presentation to *Conference on Biological-Psychosocial Interactions in Early Adolescence: A Life-Span Perspective*, Pennsylvania State University, May 1984.

Huttenlocher, J. & Newcombe, N. The child's representation of information about location. Invited presentation to the *Carnegie-Mellon Symposium*, May 1983.

Newcombe, N. Developmental changes in cognitive maps: Facts, artifact or none of the above? Invited paper to *Midwestern Psychological Association*, Detroit, May 1981.

**Colloquia**

2019—University College London, Downstate Medical Center

2018—University of Melbourne, Macquarie University, University of New South Wales, University of

 Otago, Otago Memory Group, Syracuse University (Slepecky Lecture), UC-Davis CMB Focus

 Group

2017---Temple Geography Dept., Durham University, Max Planck Institute-Berlin, University of Chicago

2016—Gallaudet University, Boston College, University of Wisconsin

2015—University College London, UC-Berkeley, Kent State, University of Western Ontario

2014---Villanova, Rutgers, ETH Zurich, University of Lausanne, Northern Illinois, University of

 Pennsylvania (Center for Cognitive Neuroscience)

2013—Georgia State

2012—Florida International University, Pennsylvania State University (Geography), University of Western

 Ontario, University of Bern

2011—Columbia University, University of California-Berkeley, University of Chicago (Education),

 University of Kansas (Visiting Scholar)

2010—University of Chicago (Psychology), Radcliffe Institute, Lehigh Valley Association of Independent

 Colleges

2009—Brown University (Schlosberg Lecture), Johns Hopkins, Lehigh University, University of

 Pennsylvania (IRCS), UC-Santa Barbara

2008— Robert Wood Johnson Medical School, UC-Davis, UC-San Diego, University of Colorado,

 University of Delaware, Wesleyan University

2007—Georgetown University, Ohio State University, Suffolk University

2006—Cornell, Washington University, University of Arizona, University of Maryland

2005---Carnegie-Mellon, Harvard, Johns Hopkins, Rutgers-Camden

2004—Ursinus College

2003-- Brooklyn College, Hunter College, Rutgers, Yale

2002—NYU, University of Pennsylvania, University of Texas at Dallas, University of Toronto

2001—University of Maryland

2000—Lehigh, McMaster, Princeton, University of Chicago, University of Iowa

1999—NYU, Princeton, University of Delaware

1998—Emory, Harvard, Robert Wood Johnson Medical School

1997—Northwestern, Pennsylvania State University, Villanova

1996—Bryn Mawr, Community College of Philadelphia, LaSalle, University of Minnesota

1995-- University of Delaware

1994—NYU, University of Illinois

1993-- University of Pennsylvania

1992-- Arizona State University, University of Arizona

1988—Concordia, University of Maine

1986—Dartmouth, Rutgers, Tulane

1985-- University of Pennsylvania

1983—University of Maryland

1982---Bryn Mawr

1980—Bucknell

1979—Lycoming College

# 5B**Refereed Conference Papers and Posters**

Ngo, C.T., Michelmann, S., Newcombe, N.S. & Olson, I.R. Pattern separation and pattern completion: Related or dissociable processes? *Psychonomic Society*, Montreal, November 2019.

Tansan, M., Shipley, T.F. & Newcombe, N.S. Individual differences in integrating spatial relationships across successively viewed regions. *Psychonomic Society*, Montreal, November 2019.

Newcombe, N.S. Semantic before episodic memory in development: Constraints on memory models. In Development as a Rosetta Stone between the MTL and memory phenomenology. *Memory Disorders Research Society*, New York City, NY, October 2019.

Brucato, M., Nazareth, A. & Newcombe, N.S. Longitudinal development of cognitive maps. *Cognitive Development Society*, Louisville KY, October 2019.

Benear, S., Ngo, C.T., Newcombe, N.S. & Olson, I.R. The effect of a delay including sleep on episodic memory interference in early childhood. *Cognitive Development Society*, Louisville KY, October 2019.

Newcombe, N.S. Active movement enhances spatial flexibility. In Integrated and flexible spatial representations: Who makes them (when and how) and why they are important. *European Society for Cognitive Psychology*, Tenerife, Spain, September 2019.

Brucato, M., Frick, A., Nazareth, A. & Newcombe, N.S. Measuring spatial perspective-taking: Analysis of four measures using item response theory. In Symposium: Individual differences in spatial representations and wayfinding. *Cognitive Science Society*, Montreal, July 2019.

Nazareth, A., Huang, X., Voyer, D. & Newcombe, N.S. A meta-analysis of sex differences in human navigation skills. In Symposium: Individual differences in spatial representations and wayfinding. *Cognitive Science Society*, Montreal, July 2019.

Resnick, I., Goldwater, M., Newcombe, N. S. Relation between mathematics achievement, fraction number line estimation, and proportional reasoning: A cross-cultural study. *422nd Annual Meeting of the Mathematics Education Research Group of Australasia, Perth, Western Australia*, July 2019.

Ngo, C.T., Horner, A.J., Newcombe, N.S. & Olson, I.R. The development of holistic episodic recollection.*Context and Episodic Memory Symposium*, Philadelphia, May 2019.

Atit, K., Miller, D., Newcombe, N.S. & Uttal, D.H. Teachers’ spatial skills across disciplines and education

 levels: Exploring nationally representative data. *Society for Research in Child Development*,

 Baltimore, MD, March 2019.

Miller-Cotto, D., Booth, J., Chang, B., Cromley, J.G., Newcombe, N.S. & Williams, T. A. A comparison of

sketching and self-explanation when solving math and science problems. *Society for Research in*

*Child Development*, Baltimore, MD, March 2019.

Ren, K., Newcombe, N.S. & Gunderson, E. Parent praise during spatial tasks: Mothers, fathers, and

 longitudinal relations to spatial skills. *Society for Research in Child Development*, Baltimore,

 MD, March 2019.

Hildebrand, L., Jirout, J., Newcombe, N.S. & Gunderson, E.The development of gender stereotypes

 about spatial, math, and reading domains. *Society for Research in Child Development*, Baltimore,

 MD, March 2019.

Keresztes, A., Ngo, C. T., Lindenberger, U., Werkle-Bergner, M., Newcombe, N. S. Hippocampal

 maturation drives memory from generalization to specificity during childhood and adolescence.

 *Budapest CEU Conference on Cognitive Development*, Budapest, Hungary, January 2019.

Velazquez, M., Holmes, C.A. & Newcombe, N.S. Going through the motions: Investigating strategies for

 spatial integration of a small-scale array. *Cognitive Science Society*, Madison WI, July 2018.

Nazareth, A., Jaeger, A. & Newcombe, N.S. Sketches and verbal descriptions: Indices of knowledge

 about spatial environments? Prompts to refine knowledge? *Cognitive Science Society*, Madison

 WI, July 2018.

Carey, I., Kirvin-Quamme, A., Newcombe, N.S. & Holmes, K. Spatial categories in language and thought:

 Evidence for categorical perception at the cardinal axes. *Cognitive Science Society*, Madison

 WI, July 2018.

Zhao, J., Klippel, A., Minear, M., Newcombe, N., Bodenheimer, B., McNamara, T., Nazareth, A. &

 Sensibaugh, T. Impacts of viewpoint transition and body--‐based cues on spatial learning in

 virtual reality. *2nd Interdisciplinary Navigation Symposium*, Mont Tremblant, Canada, June 2018.

Holmes, C., Newcombe, N.S. & Shipley, T.F. Sequential memory, spatial integration, and observer

 movement: A new perspective on spatial memory. *2nd Interdisciplinary Navigation Symposium*,

 Mont Tremblant, Canada, June 2018.

Weisberg, S.M., Newcombe, N.S. & Chatterjee, A. Everyday taxi drivers: Do gifted navigators have larger

 hippocampi? *2nd Interdisciplinary Navigation Symposium*, Mont Tremblant, Canada, June 2018.

Nazareth, A., Lin, Y. & Newcombe, N.S. Spatial navigation in normal aging. *2nd Interdisciplinary*

 *Navigation Symposium*, Mont Tremblant, Canada, June 2018.

Cromley, J.C., Newcombe, N. & Booth, J. Drawing to learn: Who benefits? *Diagrams 2018*, Edinburgh,

 Scotland, June 2018.

Canada, K.L., Ngo, C.T., Newcombe, N.S., Geng, F. & Riggins, T. It’s all in the details: Relations between

 young children’s developing pattern separation abilities and hippocampal subfield volumes.

 *Learning & Memory 2018, Huntington Beach CA, April 2018*.

Ngo, C.T., Lin, Y., Newcombe N.S. & Olson, I.R. Building up and wearing down episodic memory:

 Relational memory and pattern separation. *Learning & Memory 2018, Huntington Beach CA,*

 *April 2018.*

Weisberg, S.M., Newcombe, N.S. & Chatterjee, A. Everyday taxi drivers: Do gifted navigators have larger

 hippocampi? *Cognitive Neuroscience Society*, Boston, MA, March 2018.

Holmes. C.A, Newcombe, N.S. & Shipley, T.F. Multiple views of space: Movement around a stable array

enhances flexible spatial memory. *Psychonomic Society*, Vancouver, Canada, November 2017.

Ngo, C.T., Lin, Y., Olson, I.R. & Newcombe N.S. Tracking relational memory and pattern separation

across the life span. *Psychonomic Society*, Vancouver, Canada, November 2017.

Twyman, A.D., Holden, M.P. & Newcombe, N.S. First direct evidence of cue integration in reorientation: A

new paradigm. *Psychonomic Society*, Vancouver, Canada, November 2017.

Begolli, K., Booth, J., Homes, C. & Newcombe, N. How many apples make a quarter? The challenge of

discrete fraction formats. *Cognitive Development Society*, Portland, OR, October 2017.

Hildebrand, L., Jirout, J., Newcombe, N. & Gunderson, E. The development of gender stereotypes about

spatial skills, reading and general academic ability. *Cognitive Development Society*, Portland, OR, October 2017.

Twyman, A., Holden, M. & Newcombe, N. A new paradigm showing the first direct evidence of cue

integration in reorientation. *Cognitive Development Society*, Portland, OR, October 2017.

Lin, Y., Nazareth, A., Do, A., Haj, R. & Newcombe, N. The developmental origins of cognitive mapping:

 Age-related changes in spatial navigation studied in a virtual environment. *Society for Research*

 *in Child Development*, Austin TX, April 2017.

Ngo, C., Alm, K., Metoki, A., Olson, I., Newcombe, N. & Riggins, T. White matter connectivity and

 memory development in early childhood. *Society for Research in Child Development*, Austin

 TX, April 2017.

Lin, Y., Ngo, C.T., Dippolito, M.R., Piszker, J.M., Olson, I.R., & Newcombe, N.S. Tracking the relative development of relational memory and pattern separation*. Eastern Psychological Association*, Boston, MA, March 2017,

Nazareth, A., Weisberg, S.M., Margulis, K., Do, A., Haj, R. & Newcombe, N.S. Age-related differences in

 cognitive mapping during spatial navigation. *Psychonomic Society*, Boston, November 2016.

Holmes, C.A. & Newcombe, N.S. Integrating partial viewpoints of space: Array stability supports flexibility.

 *Psychonomic Society*, Boston, November 2016.

Ngo, C.T., Newcombe, N.S. & Olson, I.R. The ontogeny of relational memory and pattern separation: A

 radical change in performance between 4 and 6. *Psychonomic Society*, Boston, November 2016.

Nazareth, A. & Newcombe, N. Developmental origins of cognitive mapping. In symposium on Spatial

 thinking and STEM education. *International Mind Brain Education Society*, Toronto, September

 2016.

Holmes, C. & Newcombe, N. Integrating partial viewpoints of space: Array stability supports flexibility.

 *International Mind Brain Education Society*, Toronto, September 2016.

Verdine, B.N., Marzouk, M.A., Brezack, N.G., Tonob, T., Rosen, A.J., Hirsh-Pasek, K., & Golinkoff, R.M.

 Toying around with spatial learning: How toy design influences parent-child interactions around

 geometric shapes.  *Spatial Cognition 2016*, Philadelphia, PA, August 2016.

Verdine, B.N., Golinkoff, R.M., Hirsh-Pasek, K., & Newcombe, N.S. Preschool spatial skills: Are they

 important for mathematics?  *Spatial Cognition 2016*, Philadelphia, PA, August 2016.

Lin, Y., Ngo, C.T., Newcombe, N.S. & Olson, I. R. Remembering things together and apart: The

 development of memory discrimination and associative memory in young children. *Eastern*

 *Psychological Association*, New York, March 2016.

Holmes, C.A., Marchette, S. & Newcombe, N.S. It’s the journey not the destination: Observer action

 between multiple viewpoints enhances spatial learning. *Psychonomic Society,* Chicago,

 November 2015.

Blacker, K., Weisberg, S.M., Newcombe, N.S. & Courtney, S.M. How working memory for spatial

 locations versus relations predicts navigation ability. *Psychonomic Society,* Chicago, November

 2015.

Weisberg, S.M., Atit, K., Newcombe, N.S. & Shipley, T.F. How to get the point: Spatial language interacts

 with gesture in learning topographic maps. *Psychonomic Society,* Chicago, November 2015.

Galati, A., Weisberg, S.M., Newcombe, N.S. & Avraamides, M. Effect of gesturing strategies on

 navigation performance and spatial memory. *Psychonomic Society,* Chicago, November 2015.

Ngo, C.T., Weisberg, S.M., Newcombe, N.S., & Olson, I.R. The relation between navigation strategy and associative memory: An individual differences approach. *International Conference of Spatial Cognition*, Rome, Italy, September 2015.

Holmes, C.A., Marchette, S.A., Newcombe, N.S. Remembering where: Effects of perspective change and object rotation on spatial memory. *International Conference of Spatial Cognition*, Rome, Italy, September 2015.

Nardi, D., Holmes, C.A., Newcombe, N.S., & Weisberg, S.M. More on the ability to use slope for navigation: Evidence from children. *International Conference of Spatial Cognition*, Rome, Italy, September 2015.

Weisberg, S.M., & Newcombe, N.S. It’s not can but how: Navigation aptitude and strategy. *International Conference of Spatial Cognition* Rome, Italy, September 2015.

Galati, A., Weisberg, S.M., Newcombe, N.S. & Avraamides, M. Individual differences in spatial ability

influence the effect of gesturing on navigation and spatial memory. *Gesture and Speech in*

*Interaction*, Nantes, September 2015.

Xu, Y., Regier, T. & Newcombe, N. An adaptive cue combination model of spatial reorientation. *Cognitive*

 *Science Society*, Pasadena, CA, July 2015.

Morden-Snipper, D.R., Dai, T., Booth, J.L., Chang, B.L., Cromley, J.G. & Newcombe, N.S. Cognitive

 factors and representation strategies in sketching math diagrams. *Cognitive Science Society*,

 Pasadena, CA, July 2015.

Miller, B. W., Cromley, J. G., & Newcombe, N. S. Why does a diagram-focused intervention help

 students learn science? *American Educational Research Association*, Chicago, IL, April, 2015.

Cromley, J. G., Alfieri, L., Massey, C., Merlino, F. J., Newcombe, N. S., & Schunn, C. D.

 Improving middle-school science instruction with analogical reasoning. Part of a symposium

 “Relational reasoning in STEM domains: What empirical research can contribute to the national

 dialogue. *American Educational Research Association*, Chicago, IL, April, 2015.

Jirout, J., Holmes, C., Newcombe, N., & Ramsook, K. Scaling up spatial development: A closer look at

 children’s scaling ability and number knowledge. *Society for Research in Child Development*,

 Philadelphia, PA, March 2015.

Morden-Snipper, D., Chang, B., Dai, T., Howe, J., Cromley, J., Booth, J., & Newcombe, N. Drawing helps:

 Motivational and cognitive correlates of diagram creation and problem solving in math and

 science. *Society for Research in Child Development*, Philadelphia, PA, March 2015.

Möhring, W., Newcombe, N., & Frick, A. Space and mathematics: Spatial scaling is related to

 understanding of relational quantities and whole numbers. *Society for Research in Child*

 *Development*, Philadelphia, PA, March 2015.

Möhring, W., Ramsook, K., Hirsh-Pasek, K., Golinkoff, R.M., & Newcombe, N. The sound of space and

 number: Are children’s spatial, numerical and musical skills related? *Society for Research in Child*

 *Development*, Philadelphia, PA, March 2015.

Frick, W. Möhring, N. Newcombe. Spatial abilities predict later mathematics achievement: A longitudinal

 study. *Society for Research in Child Development*, Philadelphia, PA, March 2015.

Galati, A., Weisberg, S.M., Newcombe, N.S. & Avraamides, M.N. Self-generated gestures selectively

 influence navigation performance and spatial memory. *Psychonomic Society*, Long Beach CA,

 November 2014.

Weisberg, S.M. & Newcombe, N.S. Remembering what and where: The relationship between

 components of navigation ability and working memory. *Psychonomic Society*, Long Beach CA,

 November 2014.

Ngo, C., Newcombe, N.S., Olson, I. & Weisberg, S.M. The relation between navigation strategy and

 associative memory. *Psychonomic Society*, Long Beach CA, November 2014.

Newcombe, N.S., Marchette, S. & Holmes, C. Move to learn: perspective taking and rotation as methods

 of learning. *Psychonomic Society*, Long Beach CA, November 2014.

Jirout, J. & Newcombe, N. Building blocks for developing spatial skills: Evidence from a large

 representative U.S. sample. *International Mind Brain Education Society*, Fort Worth TX,

 November 2014.

Frick, A., Bergamo, N., Newcombe, N. & Möhring, W. Mentale Rotation bei 4,5- und 6-Jährigen: Ein

 Vergleich von prospektiven und retrospektiven Aufgaben und die Rolle des visuell-räumlichen

 Arbeitsgedächtnisses. *German Psychological Society*, Bochum, September 2014.

Weisberg, S.M. & Newcombe, N.S. Remembering what and where: The relationship between

 components of navigation ability and working memory. *Spatial Cognition 2014*, Bremen,

 Germany, September 2014.

Möhring, W., Newcombe, N. S., Levine, S. C., & Frick, A. A matter of proportions: Spatial scaling is

 related to proportional reasoning in 4- and 5-year-olds. *Spatial Cognition 2014*, Bremen,

 Germany, September 2014.

Holmes, C.A., Marchette, S. & Newcombe, N.S. Move to learn: Perspective taking and rotation as method

 for learning spatial layout. *Spatial Cognition 2014*, Bremen, Germany, September 2014.

Miller, B. W., Hart, J. R., Cromley, J. G., & Newcombe, N. S.  Instruction increases

 diagrammatic reasoning through behavioral engagement. *American Educational Research*

 *Association*, Philadelphia, PA, April 2014.

Miller, B. W., Cromley, J. G., & Newcombe, N. S. The critical role of knowledge gain in improving

 diagram comprehension*.*  *American Educational Research Association*, Philadelphia, PA, April

 2014.

Miller, B. W., Cromley, J. G., & Newcombe, N. S., Chang, M., & Forbus, K. Using CogSketch to

 support student science learning through sketching with automatic feedback*.*  *American*

 *Educational Research Association*, Philadelphia, PA, April 2014.

Weisberg, S.M., Newcombe, N.S. & Shipley, T.F. What predicts understanding of topographic maps?

 *Psychonomic Society*, Toronto, November 2013.

Jirout, J. & Newcombe, N.S. Mapping the role of representations in spatial game play. *Cognitive*

 *Development Society*, Memphis TN, October 2013.

Möhring, W., Newcombe, N. S., Levine, S. C., & Frick, A. A sense of proportion: Spatial proportional

 reasoning is associated with formal knowledge about fractions. *European Congress on*

 *Developmental Psychology*, Lausanne, Switzerland, September 2013.

Cromley, J. G., Bergey, B. W., Kirchgessner, M., Wills, T.W., & Newcombe, N. Combining conventions of

 diagrams instruction and repeated practice in biology classes. *American Educational Research*

 *Association*, San Francisco, April 2013*.*

Cromley, J. G., Newcombe, N., & Wills, T. W. Cognitive science-based instruction in middle

 school science: Effects on comprehension of visual representations. *American Educational*

 *Research Association*, San Francisco, April 2013.

Miller, B. W., Cromley, J. G., & Newcombe, N. Improving middle school science students’ diagram

 reasoning through instruction*. American Educational Research Association*, San Francisco, April

 2013.

Newcombe, N.S., Balcomb, F., Ferrara, K.J., Hansen, M. & Koski, J. The emergence of episodic memory

 between 18 months and five years. Part of a symposium “**The emergence and development of**

 **episodic memory: Journeys through time and space”.** *Society of Research in Child Development*,

 Seattle, WA, April 2013.

Frick, A., Möhring, W., & Newcombe, N. Picturing perspectives: The development of perspective-taking

 abilities in 4- to 8-year-olds. *Society of Research in Child Development*, Seattle, WA, April 2013.

Möhring, W., Newcombe, N., & Frick, A. Mental transformation for spatial scaling in 4- and 5-year-olds.

 *Society of Research in Child Development*, Seattle, WA, April 2013.

Jirout, J. & Newcombe, N. Mazes and maps: Can young children find their way? *Society of Research in*

 *Child Development*, Seattle, WA, April 2013.

Harris, J., George, N., Newcombe, N., & Hirsh-Pasek, K.. The mystery of misconceptions: Exploring how

 understanding of multiple components of motion develops. *Society of Research in Child*

 *Development*, Seattle, WA, April 2013.

Holmes, C.A., Weisberg, S.M., Newcombe, N.S., & Nardi, D. Hitting the slopes: The strength of gradient

 cues in child navigation. *Society of Research in Child Development*, Seattle, WA, April 2013.

Holden, M.P., Newcombe, N.S. & Shipley, T.F. Expertise effects in defining spatial categories.

 *Psychonomic Society*, Minneapolis, MN, November 2012.

Weisberg, S.M., Nardi, D., Newcombe, N.S. & Shipley, T.F. Sensing the slopes: Sensory modality effects

 in using slope. *Psychonomic Society*, Minneapolis, MN, November 2012.

Möhring, W., Newcombe, N.S. & Frick, A.. Zooming in on spatial scaling processes: Mental

 transformations or proportional judgments? *Psychonomic Society*, Minneapolis, MN, November

 2012.

Weisberg, S.M., Brakoniecki, E., & Newcombe, N.S. The other side of the mountain: Slope as a

 cue in navigation. *5th International Conference on Spatial Cognition*. Rome, Sept. 2012.

Weisberg, S.M., Epstein, R.A., Newcombe, N.S., Schinazi, V.R., & Shipley, T.F. Where do you

 think you are: A virtual environment assessment of navigation ability. *Spatial Cognition 2012*.

 Kloster Seeon, Bavaria, Germany, August 2012.

Frick, A. & Newcombe, N.S. The space between the lines: Young children’s understanding of 2D

 diagrams of 3D objects. *Spatial Cognition 2012*, Kloster Seeon, Bavaria, Germany, August 2012.

Weisberg, S.M., Brakoniecki, E., & Newcombe, N.S. The other side of the mountain: Slope as a

 cue in navigation. *Cognitive Science Society*, Sapporo, Japan, July 2012.

Resnick, I., Shipley, T., Newcombe, N., Massey, C. & Wills, T. Examining the representation and

 understanding of large magnitudes using the hierarchical alignment model of analogical

 reasoning. *Cognitive Science Society*, Sapporo, Japan, July 2012.

Koski, J., Newcombe, N. & Olson, I. Assessing relational memory across the first 6 years: What does eye

 tracking tell us? In symposium on Relational Memory in Infancy: What Kind and How Strong?

 Chair: N. Newcombe. *International Conference on Infant Studies*, Minneapolis, June 2012.

Weisberg, S.M., Epstein, R., Newcombe, N., Schinazi, V. R., & Shipley, T. Developing a virtual

 environment assessment of navigation ability. *American Psychological Society*, Chicago, May

 2012.

Cromley, J. G., Bergey, B. W., Fitzhugh, S. L., Wills, T. W., & Newcombe, N.. Effectiveness of

 student-constructed diagrams and self-explanation instruction. *American Educational Research*

 *Association*, Vancouver, CA, April, 2012.

Cromley, J. G., Wills, T. W., Bergey, B. W., Fitzhugh, S. L., & Newcombe, N.. Do spatial abilities

 matter for teaching diagram comprehension? A test of the ability-as-compensator hypothesis.

 *American Educational Research Association*, Vancouver, CA, April, 2012.

Cromley, J. G., Newcombe, N.S. & Wills, T. W.. Five tests of the ability-as-compensator hypothesis

 in diagram comprehension instruction. Part of a symposium “Cognitive processes in

 comprehension of visual representations: Art, diagrams, graphs, and models”, *American*

 *Educational Research Association*, Vancouver, CA, April, 2012.

Newcombe, N.S. Cognitive science learning principles in action: Visualization. *NSTA National Conference*

 *on Science Education*, Indianapolis, March 2012.

Frick, A. & Newcombe, N.S. Development of mental rotation in 3- to 5-year-olds. *Cognitive Development*

 *Society*, Philadelphia, PA, October 2011.

Resnick, I., Shipley, T.F., Newcombe, N., Massey, C., & Wills, T. Progressive alignment of geologic time.

 *Geological Society of America*, Minneapolis, MN, October 2011.

Nardi, D., Newcombe, N.S. & Shipley, T.F. Individual differences in reorientation. *American Psychological*

 *Society*, Washington, DC, May 2011.

Cromley, J., Newcombe, N., Wills, T. W., Wills, M., Karakus, M., & Batchelor, M. (2011). Teaching middle

 school students to reason with visual representations in science. Part of symposium "The effects

 of curricular modifications based on principles of cognitive science for middle school science

 curricula". *American Educational Research Association*, New Orleans, LA, April 8-12, 2011.

Terranova, J., Halberstadt, C., Hou, L., McManaman, M., Athanasopoulou, A., Stahl, A., Wong, W.,

 Chang, A., Golinkoff, R., Hirsh-Pasek, K., Newcombe, N.S. (2011). Girls and boys square off:

 Gender differences in children’s recognition of shapes. *Society for Research in Child*

 *Development*, Montreal, QC, March 2011.

Fisher, K., Hirsh-Pasek, K., Newcombe, N.S., Golinkoff, R. (2011). Untangling playful-learning: Exploring

 the impact of dialogic inquiry and exploration in play-based pedagogies. *Society for Research in*

 *Child Development*, Montreal, QC, March 2011.

Balcomb, F., Newcombe, N.S., Ferrara, K. (2011). Two rooms, two representations? Emergent

 episodic-like memory in early childhood. *Society for Research in Child Development*, Montreal,

 QC, March 2011.

Frick, A., Newcombe, N.S. (2011). Spatial scaling abilities in 3- to 6- year-olds. *Society for Research in*

 *Child Development*, Montreal, QC, March 2011.

Funk, A., Twyman, A., Newcombe, N.S. (2011). Three-year-old children’s successful use of a “middle”

 search strategy. *Society for Research in Child Development*, Montreal, QC, March 2011.

Fisher, K., Hirsh-Pasek, K., Newcombe, N.S., Golinkoff, R. (2011). When playful learning trumps direct

 instruction: The case of shape learning. *Society for Research in Child Development*, Montreal,

 QC, March 2011.

Holden, M.P., Newcombe, N.S. & Shipley, T.F. Recognition memory and the category adjustment model:

 A forced-choice location memory study. *Psychonomic Society*, St. Louis, MO, November 2010.

Schinazi, V. R., Dara-Abrams, D., Epstein, R., Nardi, D., Newcombe, N. & Shipley, T. From the real to the

 virtual world: Individual differences in navigation. *Spatial Cognition 2010*, Mount Hood, Oregon,

 August 2010.

Cromley, J. G., Wills, T. W., Resnick, I., Dai, T., Perez, A. C., Fitzhugh, S., Newcombe, N., & Ramos-Castillo, N. (2010). Reading comprehension--sequences of cognitive moves while reading scientific text. *Society for the Scientific Study of Reading*, Berlin, Germany, July 7-10.

Perez, A. C., Cromley, J. G., & Newcombe, N. Relationships between visuospatial skills, knowledge, and reasoning with science diagrams. *American Educational Research Association*, Denver, CO, April 30-May 4, 2010.

Fitzhugh, J.G., Cromley, J. G., Newcombe, N., Perez, A. C., & Wills, T. W. High school students comprehension of text and diagrams: Testing a model with eye tracking data. *American Educational Research Association*, Denver, CO, April 30-May 4, 2010.

Schunn, C., Merlino, J., Cromley, J. G., Massey, C., Newcombe, N., & Nokes, T.. Translational science of cognitive science in middle school science curricula. Part of a symposium entitled Implementing best practice methodology given school realities: Approaches from a middle school science intervention evaluation. *American Educational Research Association*, Denver, CO, April 30-May 4, 2010.

Sutton, J., Joanisse, M. & Newcombe, N.S. Neural correlates of virtual reorientation. *Cognitive*

 *Neuroscience Society*, Montreal, Canada, April 2010.

Balcomb, F., Newcombe, N.S., Ferrara, K., & Funk, A.Y.Changes in context-bound memory may provide the foundations for episodic memory. *International Conference on Infant Studies,* Baltimore, MD, March 2010.

Wong, W., Dewson, G., Monahan, M., Shi, T. Stahl, A.., Golinkoff, R., Newcombe, N.S., & Hirsh-Pasek, K. The square goes here! Language and action scaffolding during shape play with traditional and electronic shape sorting toys. *International Conference on Infant Studies,* Baltimore, MD, March 2010.

Wong, W., McManaman, M.T., Stahl, A., Golinkoff, R.M., Newcombe, N.S., & Hirsh-Pasek, K. Triangles as pizza slices, circles in clocks: Representational complexity in children's recognition of shapes. *International Conference on Infant Studies,* Baltimore, MD, March 2010.

Fitzhugh, S.L., Goksun, T., Goldin-Meadow, S., Newcombe, N.S., & Shipley, T.F. Insights into mental transformations: Combining gesture, speech, and eye movements to understand mental rotation. *Psychonomic Society,* Boston, MA, November 2009.

Holden, M.P., Newcombe, N.S., & Shipley, T.F. Extending the boundaries of category adjustment: Perceptually and conceptually defined categories. *Psychonomic Society,* Boston, MA, November 2009.

Schinazi, V.R., Epstein, R.A., Nardi, D., Newcombe, N.S., & Shipley, T.F. The acquisition of spatial knowledge in an unfamiliar campus environment. *Psychonomic Society,* Boston, MA, November 2009.

Balcomb, F., Newcombe, N.S., Ferrara, K., Grant, J., & Hittinger, S.M. Early arbitrary object memory in toddlers may set the stage for episodic memory. *Cognitive Development Society*, San Antonio, TX, October 2009.

Fisher, K., Ferrara, K., Hirsh-Pasek, K., Newcombe, N.S. & Golinkoff, R. Transforming preschoolers’ geometric shape knowledge: Exploring verbalizations & behaviors during a categorization task. *Cognitive Development Society*, San Antonio, TX, October 2009.

Frick, A., & Newcombe, N.S. Measuring mental rotation in 4-year-olds using a nonverbal touch screen paradigm. *Cognitive Development Society*, San Antonio, TX, October 2009.

Twyman, A., Newcombe, N.S., & Gould, T. J. Sex effects, age effects, and malleability in spatial navigation. *Cognitive Development Society*, San Antonio, TX, October 2009.

Twyman, A., Newcombe, N.S., & Gould, T. J. Tale of two cities: Rearing environment

 influences spatial reorientation. In S.E. MacDonald (Chair), “Foraging and the Evolution of

 Cognition”. *American Psychological Association*. Toronto, Canada, August 2009.

Balcomb, F., Newcombe, N.S., & Ferrara, K. Convergence and divergence in representational systems:   Place learning and language in toddlers.  *Cognitive Science Society*, Amsterdam, The

 Netherlands, July 2009.

Newcombe, N.S. The Academy’s peer review of the National Children’s Study research design. In W.R. Beardslee and R. Chalk (Chairs), “Recent Studies on Mental Health, Depression, and Assessment of Young Children from the National Academy of Sciences. Paper symposium conducted at the biennial meeting of the *Society for Research in Child Development,* Denver, CO, April 2009.

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Fisher, K., Nash, B.A., Hirsh-Pasek, K.A., Newcombe, N.S. Breaking the mold: Altering preschooler’s concepts of geometric shapes. *Society for Research in Child Development*, Denver, CO, April 2009.

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Wan, X.I., Newcombe, N.S., Shipley, T.F., & Fitzhugh, S. Sex differences in direction giving: Easy to fix? In D. Uttal (Chair), “How Malleable Is Spatial Skill? What We Can Change and What We Can’t.” Paper symposium conducted at *Society for Research in Child Development,* Denver, CO, April 2009.

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 IL, June 2008.

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 November 2007.

Ratliff, K.R. & Newcombe, N.S. A matter of trust: When landmarks and geometry are used during

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Crawley, S.L., Newcombe, N.S., Lloyd, M, Sluzenski, J., Doydum, A., & Sywulak, L. Changes in

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 *American Psychological Society*, Washington, DC. May 2007.

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Newcombe, N.S., Jones, M.C. & Shallcross, W. How are geometric and featural information used to reorient in a complex space? Part of symposium, “Spatial representation in young children: How is geometric and non-geometric location information processed?” *Society for Research in Child Development*, Boston, March 2007.

Marulis, L. M., Liu, L. L., Warren, C. M., Uttal, D. H., & Newcombe, N. S. Effects of training or experience on spatial cognition in children and adults: A meta-analysis. Poster presented at the biennial meeting of the *Society for Research in Child Development*, Boston, March 2007.

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Learmonth, A., Newcombe, N., Hansell, N. & Jones, M. Action and reorientation ability: The role of restricted movement at 3 and 5 years. Part of symposium, The diversity of children’s spatial representations. *Cognitive Development Society*, San Diego, October 2005.

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Newcombe, N.S. & Sluzenski, J. Neural substrates of the development of episodic memory. Part of symposium, A neurobehavioral perspective on the development of autobiographical memory. *Society for Research in Child Development*, Atlanta, GA, April 2005.

Kovacs, S.L., Hansell, N., & Newcombe, N.S. Preschoolers' feature memory and binding processes.

 *Society for Research in Child Development*, Atlanta, GA, April, 2005.

Newcombe, N.S. (Organizer and Chair). A cross-species perspective on integration of spatial information for navigation. *American Association for the Advancement of Science*, Washington, DC, Feb. 2005.

Roblyer, K.R. & Newcombe, N.S. Human spatial reorientation: Evidence from dual-task paradigms. *Psychonomic Society*, Minneapolis, November 2004.

Newcombe, N.S. & Learmonth, A.E. The development of place learning in comparative perspective. Part of symposium, Spatial perception, spatial cognition: Mapping the self and the environment. *American Psychological Association*, Honolulu, August 2004.

Newcombe, N.S. Introduction and overview to symposium: Using science to inform preschool assessment. *National Institute for Early Childhood Professional Development, Learning from Assessment*, Baltimore, Maryland, June 20-23, 2004

Sluzenski, J. & Newcombe, N.S. Do infants just follow their noses in coding spatial location? Discrimination of locations not directly in front of the body. *International Conference on Infant Studies*, Chicago, IL, May 2004.

Chiang, N. C.-R. & Newcombe, N.S. Learning geographical information from hypothetical maps. *Psychonomic Society*, Vancouver, November 2003.

 Yantorno, R., Terlecki, M., Newcombe, N., Weisberg, R., & Liu, C. T. (2003). From school to work: Impedance mismatch? Proceedings of the Fall 2003 *American Society for Engineering Education Middle Atlantic Section Conference*, ASEE, Baltimore, MD.

Newcombe, N.S., Sluzenski, J. & Kovacs, S.L. A source-monitoring framework for studying the development of episodic memory. Part of symposium, “A window to the past: The nature and timing of long-term memory development”. *Society for Research in Child Development*, Tampa, April 2003.

Sluzenski, E.J. & Newcombe, N.S. Development of binding in children’s memory. *Psychonomic Society*, Kansas City, November 2002.

Newcombe, N.S. What do you say after you say interactionism? Spatial development in the first two years. *Jean Piaget Society*, Philadelphia, PA, June 2002.

Kovacs, S.L., Maguire, M.J. & Newcombe, N.S. Young infants’ ability to use “what” information when the salience of “where” information is reduced. *International Conference on Infant Studies*, Toronto, ON, April 2002.

Kovacs, S.L., Newcombe, N.S. & Johnson, M.K. The effect of emotional focus on children’s recognition and source memory. *Cognitive Development Society*, Virginia Beach, VA, October 2001.

Sluzenski, J., Newcombe, N.S. & Huttenlocher, J. Infants’ knowledge of normal and anomalous spatial events. *Cognitive Development Society*, Virginia Beach, VA, October 2001.

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Satlow, E. & Newcombe, N.S. The origins of functional spatial memory: A foundational characteristics approach. *International Conference on Memory-3*, Valencia, Spain, July 2001.

Himmelfarb, D., Drummey, A.B., Fox, N.A. & Newcombe, N.S. A developmental study of event-related potentials during a recognition memory task. *Cognitive Neuroscience Society*, New York, March 2001.

Newcombe, N. S. Building from starting points in spatial development. Part of symposium organized by N. S. Newcombe and K. Hirsh-Pasek, "Standing at the radical middle: Interactionism in infant development in the linguistic, spatial and quantitative domains", *International Conference on Infant Studies*, Brighton, England, July 2000.

Newcombe, N. S. Questioning the egocentric-to-allocentric shift hypothesis of infant spatial development. Part of symposium, "Do they know where they're going: The development of spatial processing in infancy", *International Conference on Infant Studies*, Brighton, England, July 2000

Newcombe, N. S. The relation of childhood amnesia to prefrontal cortex development. Presented at conference organized by N. Newcombe, M. Farah & N. Fox, *The relations of prefrontal cortex development to children's cognitive and social behavior*, May 5-8, 2000.

Ottinger-Alberts, W. & Newcombe, N.S. Retrieval effort, source monitoring and childhood amnesia: A new look at an old problem. Part of symposium, "Converging perspectives on the nature of early memory development", *Society for Research in Child Development*, Albuquerque, April 1999.

Drummey, A.B., Fox, N. & Newcombe, N.S. An event-related potential study of source memory using the Deese procedure. *Cognitive Neuroscience Society*, Washington, April 1999.

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Drummey, A.B. & Newcombe, N. Can prefrontal cortex development explain changes in episodic memory? *Cognitive Neuroscience Society*, San Francisco, April 1998.

Newcombe, N.S., Huttenlocher, J. & Learmonth, A. Spatial memory in five-month-olds is more than categorical. *International Conference on Infant Studies*, Atlanta, April 1998.

Newcombe, N.S. Defining a "radical middle" in the study of cognitive development. Part of symposium, "Domains of change or continuity: Why is infancy so important?" *International Conference on Infant Studies*, Atlanta, April 1998.

Ottinger-Alberts, W. & Newcombe, N.S. Perceptual facilitation in children at chance levels of forced-choice recognition. *Psychonomic Society*, Philadelphia, November 1997.

Newcombe, N., Learmonth, A. & Wiley, J.G. Infants' coding of location in continuous space. Part of symposium organized by N. Newcombe, Objects and Space in Infancy, *Society for Research in Child Development*, Washington, DC, April 1997.

Huttenlocher, J., Newcombe, N. & Sandberg, E.H. Early map use. Part of symposium organized by N. Newcombe, Development of Spatial Symbolization, Society for Research in Child Development, Washington, DC, April 1997.

Newcombe, N., Huttenlocher, J., Sandberg, E. & Lie, E. What do asymmetries in judgment indicate about representation? The case of spatial estimation. *Psychonomic Society*, Chicago, November 1996.

Newcombe, N., Lie, E. & Drummey, A.B. Rethinking infantile amnesia. Part of symposium organized by N. Newcombe, Varieties of Children's Mnemonic Experience, *International Conference on Memory-2*, Padua, Italy, July 1996.

Newcombe, N., Huttenlocher, J., Learmonth, A. & Wiley, J. Spatial memory in 5-month-old infants. *International Conference on Infant Studies*, Providence, April 1996.

Newcombe, N., Huttenlocher, J., Drummey, A.B. & Wiley, J. Use of external frames of reference and dead reckoning in toddlers' coding of spatial location. *International Conference on Infant Studies*, Providence, April 1996.

Lie, E. & Newcombe, N. Childhood amnesia: Memory for faces of preschool classmates. *Psychonomic Society*, Los Angeles, November 1995.

Newcombe, N. & Bullock, A. Remembering versus knowing the past: Children's explicit and implicit memory for pictures. *Society for Research in Child Development*, Indianapolis, April 1995.

Newcombe, N., Huttenlocher, J. & Sandberg, E. Development of hierarchical spatial coding. *Society for Research in Child Development*, Indianapolis, April 1995.

Lie, E. & Newcombe, N. Double dissociation between implicit and explicit memory of faces observed in adults and children. *American Psychological Society*, Washington, D.C., July 1994.

Bullock, A. & Newcombe, N. Memory at three years: Robust facilitation of perceptual identification, failure of recognition. *Psychonomic Society*, Washington, D.C., November 1993.

Newcombe, N. & Sanderson, H. L. The relation between preschoolers' everyday activities and spatial ability. Part of symposium, "Sex differences in spatial ability: New data on biocultural interactions", organized and chaired by N. Newcombe, *Society for Research in Child Development*, New Orleans, March 1993.

Lie, E. & Newcombe, N. Young children's ability to recognize familiar and unfamiliar faces. *American Psychological Association*, Washington, D.C., August 1992.

Newcombe, N. Children's early ability to solve perspective-taking problems. Part of symposium, "The nature of spatial location coding: Developmental and cross-species studies", organized and chaired by N. Newcombe, *Society for Research in Child Development*, Seattle, April 1991.

Newcombe, N. Two-year-olds' coding of spatial location. *Psychonomic Society*, New Orleans, November 1990.

Dubas, J.S. & Newcombe, N. The role of gender-stereotyped spatial activities in predicting young adolescents' spatial ability. *Society for Research on Adolescence*, Atlanta, March 1990.

Newcombe, N. & Huttenlocher, J. Children's early ability to solve perspective-taking problems. *Psychonomic Society*, Atlanta, November 1989.

Fox, N., Newcombe, N., Prime, A. & Smith, J. 11-12-year-olds' memory for former preschool classmates. *American Psychological Society*, Alexandria, VA, June, 1989.

Newcombe, N. Perspective taking and spatial representation: The role of environmental coding. Part of symposium, "Contextual influences on spatial understanding". *Jean Piaget Society*, Philadelphia, PA, June, 1989.

Dubas, J. S. & Newcombe, N. Information processing analysis of two spatial visualization tasks: Are

 there common mental processes? *Society for Research in Child Development*, Kansas City, April

 1989.

Weinmann, L. & Newcombe, N. Identity status and perceived course of relationship with parents. *Society for Research on Adolescence*, Alexandria, VA, March 1988.

Newcombe, N. & Baenninger, M. A. Timing of puberty and spatial ability: Current status of the hypothesis. Part of symposium, "Individual differences in cognitive abilities during adolescence: An integration of environmental and physiological variables." *Society for Research on Adolescence*, Alexandria, VA, March 1988.

Newcombe, N. A longitudinal study of predictors of spatial ability in adolescent females. *Society for Research in Child Development*, Baltimore, April 1987.

Baenninger, M. A., Dubas, J. S. & Newcombe, N. Biological and experiential factors in sex-related differences in spatial ability. Part of symposium organized by N. Newcombe, "Sex-related differences in spatial ability: Recent meta-analyses and future directions." *Society for Research in Child Development*, Baltimore, April 1987.

Newcombe, N. What do spatial transformation tasks tell us about spatial coding? Part of symposium, "Different frames of reference in children's spatial representation." *American Psychological Association*, Washington, DC, August 1986.

Wasik, B. & Newcombe, N. Explaining the value of mnemonic strategies: Effects on LD and NLD children. *Southeastern Conference on Human Development*, Nashville, TN, April 1986.

Spies, C., Newcombe, N., & Huttenlocher, J. Developmental changes in children's ability to solve spatial transformation problems. *Southeastern Conference on Human Development*, Nashville, TN, April 1986.

Newcombe, N. & Dubas, J.S. Cognitive consequences of timing of puberty: A meta-analysis. *International Society for the Study of Behavioral Development*, Tours, France, July 1985.

Newcombe, N., Dubas, J.S., & Spies, C. Two-year-olds' coding of spatial location. *Society for Research on Child Development*, Toronto, April 1985.

Newcombe, N., Dubas, J.S., & Moore, M.A. Associations of timing of puberty with spatial ability, lateralization and personality: Do they persist in adulthood? Part of symposium, "Pubertal change and spatial ability reconsidered." *Society for Research in Child Development*, Toronto, April 1985.

Dubas, J.S. & Newcombe, N. The choice of non-traditional careers for women: Preference or ability? *Association of Women in Psychology*, New York, March 1985.

Ward, S.L., Newcombe, N., & Overton, W.F. Turn left at the church, or three miles north: A study of direction giving and sex differences. *Eastern Psychological Association*, Boston, March 1985.

Newcombe, N., Huttenlocher, J., & Dundon, W. Landmarks and memory for large-scale space: A closer look at developmental change. *Southeastern Conference on Human Development*, Athens, GA, April 1984

Newcombe, N. Gender issues in the study of development. Part of symposium, "Gender, power, and values: The intellectual legacy of Carolyn Wood Sherif." *American Psychological Association*, Anaheim, California, August 1983.

Newcombe, N. & Lerner, J.C. The varieties of historical experience: Methodology in assessing the life and work of John Bowlby. *Society for Research in Child Development*, Detroit, April 1983

Newcombe, N. & Bandura, M.M. Pubertal timing and personality in adolescent girls. *Southeastern Conference on Human Development*, Baltimore, April 1982.

Liben, L.S. & Newcombe, N. Barrier effects and processing demands. *Psychonomic Society*, Philadelphia, November 1981.

Newcombe, N., Wallett, D., & Zaslow, M. Code-switching in the use of directives by three- and five-year-old children. *International Society for the Study of Behavioral Development*, Toronto, Aug. 1981.

Newcombe, N. & Bandura, M.M. Effects of age at puberty on spatial ability in girls: A question of mechanism. *Society for Research in Child Development*, Boston, April 1981.

Newcombe, N., Bandura, M.M., & Taylor, D.G. Spatial ability and spatial activities in adolescence. *American Psychological Association*, Montreal, September 1980.

Newcombe, N., Wallett, D., & Zaslow, M. "Let's Play": Children's directives in play with mothers and strangers. *Association for the Anthropological Study of Play*, Ann Arbor, Michigan, April 1980.

Liben, L.S. & Newcombe, N. Barrier effects on the cognitive maps of children and adults. *Southeastern Conference on Human Development*, Alexandria, Virginia, April 1980.

Newcombe, N. & Zaslow, M. Hints and question directives in the speech of 2 1/2-year-old children to adults. Part of symposium, Development of Directives: From Infancy to First Grade, organized by N. Newcombe. *Southeastern Conference on Human Development*, Alexandria, Virginia, April 1980.

Branch, C. & Newcombe, N. Racial attitudes in preschoolers as related to level of parental civil rights activism. *Eastern Psychological Association*, Philadelphia, Pennsylvania, April 1979.

Lerner, J.C. & Newcombe, N. Britain between the wars: The historical context of Bowlby's theory of attachment. *Society for Research in Child Development*, San Francisco, California, March 1979

Newcombe, N. & MacKenzie, D.L. Development of encoding and decision processes in visual recognition. *American Psychological Association*, Toronto, Ontario, August 1978

Newcombe, N. & Arnkoff, D.B. Speech styles and sex stereotypes. *Association of Women in Psychology*, Pittsburgh, Pennsylvania, March 1978.

Newcombe, N. & Huttenlocher, J. Semantic effects on immediate ordered recall by young children. *Society for Research in Child Development*, Denver, Colorado, April 1975.

**Professional Service Talks**

### Newcombe, N.S. Co-chair, Symposium: Associations between space and number across development.

###  *Society for Research in Child Development*, Baltimore, MD, March 2019.

### Newcombe, N.S. Panelist, Memory assessments across development: Current practices and aspirations

 for the future. *Society for Research in Child Development*, Baltimore, MD, March 2019.

Newcombe, N.S. The editors’ corner: Conducting and publishing integrative science. *International*

 *Convention of Psychological Science*, Paris, France, March 2019.

Newcombe, N.S. Organizer, How people learn II. *American Association for the Advancement of Science*,

 Washington, DC, February 2019.

Newcombe, N.S. Participant in panel on social media. *Women in Cognitive Science*, Vancouver, BC,

 November 2017.

Newcombe, N.S. Organizer and moderator, Psychonomic Society-sponsored symposium on “Embodied

 cognition and STEM learning”. *European Society for Cognitive Psychology*, Potsdam, Germany,

 September 2017.

Newcombe, N.S. Participant in conversation round table on “Catalyzing a paradigm shift: Research

 translation for advancing science and society”. *Society for Research in Child Development*, Austin

 TX, April 2017.

Newcombe, N.S. Introduction for Dr. Martha Farah, *Society for Research in Child Development*,

 Philadelphia, PA, March 2015.

Newcombe, N.S. & Hawes, Z. (Chairs), Symposium on “The relationship between spatial thinking and

 mathematics in early childhood”*, Society for Research in Child Development*, Philadelphia, PA,

 March 2015.

Newcombe, N.S. Introduction for Dr. Laurence Steinberg, *Cognitive Development Society*, Philadelphia, PA, October 2011.

Newcombe, N.S. Introduction for Dr. Marcia Johnson’s address in connection with the Distinguished Scientific Contribution Award, *American Psychological Association*, Washington DC, August 2011.

Newcombe, N.S. Participant inpanel on Academic Careers in Psychology*, Eastern Psychological Association*, Cambridge, MA, March 2011.

Newcombe, N.S. Participant in “Writing effective graduate school letters of recommendation”. *Eastern Psychological Association*, Pittsburgh, PA, March 2009.

Newcombe, N.S. Introduction for Dr. Janellen Huttenlocher’s address in connection with the Distinguished Scientific Contribution Award, *American Psychological Association*, Boston, August 2008.

Newcombe, N.S. Five burning questions of the professoriate. *Cognitive Development Society*, Santa Fe, NM, October 2007.

Newcombe, N.S. & Hagen, J.W. Conversation hour on Presidential Task Force on Math and Science Education, *American Psychological Association*, San Francisco, CA, August 2007.

Newcombe, N.S. How to get published: Advice from journal editors. *Association for Psychological Science*, Washington DC, May 2007.

Newcombe, N.S. Presenter at APA Career Workshop, *Society for Research in Child Development*, Boston, March 2007.

Newcombe, N.S. Moderator for Establishing Professional Connections and Collaborations: A Panel Discussion. Women in Cognitive Science, *Psychonomic Society*, Houston, November 2006.

Newcombe, N.S. Introduction for Dr. Ann Masten’s Division 7 Presidential Address, *American Psychological Association*, New Orleans, August 2006.

Newcombe, N.S. Introduction for Dr. Douglas Medin’s address in connection with the Distinguished Scientific Contribution Award, *American Psychological Association*, Washington, DC, August 2005.

Newcombe, N.S. Introduction for Dr. Nathan Fox’s Division 7 Presidential Address, *American Psychological Association*, Honolulu, August 2004.

Newcombe, N.S. Co- Chair for Roundtable Breakfast Discussion, Reconsidering Domain Specificity and Domain Generality in Infant Cognition. *International Conference on Infant Studies*, Chicago, IL, May 2004.

Newcombe, N.S. Introduction for Dr. Richard J. Davidson, *Cognitive Development Society*, Park City, Utah, October 2003.

Newcombe, N.S. How to negotiate. Paper in Academic Career Workshop for new Ph.D.s. *Society for Research in Child Development*, Tampa, FLA, April 2003.

Newcombe, N.S. Participant in Town Meeting on the United Nations Convention on the Rights of the Child. *American Psychological Association*, Chicago, August 2002.

Newcombe, N.S. Participant in Conversation Hour on IRBs and research with children—Protecting children and promoting research. *American Psychological Association*, Chicago, August 2002.

Newcombe, N.S. Introduction for Dr. Janellen Huttenlocher’s G. Stanley Hall Award Lecture, *American Psychological Association*, Chicago, August 2002.

Newcombe, N.S. Introduction for Dr. Amanda Woodward’s McCandless Award Lecture, *American Psychological Association*, San Francisco, August 2001.

Newcombe, N.S. How to publish: The editor's perspective. *American Psychological Association*, San Francisco, August 2001

Newcombe, N.S. How to negotiate. Paper in Academic Career Workshop for new Ph.D.s. *Society for Research in Child Development*, Minneapolis, MN, April 2001.

Newcombe, N.S. Introduction for Dr. Judy DeLoache’s Division 7 Presidential Address, *American Psychological Association*, Washington, DC, August 2000.

Newcombe, N.S. Introduction for Dr. Judy DeLoache's Master Lecture on Cognitive Development, *Society for Research in Child Development*, Albuquerque, April 1999

Newcombe, N.S. How to publish: The editor's perspective. *American Psychological Association*, Chicago, August 1997.

Newcombe, N.S. An editor's perspective on electronic publishing. Part of symposium, Where is Electronic Publishing Taking APA? *American Psychological Association*, Chicago, August 1997.

Newcombe, N. How to get your articles published. *Southeastern Psychological Association*, Norfolk, March 1996.

**Discussant Comments**

Newcombe, N.S. Discussant for symposium “When man bites dog: What do developmental reversals tell

 us about cognitive development, aging, and the brain. *Psychonomic Society,* Vancouver, Canada,

 November 2017.

Newcombe, N.S. Discussant for symposium “Recall memory in children with Down Syndrome and

 typically developing controls: Longitudinal relations and moderating influences *Society for*

 *Research in Child Development*, Austin TX, April 2017.

Newcombe, N.S. Discussant for symposium “A new approach to memory development*”*. *Society for*

 *Research in Child Development*, Philadelphia, PA, March 2015.

Newcombe, N.S. Discussant for symposium “**Memory for objects in spatial context: Developmental**

 **change examined with ERP, MRI and in atypical development”.** *Society for Research in Child*

 *Development*, Seattle, WA, April 2013.

Newcombe, N.S. Discussant and Co-Organizer for symposium “Educating spatial skills at varied ages

 with varied approaches: Are STEM outcomes affected? *Society for Research in Child*

 *Development*, Seattle, WA, April 2013.

Newcombe, N.S. Discussant for symposium “Where are we now? Understanding spatial skills, strategies,

 and navigation”. *American Psychological Society*, Washington, DC, May 2011.

Newcombe, N.S. Discussant for symposium “When representational systems collide: Aligning space and language”. *International Society on Infant Studies,* Baltimore, MD, March 2010.

Newcombe, N.S. Discussant for symposium “Visualizations in the mind and in the world: Implications for

 STEM education”, American *Association for the Advancement of Science*, San Diego, CA,

 February 2010.

Newcombe, N.S. Looking in from the outside: The view from space and the view from language. Discussant comments for Conference on *The INS and OUTS of Spatial Language*. Chicago, June 2008.

Newcombe, N.S. Discussant for symposium, “’What goes in must come out’: Developmental differences in encoding and the effects on source monitoring.” *Society for Research in Child Development*, Boston, March 2007.

Newcombe, N.S. Discussant for the symposium “Perspectives on space: Development, representation and spatial dysfunction in William’s syndrome. *Eastern Psychological Association*, Baltimore, MD, March 2006.

Newcombe, N.S. Discussant for symposium, “Early gender differences in spatial skills: How to intervene to improve spatially-based mathematical thinking. *Society for Research in Child Development*, Atlanta, GA, April 2005.

Newcombe, N.S. Discussant for symposium, “Early development of relational coding: Abilities and limitations. *Society for Research in Child Development*, Atlanta, GA, April 2005.

Newcombe, N.S. Discussant for Presidential symposium, New perspectives on language acquisition, *Cognitive Development Society*, Park City, Utah, October 2003.

Newcombe, N.S. Discussant for symposium, “Spatial cognition and the rest of cognition: Relations between spatial and nonspatial thinking.” *Society for Research in Child Development*, Tampa, April 2003.

Newcombe, N.S. Discussant for symposium, “Infant working memory: Development, measurement, and functionality.” *Society for Research in Child Development*, Minneapolis, MN, April 2001.

Newcombe, N. S. Discussant for symposium, "Expectancy, perseveration, and permanence: What information do we get from looking and reaching tasks?” *International Conference on Infant Studies*, Brighton, England, July 2000.

Newcombe, N. Discussant for John Bruer's talk, *The myth of the first three years: Implications for child development and public policy*, Temple University, March 13, 2000.

Newcombe, N. Discussant for Spatial Coding session, Symposium Co-Organized by N. Newcombe, J. Huttenlocher and B. Landau, *Fostering Spatial Competence: Behavioral, Symbolic and Brain Aspects*, Chicago, Oct 17-19, 1999.

Newcombe, N.S. Discussant for symposium, "The representation of continuous quantity in infants and children", *Society for Research in Child Development*, Albuquerque, April 1999.

Newcombe, N. Discussant for invited symposium on early memory, organized by P. Bauer, *American Psychological Society*, New York, July 1995.

Newcombe, N. Discussant for paper session: Young children's thinking. *Jean Piaget Society*, Philadelphia, PA, June 1990

Newcombe, N. Discussant for symposium: Do gender differences in horizontality result primarily from cognitive or perceptual factors? *Eastern Psychological Association*, Philadelphia, PA, April 1990.

Newcombe, N. Discussant for paper session: Spatial relations. *Jean Piaget Society*, Philadelphia, PA, June, 1989.

Newcombe, N. Discussant for paper session: Young children's cognition. *Jean Piaget Society*, June 1988.

Newcombe, N. Discussant for paper session: Spatial representation. *Jean Piaget Society*, Philadelphia, May 1987.

Newcombe, N. Discussant for paper session: Spatial representational processes. *Jean Piaget Society*, Philadelphia, May 1986.

Newcombe, N. Discussant for M.C. Linn & A.C. Petersen, Emergence and characterization for gender differences in spatial ability: A meta-analysis. *American Educational Research Association*, Montreal, April 1983.

Newcombe, N. Discussant for symposium: Cognitive mapping. *American Psychological Association*, Washington, DC, August 1982.

Newcombe, N. Discussant for symposium: Current perspectives in large-scale spatial cognition. *Society for Research in Child Development*, Boston, April 1981.

Newcombe, N. Discussant for symposium: Sex differences in cognition: Exploring alternative explanations. *American Psychological Association*, Montreal, September 1980.

**Professional Service**

U**Current Editorial Positions**U**:**

**Editor,** *Psychological Science in the Public Interest*, 2019-2022

**Action/Associate Editor,** *Cognitive Research: Principles and Implications* (Founding Editorial Board), 2015-

**Editorial Board,** *Policy Insights from Behavioral and Brain Sciences,* 2014- ,

*Psychonomic Bulletin and Review*, 2005- , *Spatial Cognition and Computation*, 2008- , *Developmental Science*, 2014- , Mind, Brain & Education, 2017-

**Reviewer** for many other journals, e.g., *Current Biology, Journal of Cognition and Development, Journal of Experimental Psychology: Learning, Memory, and Cognition, Psychological Bulletin*, *Psychological Review, PNAS.*

U**Current Professional Society Positions:**U

Society for Research in Child Development, Publications Committee, 2019-23.

American Psychological Association, Needs Assessment Slating and Campaigns Committee,

 2020-22.

International Mind, Brain, Education Society, President-Elect 2017-18, President 2019-20, Past

 President 2021-22.

Cognitive Science Society, Elman Prize Committee, Chair, 2019-21.

Federation of Associations in Behavioral & Brain Sciences, President-Elect, 2016-17, President

 2018-19, Past President 2020-21.

U**Other Professional Service (Current)**U:

Advisory Board for RO1, Florida International University, 2019-2023.

Advisory Board for JHU Science of Learning Institute IES Grant, 2017-20.

Advisory Board for P01 project “Development and Neurobiology of Categorization”, 2016-2021.

Advisory Board, MIND Research Neuroscience, 2019-

Advisory Board for Databrary, 2015-

Advisory Board for GSS, 2014-

Committee on Science and the Arts, The Franklin Institute, 2013-

U**Past Editorial Positions**U**:**

**Associate Editor,** *Cognitive Psychology,* 2007- 19

**Editor**, *Journal of Experimental Psychology: General,* 1996-2001.

**Editorial Board,** *Cognition*, 2015-19, *Canadian Psychology*, 2017- 19.

**Associate Editor**, *Psychological Bulletin*, 1990-94

 **Associate Editor,** *Perspectives on Psychological Science,* 2005-09.

**Associate Editor,** *WIREs in Cognitive Science,* 2008-2016.

**Associate Editor,** *Cognitive Processing*, 2012-2016.

 **Guest Co-Editor,** Special Issue onSocial Cognition: From Babies to Robots. *Neural Networks,*

2010.

**Guest Co-Editor**, Special Issue on Spatial Frameworks, *Journal of Experimental*

*Psychology: Learning, Memory and Cognition***,** 2008-09.

**Invited Co-Editor**, Special Issue on Interactions among Scientists and Policy Makers: Challenges

 and Opportunities, *American Psychologist,* March 2002.

**Guest Editor**, Special Issues on Early Memory, *Journal of Experimental Child*

*Psychology*, 1993-94.

**Consulting Editor**, *Developmental Psychology*, 1981-87, *Child Development*,

1982-1996, 2007-13, *Journal of Experimental Child Psychology*, 1983-2005, *Psychological Bulletin*, 2002-04, *Psychological Science*, 2004-10

**Past Grant Reviewing:**

Reviewer, NSF NCS Panel, 2019.

NSF STC Pre-Proposals, Reviewer, February 2015.

NSF SBE MPRF Panel, Reviewer, January 2012.

NIH Program Project Grant, Reviewer, April 2011, May 2012.

Research and Evaluation on Education in Science and Engineering

 (REESE), NSF, February 2010.

Developmental and Learning Sciences Advisory Panel, NSF, 2003-06.

Developmental and Learning Sciences Advisory Panel, NSF, November 2001.

Learning and Intelligent Systems Initiative, NSF, 1998.

Perception and Cognition Review Group, NIH, 1993.

Human Cognition and Performance Advisory Panel, NSF, 1989-93.

Mental Health Small Grant Review Panel, NIMH, 1987-89, Chair 1988-89.

Adolescent Family Life Review Group, NIH, 1985

**Past APA Activity**:

APA Task Force on Advocacy, 2018

Board of Scientific Affairs, Member 2009-11, Chair 2011

Member-at-Large, Division 3 Executive Committee, 2007-10.

 Editor Search Committee, *Journal of Experimental Psychology: General,* 2010

 Host at Mentoring Breakfast, APA Meeting, Boston, August 2008.

Delegate, Grand Challenges Summit, October 2007.

Chair, APA Task Force on Math and Science Education, 2007.

Delegate, Education Leadership Conference, 2007.

Delegate, Science Leadership Conference, 2005, 2006, 2007, 2010, 2011

Candidate for APA President, 2006.

APA Board of Scientific Affairs Representative to the Federation of Behavioral, Psychological,

 and Cognitive Sciences, 2006-8.

Delegate, APA Membership Summit, 2006

 Editor Search Committee, *Journal of Experimental Psychology: General,* 2006

APA Board of Scientific Affairs Representative to AAAS Section J, 2005-8.

Committee on Scientific Awards, 2004-2006, Chair 2006

Koppitz Fund Committee, American Psychological Foundation, 2003-7.

APA Testimony to Congress on the NSF Budget, April 2002.

President-Elect, Division 7, 2000-2001; President, 2001-2002; Past President, 2002-2003.

Executive Committee, Division 1 (General), 1999-2000.

Publications and Communications Board Liaison, 1998-2000

Chair-Elect (1998-99), Chair (1999-2000), Council of Editors

Division 7 Representative to Council, 1998-2000.

Chair, Division 7 Early Career Award Committee, 1995.

Member, Division 7 Credentials Committee, 1994-96.

Chair, Division 7 Dissertation Award Committee, 1993.

Member-at-Large, Division 7 Executive Committee, 1991-93.

Track Chair, Science Weekend,1989;Program Chair, Division 7, 1989.

**Past Professional Society Positions:**

Section on Psychology (J), American Association for the Advancement of Science, Chair-Elect

 2016-17, Chair 2017-18, Past Chair 2018-19.

Governing Board, Cognitive Science Society, 2013-18, Chair-Elect 2014-15, Chair 2015-16, Past

 Chair 2016-17.

Board of the International Mind, Brain, Education Society, 2009-16

American Academy of Arts and Sciences’ Class III, Section 1

  (Social and Developmental Psychology) Membership Panel, 2012-14

President-Elect 2007-9, President 2010-11, Past President 2012-13, Cognitive

 Development Society

Program Chair, 2011, International Mind, Brain, Education Society.

President-Elect 2007-8, President 2008-9, Past President 2009-10, Eastern Psychological

 Association

Secretary, Section on Psychology (J), American Association for the Advancement of Science,

 2002-2010.

*Perspectives* Editor Search Committee, APS, 2009

Lifelong Learning at Work and at Home Taskforce, APS, 2006-09

Psychonomic Society representative to AAAS Section J, 2005-09.

Women in Cognitive Science Board, 2004-08.

Board of the Cognitive Development Society, 2003-9; Program Chair, 2005.

Governing Board, Psychonomic Society, 2002-8

*PB&R* Editor Search Committee 2005.

Host, Lunch with the Leaders, SRCD, Albuquerque, NM, April 1999.

Program Committee, Society for Research in Child Development, 1993-99, Co-Chair, 1995-97.

**Past NSF-Related Activity:**

Invited Participant, Design-Based Implementation Workshop, San Francisco, June 2011.

Research Methodology Expert Panel, NORC, April 25, 2011.

Invited Participant, UCSB Spatial Literacy Workshop, February 2011.

Invited Participant, NSF Neuroscience Workshop, Arlington, VA, Dec. 2007

Invited Participant, Transfer of Learning Workshop, March 2002.

Invited Participant, Applying the Science of Learning, Claremont, CA, Feb. 2001.

Co-Organizer of Conference on Fostering Spatial Competence: Behavioral,

Symbolic and Brain Aspects, Chicago, Oct 17-19, 1999. NSF Sponsored.

Co-Chair, Blue Ribbon Panel on Transition of Children to the Workforce,

1999-2000.

Advisory Committee on Children and Learning, 1998.

Workshop on Contributions of the Social Sciences to the NSF Review of Undergraduate

 Education, 1996.

Co-Chair, Conference on Cognitive Science Bases of Math and Science Education, 1995.

**Other Service (Past)**:

William James Award Selection Committee, Association for Psychological Science, 2016-19.

American Academy of Arts and Science, Task Force on the *Public Face of Science*, 2016-19.

Advisory Board, VISUAL Project, UC-Berkeley, 2010-2015

 Nominating Committee, AAAS Section on Psychology, 2012-2014

 Advisory Board, National Living Laboratory, 2011-13

Advisory Panel, Wechsler Preschool and Primary Scale of Intelligence–Fourth Edition (WPPSI–

 IV), 2010-12

Coordinator, Science of Learning Center PI Committee, 2010 and 2011.

External Review Board, University of Minnesota Interdisciplinary Training Program in Cognitive

 Science, 2006-11.

Co-Program Chair, Spatial Cognition 10, Mount Hood, Oregon.

Co-Program Chair, Spatial Cognition 08, Freiburg, Germany.

Advisory Board, Hegarty-Stieff Chemistry Education Grant, 2008-10

National Academy Panel to Review the National Children’s Study

 Research Plan, 2007-8.

Congressional visits on behalf of the Coalition for National Science Funding,

Hill Day, September 13, 2006.

Presentation, Women in Science Congressional Briefing Lunch, May 24, 2005.

Presentation to 10th Annual Coalition for National Science Funding,

 Science@Work, Capitol Hill, June 22, 2004.

Presentations to the Mathematical Sciences Education Board, National Academy

 of Sciences, Nov. 5, 2003 and March 22, 2004.

Advisory Board, Cornell Institute for Research on Children (CIRC), 2003-5.

Co-Organizer, Working Conference on Using Scientific Knowledge of

Development to Inform Preschool Assessment, Temple University

Center City, Jan. 30-31, 2003.

Co-Organizer, Conference on the Relations of Prefrontal Cortex Development to

Children's Cognitive and Social Behavior, Chestnut Hill, PA, May 5-8, 2000. Sponsored by Temple University and APA.

Presenter and Discussion Leader on Cognitive Development, Research

Opportunities in Child and Adolescent Development, Forum on Research

Management, Dec 16-17, 1999.

Presentation to 4th Annual Coalition for National Science Funding,

 Capitol Hill, June, 1998.

External Examiner, Swarthmore College, 1992.

External Examiner, Doctoral Dissertation, University of Toronto, 1987.

External Evaluator, Psychology Dept., University of Massachusetts-Boston,

 1986.

**Memberships:**

American Association for the Advancement of Science, Association for Psychological Science, Cognitive

Development Society, Cognitive Science Society, International Mind Brain Education Society,

Psychonomic Society, Society for Research in Child Development

**Teaching**

**Undergraduate:** introduction to psychology, developmental psychology, research methods, cognitive development, memory, infancy, adolescence, cognitive bases of education

**Graduate:** developmental core, cognitive core, cognitive development, developmental theory, memory and memory development, spatial cognition and development, cognitive development and education.