



## Publications

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- Lee, S. A.,** Ferrari, A., Vallortigara, G., & Sovrano, V. A. (2015). Boundary primacy in spatial mapping: Evidence from zebrafish (*Danio rerio*). *Behavioural Processes*, 119, 116-122.
- Poulter, S., **Lee, S. A.,** & Lever, C. (2015). Place cells and episodic memory. In Moulin, C.J.A. and Souchay, C. (Eds.) *Memory*. BPS Textbooks in Psychology Series Chichester, UK: John Wiley & Sons Ltd.
- Lee, S. A.,** Tucci, V., Sovrano, V. A., & Vallortigara, G. (2015). Working-memory and reference-memory tests of spatial navigation in mice (*Mus musculus*). *Journal of Comparative Psychology*, 129, 189-197.
- Lee, S. A.** & Vallortigara, G. (2015). Bumblebees spontaneously map location of conspecific using geometry and features. *Learning and Motivation*, 50, 32-38.
- Lee, S. A.,** Vallortigara, G., Flore, M., Spelke, E. S., & Sovrano, V. A. (2013). Navigation by environmental geometry: the use of zebrafish as a model. *The Journal of Experimental Biology*, 216, 3693-3699.
- Lee, S. A.,** Winkler-Rhoades, N., & Spelke, E. S. (2012). Spontaneous reorientation is guided by perceived surface distance, not by image matching or comparison. *PLOS ONE*, 7, e51373.
- Lee, S. A.** (2012). Response to Wystrach & Graham, 2012. *I-Perception*, DOI: 10.1068/i0542ic.
- Spelke, E. S., & **Lee, S. A.** (2012). Core system of geometry in animal minds. *Philosophical Transactions of the Royal Society B*, 367, 2784-2793.
- Lee, S. A.,** Vallortigara, G., Ruga, V., & Sovrano, V. A. (2012). Independent uses of geometry and landmark in a spontaneous reorientation task: A study of two species of fish. *Animal Cognition*, 15, 861-870.
- Lee, S. A.,** Spelke, E. S., & Vallortigara, G. (2012). Chicks, like children, spontaneously reorient by 3-D environmental geometry, not by image matching. *Biology Letters*, 8, 492-494.
- Lee, S. A.,** Sovrano, V. A., & Spelke, E. S. (2012). Navigation as a source of geometric knowledge: Young children's use of length, angle, distance, and direction in a reorientation task. *Cognition*, 123, 144-161.
- Shusterman, A., **Lee, S. A.,** & Spelke, E. S. (2011). Cognitive effects of language on human navigation. *Cognition*, 120, 186-201.
- Lee, S. A.** & Spelke, E. S. (2011). Young children navigate by computing layout geometry, not by matching images of the environment. *Psychonomic Bulletin and Review*, 18, 192-198.
- Hyde, D. C., Winkler-Rhoades, N., **Lee, S. A.,** Izard, V., Shapiro, K. A., & Spelke, E. S. (2011). Spatial and numerical abilities without a complete natural language. *Neuropsychologia*, 49, 924-936.
- Lee, S. A.,** & Spelke, E. S. (2010). Two systems of spatial representation underlying navigation. *Experimental Brain Research*, 206, 179-188.
- Spelke, E. S., **Lee, S. A.,** & Izard, V. (2010). Beyond core knowledge: Natural geometry. *Cognitive*

*Science*, 34, 863-884.

**Lee, S. A.**, & Spelke, E. S. (2010). A modular mechanism for navigation in disoriented children. *Cognitive Psychology*, 61, 152-176.

**Lee, S. A.**, & Spelke, E. S. (2008). Children's use of geometry for reorientation. *Developmental Science*, 11, 743-749.

Shusterman, A., **Lee, S. A.**, & Spelke, E. S. (2008). Young children's spontaneous use of geometry in maps. *Developmental Science*, 11, F1-F7.

**Lee, S. A.**, Shusterman, A., & Spelke, E. S. (2006). Reorientation and landmark-guided search by young children: Evidence for two systems. *Psychological Science*, 17, 577-582.

## Manuscripts in Preparation

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**Lee, S. A.**, Miller, J., Coffey, Sperling, M., Sharan, A., Worrell, G., Berry, B., Jobst, B., Davis, K., Lucas, T., Gross, R., Das, S., Stein, J., Rizzuto, D. & Jacobs, J. (in preparation). Intracranial recordings of boundary-based spatial representation in humans.

Jacobs, J., **Lee, S. A.**, & Buffalo, E. (in preparation). The hippocampal formation in humans: Beyond spatial mapping.

**Lee, S. A.**, Sovrano, V. A., Vallortigara, G. (in preparation). An invertebrate's representations of boundaries and landmarks.

Stewart, S., Wills, T., **Lee, S. A.**, Jeewajee, A., Burgess, N., & Lever, C. (in preparation). Grid-like signals in the subiculum of the freely moving rat.

Lever, C., Poulter, S., Jeewajee, A., **Lee, S. A.**, & Burgess, N. (in preparation). Re-viewing the subiculum's role in the hippocampal formation in health and disease: input as well as output.

**Lee, S. A.**, Austen, J., Vallortigara, G., Sovrano, V. A., Lever, C., & McGregor, A. (in preparation). The purely geometric module: 30 years later.

## Invited Talks

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"The Origins of Spatial Cognition in Development, Evolution, and the Brain." Center for Cognitive Neuroscience, University of Pennsylvania, Philadelphia, PA, 2015.

"Boundaries in Space: A Comparative Approach." Cognitive Brain Dynamics Laboratory, School of Biomedical Engineering, Drexel University, Philadelphia, PA, 2014.

"Spatial Representation: From Neurons to Euclid." Departmental Colloquium. Department of Cognitive Sciences, Johns Hopkins University, Baltimore, MD, September 2013.

"Cognitive Processes Underlying Spatial Navigation: A Behavioral Genetics Approach."

Behavioral Neuroscience Laboratory Seminar, Italian Institute of Technology, Genoa, Italy, November 2012.

“Short-Range Spatial Navigation by Geometry and Landmarks in Various Species of Animals.” Neurobiology, Behaviour and Cognition Seminar, Queen Mary University of London, London, UK, June 2012.

“Specialized Mechanisms for Computing Orientation in Navigation.” Institute of Cognitive Neuroscience, University College London, London, UK, June 2012.

“Geometry-Specific Mechanisms in Spatial Navigation.” Perception and Action Laboratory, University of Paris Descartes, Paris, France, April 2012.

“Core Cognitive Systems Underlying Geometric Knowledge.” Cognitive Development Center, Department of Cognitive Science at Central European University, Budapest, Hungary, March 2012.

“Origins of Geometric Knowledge.” Research in Spatial Cognition Laboratory at Temple University, Philadelphia, PA, 2010.

“Origins of Euclidean Geometry.” Cognitive Development Laboratory at Wesleyan University, Middletown, CT, 2010.

“Mechanisms of Navigation by Environmental Geometry.” Cognitive Evolution Laboratory at Harvard University, Cambridge, MA, 2010.

## Conference Presentations

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Jacobs, J., Coffey, T., Miller, J., **Lee, S. A.**, Sperling, M., Sharan, A., Asadi-Pooya, A., Worrell, G., Berry, B., Jobst, B., Davis, K., Lucas, T., Gross, R., Das, S., Stein, J., Rizzuto, D. (upcoming). Electrical stimulation in the medial temporal lobe alters memory encoding. *Poster to be presented at the Annual Meeting of the Society for Neuroscience, Chicago, IL.*

**Lee, S. A.** (2015). Origins of spatial representations: From zebrafish to children. *Talk presented at the Biennial Meeting of the Society for Research in Child Development, Philadelphia, PA.*

**Lee, S. A.** (2015). Geometric reorientation: Neural and cognitive signatures in mice and humans. *Talk presented at the Biennial meeting of the Society for Research in Child Development, Philadelphia, PA.*

Gianni, E., Mayer, U., Vallortigara, G., & **Lee, S. A.** (2014). Behavioral and neural correlates of reorientation by boundaries and features. *Poster presented at the 4<sup>th</sup> Rovereto Workshop on Cognition and Evolution, Rovereto, Italy.*

**Lee, S. A.**, Tucci, V., Lassi, G., & Vallortigara, G. (2014). Behavioral profiles for spatial impairments in genetic syndromes: Insights from genetically altered mice. *Poster presented at the International Conference for Infant Studies, Berlin, Germany.*

**Lee, S. A.**, Tucci, V., Sovrano V. A., & Vallortigara, G. (2013). Dissociable systems of spatial representation in mice. *Poster presented at “Space in the brain: cells, circuits, codes, and cognition,” The Royal Society at Chicheley Hall, Buckinghamshire, UK.*

- Lee, S. A.,** Sovrano, V. A., Spelke, E. S., & Vallortigara, G. (2012). Domain-Specific Cognitive Systems Underlying Geometric Knowledge. *Talk presented at the Workshop on Cognitive Modules & Interfaces, International School for Advanced Studies (SISSA), Trieste, Italy.*
- Lee, S. A.,** Vallortigara, G., & Sovrano, V. A. (2012). Isolated Zebrafish Spontaneously Use Various Spatial Cues in Search of a Conspecific. *Poster presented at the 3<sup>rd</sup> Rovereto Workshop on Cognition and Evolution, Rovereto, Italy.*
- Lee, S.A.** (2012). Effects of Cue Specificity and Reinforcement Learning in Spatial Navigation. *Talk presented at the Space and Memory Workshop at Durham University, Durham, UK.*
- Lee, S. A.,** Vallortigara, G., Spelke, E. S., Flore, M., & Sovrano, V. A. (2012). Fish reorient specifically by distance relationships in the 3D surface layout. *Poster presented at the Rovereto Workshop on Concepts, Actions, and Objects, Rovereto, Italy.*
- Lee, S.A.** & Spelke, E.S. (2012). Core Knowledge and Cognitive Development of Natural Geometry: Insights from Comparative Cognition. *Talk presented at Animal Minds: From Computation to Evolution, The Royal Society, London, UK.*
- Lee, S. A.** (2011). Systems of spatial navigation across distantly related species. *Talk presented at the Trieste Symposium on Perception and Cognition, Trieste, Italy.*
- Lee, S. A.,** Baldwin, E., & Spelke, E. S. (2011). Children's transfer of geometric information from a 2D map to a 3D array. *Poster presented at the Biennial meeting of the Society for Research in Child Development, Atlanta, GA.*
- Lee, S. A.,** Spelke, E. S., & Vallortigara, G. (2010). Spontaneous reorientation behavior in chicks: Evidence for evolutionary continuity across distantly related species. *Poster presented at the 2<sup>nd</sup> Rovereto Workshop on Cognition and Evolution, Rovereto, Italy.*
- Lee, S. A.,** Winkler-Rhoades, N., & Spelke, E. S. (2010). Fooling the geometric module: Children reorient by perceived shape of the spatial layout, not by image-matching or relational information. *24th International Symposium on Attention and Performance, Paris, France.*
- Lee, S. A.,** & Spelke, E. S. (2009). Surface layout representation for reorientation in children. *Poster presented at the 1<sup>st</sup> Rovereto Workshop on Cognition and Evolution, Rovereto, Italy.*
- Lee, S. A.,** & Spelke, E. S. (2007). Fundamentals of geometric knowledge in rhesus macaques. *Poster at the Biennial meeting of the Cognitive Development Society, Santa Fe, NM.*
- Lee, S. A.,** & Spelke, E. S. (2006). Children's use of extended surfaces for reorientation. *Poster presented at the meeting of the Vision Sciences Society, Sarasota, FL.*
- Lee, S. A.,** & Spelke, E. S. (2005). Children's use of geometry for reorientation. *Poster presented at the biennial meeting of the Cognitive Development Society, San Diego, CA.*
- Shusterman, A., **Lee, S. A.,** & Spelke, E. (2005). The surprising benefit of verbal cues in a reorientation task. *Poster presented at the Biennial Meeting of the Society for Research in Child Development, Atlanta, GA.*
- Lee, S. A.,** Shusterman, A. & Spelke, E. S. (2005). Reorientation by a distinct landmark: Evidence for two distinct systems. *Poster presented at the Biennial meeting of the Society for Research in Child Development, Atlanta, GA.*

## Professional Activities

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Ad hoc Reviewer:

Cognition  
Psychological Science  
*Journal of Experimental Psychology: General*  
*Journal of Experimental Psychology: Learning, Memory, and Cognition*  
*Journal of Experimental Psychology: Human Perception and Performance*  
Developmental Science  
Child Development  
PLOS ONE  
Cognitive Neuropsychology  
*Journal of Experimental Child Psychology*  
Animal Cognition  
Cognitive Science Society  
*Attention and Performance*  
*British Journal of Psychology*  
*Frontiers in Developmental Psychology*  
Ethology  
*Journal of Cognitive Science*

Organizing Committee, Rovereto Workshop on Cognition and Evolution, Italy, 2012-present.

Doctoral Program Executive Committee, Center for Mind/Brain Sciences, University of Trento, 2013-present.

Symposium Chair and Organizer, "Cognitive Development and Evolution." *Biennial meeting of the Society for Research in Child Development*, Philadelphia, PA, 2015.

PhD Selection Committee, Center for Mind/Brain Sciences, University of Trento, 2013-2014.

## Teaching and Advising

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The Evolutionary and Developmental Origins of Cognition, Harvard Summer School, 2015.

Research Communications, Doctoral Program at the Center for Mind/Brain Sciences, University of Trento, Italy, 2014-present.

Foundations of Cognitive Psychology, Master's Program at the Center for Mind/Brain Sciences, University of Trento, Italy, 2014-present.

Spatial Cognitive Development and Evolution Seminar, Center for Mind/Brain Sciences, University of Trento, Italy, 2013-present.

Animal Cognition (co-taught with Giorgio Vallortigara), Master's Program at the Center for Mind/Brain Sciences, University of Trento, Italy, 2011-2012.

The Human Mind, Teaching Fellow, Core Program, Harvard University, 2006-2008.

Origins of Knowledge, Teaching Assistant for Lab Sections, Harvard University, 2005.

Master's Thesis Advisor, Center for Mind/Brain Sciences, University of Trento. "Spatial Representations and Geometry in Children" (Anna Gui), 2013-2015.

Master's Thesis Advisor, Center for Mind/Brain Sciences, University of Trento. "Boundary Geometry in Chicks: Effects on Behavior and the Brain" (Eugenia Gianni), 2013-2015.

Thesis Advisor, Department of Cognitive Science, University of Trento. "Disoriented Use of Featural Cues by Zebrafish in Search of a Conspecific" (Daniela Tosoni), 2012-2013.

Thesis Advisor, Department of Cognitive Science, University of Trento. "Bumblebees' Use of Environmental Geometry for Reorientation" (Massimiliano Zambotti), 2012-2013.

Thesis Advisor, Center for Mind/Brain Sciences, University of Trento. "Use of Distances and Lengths for Reorientation by Fish" (Michele Fiore), 2011-2012.

Thesis Advisor, Center for Mind/Brain Sciences, University of Trento. "Bumblebees' Use of Landmarks and Features for Navigation" (Sara Forti), 2011-2012.

Thesis Advisor, Center for Mind/Brain Sciences, University of Trento. "Navigational Use of a Directional Light Source by Fish" (Ambra Ferrari), 2011-2012.

Thesis Advisor, Center for Mind/Brain Sciences, University of Trento. "Shape and Size of Enclosure Affects Bumblebee Navigation" (Caterina Magri), 2011.

Research Advisor, Lab for Developmental Studies, Harvard University. Advised undergraduate students on designing and conducting experiments and writing research papers on spatial cognition, navigation, and object shape discrimination in toddlers. 2007, 2008, 2009, 2010.

Research Advisor, Cognitive Evolution Laboratory, Harvard University. Advised students and research assistants on designing and conducting research projects on nonhuman primates. 2006, 2007.

Concentration Advisor, Department of Psychology, Harvard University. Served as a departmental advisor for undergraduate students majoring in psychology, 2004-2005.