

## **Percival G. Matthews**

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### **EDUCATION**

- 2010 Ph.D., Psychology, Vanderbilt University, Nashville, TN  
Dissertation title: *When Concepts Act Concretely: Exploring the Notion of Conceptual Concreteness in a Novel Mathematical Domain.*
- 2008 M.S., Psychology, Vanderbilt University, Nashville, TN
- 2001 M.A., Political Science, University of Chicago, Chicago, IL
- 1997 B.A., Physics, Harvard University, Cambridge, MA

### **ACADEMIC POSITIONS**

- 2021 – Present Interim Associate Dean, University of Wisconsin-Madison  
School of Education Office of Equity, Diversity, and Inclusion
- 2019 – Present Associate Professor, University of Wisconsin-Madison  
Department of Educational Psychology
- 2012 – 2019 Assistant Professor, University of Wisconsin-Madison  
Department of Educational Psychology
- 2010 –2012 Postdoctoral Researcher, University of Notre Dame  
Department of Psychology, Moreau Postdoctoral Fellowship

### **HONORS AND AWARDS**

- UW-Madison School of Education Impact 2030 Faculty Fellow
- James S. McDonnell Foundation, Understanding Human Cognition Scholar 2018
- NIH Loan Repayment Program Award in Pediatric Research 2017-2020
- Nellie McKay Fellowship, University of Wisconsin-Madison, 2016-2017
- Moreau Academic Diversity Postdoctoral Fellowship, one of ten competitive two-year postdoctoral appointments awarded by the Provost of The University of Notre Dame, 2010-2012
- Hardy Culver Wilcoxon Award, presented by the Peabody College Department of Psychology and Human Development to the graduate student with the most distinguished doctoral dissertation in any area of Psychological Inquiry, 2010.
- Julius Seeman Award, presented by the Peabody College Department of Psychology and Human Development to the graduate who exemplifies the department's ideals of scholastic, personal and professional achievement, 2009.
- Student Travel Award, Society for Research in Child Development, April 2009.
- Vanderbilt University Provost Fellowship, September 2005.

## RESEARCH AND PUBLICATIONS

### ARTICLES IN REFEREED JOURNALS

1. Chesney, D. L., & Matthews, P. G. (2022). Circling around number: People can accurately extract numeric values from circle area ratios. *Psychonomic Bulletin & Review*, 1-11.
2. Park, Y., & Matthews, P. G. (2021). Revisiting and refining relations between nonsymbolic ratio processing and symbolic math achievement. *Journal of Numerical Cognition*, 7(3), 328-350.
3. Thompson, C. A., Taber, J. M., Sidney, P. G., Fitzsimmons, C. J., Mielicki, M. K., Matthews, P. G., Schemmel, E. A., Simonovic, N., Foust, J. L., Aurora, P., Disabato, D. J., Seah, T. H. S., Schiller, L. K., & Coifman, K. G. (2021). Math matters: A novel, brief educational intervention decreases whole number bias when reasoning about COVID-19. *Journal of Experimental Psychology: Applied*, 27(4), 632–656. <https://doi.org/10.1037/xap0000403>
4. Hubbard, E.M. & Matthews, P.G. (2021) The Number Sense Represents (Rational) Numbers (commentary). *Behavioral and Brain Sciences*, 44
5. Park, Y., Viegut, A. A., & Matthews, P. G. (2021). More than the sum of its parts: Exploring the development of ratio magnitude versus simple magnitude perception. *Developmental Science*, 24(3), e13043.
6. Fyfe, E. R., Matthews, P. G., & Amsel, E. (2020). College developmental math students' knowledge of the equal sign. *Educational Studies in Mathematics*, 104(1), 65-85.
7. Kalra, P. B., Hubbard, E. M., & Matthews, P. G. (2020). Taking the relational structure of fractions seriously: Relational reasoning predicts fraction knowledge in elementary school children. *Contemporary Educational Psychology*, 62, 101896.
8. Kalra, P. B., Binzak, J. V., Matthews, P. G., & Hubbard, E. M. (2020). Symbolic fractions elicit an analog magnitude representation in school-age children. *Journal of Experimental Child Psychology*, 195, 104844
9. Meng, R., Matthews, P. G., and Toomarian, E. Y. (2019). The Relational SNARC: Spatial Representation of Nonsymbolic Ratios. *Cognitive Science*.
10. Chesney, D. L., & Matthews, P. G. (2018). Task constraints affect mapping from approximate number system estimates to symbolic numbers. *Frontiers in Psychology*.
11. Matthews, P. G. & Fuchs, L. S. (2018). Keys to the gate? Equal sign knowledge at 2nd grade predicts 4th grade algebra competence. *Child Development*.
12. Matthews, P. G. & Ellis, A. B. (2018). Natural alternatives to natural number: The case of ratio. *Journal of Numerical Cognition*.

13. Fyfe, E. R., Matthews, P. G., Amsel, E., McEldoon, K. L., and McNeil, N. M. (2018). Assessing formal knowledge of math equivalence among algebra and pre-algebra students. *Journal of Educational Psychology*, 110(1), 87. doi: 10.1037/edu0000208
14. McCaffrey, T. & Matthews, P. G. (2017). An emoji is worth a thousand variables. *The Mathematics Teacher*. doi: 10.5951/mathteacher.111.2.0096
15. Sidney, P. G., Thompson, C. A., Matthews, P. G. & Hubbard, E. M. (2017). From continuous magnitudes to symbolic numbers: The centrality of ratio. *Behavioral and Brain Sciences*, 40. doi: 10.1017/S0140525X16002284
16. Rau, M. A. & Matthews, P. G. (2017). How to make 'more' better? Principles for effective use of multiple representations to enhance students' learning about fractions. *ZDM*, 49(4), 531-544. doi: 10.1007/s11858-017-0846-8
17. Matthews, P.G., & Hubbard, E. M. (2017). Making space for spatial proportions. *Journal of Learning Disabilities*, 50(6), 644-647. doi: 10.1177/0022219416679133
18. Matthews, P. G., & Lewis, M. R. (2017). Fractions we can't ignore: The ratio congruity effect. *Cognitive Science*, 41(6), 1656-1674. doi: 10.1111/cogs.12419
19. Hubbard, E. M., Matthews, P.G., & Samek, A. S. (2016). Using online compound interest tools to improve financial literacy. *The Journal of Economic Education*, 47, 106-120. doi: 10.1080/00220485.2016.1146097
20. Matthews, P. G., Lewis M. R., & Hubbard, E. M. (2016). Individual differences in nonsymbolic ratio processing predict symbolic math performance. *Psychological Science*, 27(2), 191-202. doi: 10.1177/0956797615617799  
Featured in Psychology Today: <https://www.psychologytoday.com/blog/finding-the-next-einstein/201601/do-humans-have-basic-capacity-understand-fractions>
21. Matthews, P. G., & Chesney, D. L. (2015). Fractions as percepts? Exploring cross-format distance effects for fractional magnitudes. *Cognitive Psychology*, 78, 28-56. doi: 10.1016/j.cogpsych.2015.01.006
22. Byrd, C. E., McNeil, N. M., Chesney, D. L., & Matthews, P. G. (2015). A specific misconception of the equal sign acts as a barrier to children's learning of early algebra. *Learning and Individual Differences*, 38, 61-67. doi: 10.1016/j.lindif.2015.01.001
23. Chesney, D. L., McNeil, N. M., Matthews, P. G., Byrd, C. E., Petersen, L. A., Wheeler, M. C., ... & Dunwiddie, A. E. (2014). Organization matters: Mental organization of addition knowledge relates to understanding math equivalence in symbolic form. *Cognitive Development*, 30, 30-46. doi: 10.1016/j.cogdev.2014.01.001
24. Chesney, D. L., & Matthews, P. G. (2013). Knowledge on the line: Manipulating beliefs about the magnitudes of symbolic numbers affects the linearity of line estimation tasks. *Psychonomic Bulletin & Review*, 20(6), 1146-1153. doi: 10.3758/s13423-013-0446-8
25. McNeil, N. M., Chesney, D. L., Matthews, P. G., Fyfe, E. R., Petersen, L. A., Dunwiddie, A. E., & Wheeler, M. C. (2012). It pays to be organized: Organizing arithmetic practice around equivalent

values facilitates understanding of math equivalence. *Journal of Educational Psychology*, 104(4), 1109. doi: 10.1037/a0028997

26. \*Matthews, P.G., Rittle-Johnson, B., McEldoon, K., & Taylor, R. (2012). Measure for measure: What combining diverse measures reveals about children's understanding of the equal sign as an indicator of mathematical equality. *Journal for Research in Mathematics Education*, 43(3), 316-350. doi: 10.5951/jresmetheduc.43.3.0316
27. Rittle-Johnson, B., Matthews, P. G., Taylor, R. S., & McEldoon, K. L. (2011). Assessing knowledge of mathematical equivalence: A construct-modeling approach. *Journal of Educational Psychology*, 103(1), 85. doi: 10.1037/a0021334
28. Matthews, P.G., & Rittle-Johnson, B. (2009). In pursuit of knowledge: Comparing self-explanations, concepts, and procedures as pedagogical tools. *Journal of Experimental Child Psychology*, 104(1), 1-21. doi: 10.1016/j.jecp.2008.08.004

#### **BOOK CHAPTERS & CONFERENCE PROCEEDINGS**

29. Matthews, P. G. & Ziols, R. (2019). What's perception got to do with it? Re-framing Foundations for Rational Numbers. In Norton, A. & Alibali, M. W. (Eds). *Constructing number: Merging perspectives from psychology and mathematics education*. New York: Springer.
30. Fyfe, E. R., Matthews, P. G., & Amsel, E. (2017). College students' knowledge of the equal sign and its relation to solving equations. In E. Galindo & J. Newton (Eds.), *Proceedings of the 39th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 279-282). Indianapolis, IN.
31. Matthews, P. G., Meng, R., Toomarian, E. Y. & Hubbard, E. M. (2016). The relational SNARC: spatial representation of nonsymbolic ratios? In A. Papafragou, D. Grodner, D. Mirman & J. C. Trueswell (Eds.), *Proceedings of the 38th Annual Conference of the Cognitive Science Society* (pp. 2651-2656). Philadelphia, PA: Cognitive Science Society.
32. Lewis, M.R., Matthews, P. G., & Hubbard, E. M. (2015). Neurocognitive architectures and the non-symbolic foundations of fraction understanding. In D. B. Berch, D. C. Geary, & K. Mann Koepke (Eds.), *Development of mathematical cognition: Neural substrates and genetic influences*. San Diego, CA: Academic Press.
33. Ziols, R. & Matthews, P.G. (2015). Exploring a 'not-so-common' common fraction representation. In T. G. Bartell, T. G., Bieda, K. N., Putnam, R. T., Bradfield, K., & Dominguez, H. (Eds.), *Proceedings of the 37th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. East Lansing, MI: Michigan State University.
34. Matthews, P.G., Chesney, D.L., & McNeil, N.M. (2014). Are fractions natural numbers too? In P. Bello P., Guarini M., McShane M. & Scassellati B. (Eds.) *Proceedings of the 36th Annual Conference of the Cognitive Science Society* (pp. 982-987). Austin TX: Cognitive Science Society.
35. Lewis, M.R., Matthews, P.G., & Hubbard, E. M. (2014). The neurocognitive roots of fraction knowledge. In P. Bello, M. Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th Annual Conference of the Cognitive Science Society* (pp. 2549-2554) Austin, TX: Cognitive

Science Society.

36. Matthews, P. G. & Chesney, D. L. (2011). Straightening up: Number line estimates shift from log to linear with additional information. In L. Carlson, C. Höscher, & T. Shipley (Eds.), *Proceedings of the 33rd Annual Conference of the Cognitive Science Society* (pp. 1936-1941). Boston, MA: Cognitive Science Society.
37. \*Matthews, P. G. & Rittle-Johnson, B. (2007). To teach by concept or by procedure? Making the most of self-explanations. In D. S. McNamara & J. G. Trafton (Eds.), *Proceedings of the 29th Annual Meeting of the Cognitive Sciences Society* (pp. 1283-1288). Nashville, TN: Cognitive Science Society.

## RESEARCH SUPPORT

### Extramural Funding:

- IES Grant R305U200004, subaward 401022-UWM: An Educational Intervention to Combat Whole Number Bias in Risk Perceptions in an Ambiguous Health Context: COVID-19, co-PI with PI Clarissa Thompson and co-PIs J. Taber, K. Coifman, and P. Sidney (subaward \$12,496, 2020-2022).
- NSF Science of Learning #1824182: Cultivating Knowledge of Mathematical Equivalence, PI with co-PIs M. Alibali and A. Stephens (\$670,986, 2018-2021).
- James S. McDonnell Understanding Human Cognition: Theoretical and Pedagogical Implications of the Nonsymbolic Ratio Processing System, PI (\$600,000, 2018-2024).
- NIH R01 Grant HD088585: Perceptual and Cognitive Mechanisms of Developing Fractions Knowledge: A Cross-Sequential Approach, Dual PI with E. Hubbard (\$1,878,053, 2016–2021).
- NSF REAL Grant #1420211: Using Nonsymbolic Ratios to Promote Fraction Knowledge: A Neurocognitive Approach, PI with co-PI E. Hubbard (\$499,997, 2014–2017, in NCE).
- NIH R03 Grant HD081087: Delimiting and Leveraging Children's Natural Sense of Proportion, PI (\$150,500, 2014–2016).
- NSF DGE Grant # 1545481: LUCID – A Project-focused Cross-disciplinary Graduate Training Program for Data-enabled Research in Human and Machine Learning and Teaching, core faculty (\$2,999,767, 2015 – 2020).

### Intramural Funding:

- Wisconsin Alumni Research Foundation: Cultivating Mathematical Equivalence, PI (\$31,974, 2017-2018, declined).
- University of Wisconsin – Madison Graduate School Research Committee, Optimizing Mathematics Learning and Teaching, co-PI with Martha Alibali, Timothy Rogers, and Jerry Zhu (\$117,516, 2015-2017).
- Wisconsin Alumni Research Foundation: Delimiting Children's Natural Sense of Proportion, PI (\$37,182 awarded, \$10,456 declined, 2014-2015).
- Wisconsin Alumni Research Foundation: Exploring the Number Sense, PI (\$32,331, 2013-2014).
- Wisconsin Alumni Research Foundation: CIViz: Development of Compound Interest Visualizations and Testing of Design Principles for Improving Financial Literacy, co-PI with Edward Hubbard and Anya Samek (2013-2014, \$48,154.00).

## CONFERENCE PRESENTATIONS

- Mielicki, M. K., Fitzsimmons, C. J., Schiller, L. K., Scheibe, D., Taber, J. M., Sidney, P. G., Matthews, P. G., Coifman, K. G., Waters, E. A., & Thompson, C. A. (2022, April). The

- picture of health: Visuals and health-related math problem solving. Paper to be presented at the 94<sup>th</sup> Annual Meeting of the Midwestern Psychological Association, Chicago, IL.
- Viegut, A. A. & Matthews, P.G. (postponed due to COVID-19). *Using analogy to improve fraction understanding*. Talk to be presented at Mathematics Cognition and Learning Society Conference, Dublin, Ireland.
- Viegut, A. A., Donovan, A. M., Brown, S. A., Matthews, P. G., Alibali, M. W. (postponed due to COVID-19). *Gesture use in a nonsymbolic and symbolic fraction comparison task*. Poster to be presented at Mathematics Cognition and Learning Society Conference, Dublin, Ireland.
- Park, Y., Dean, D.3<sup>rd</sup>, Binzak, J.V., Matthews, P.G., & Hubbard, E.M. (May, 2020) Symbolic and Non-Symbolic Fractions Relate to Different White Matter Tracts: A Cross-Sectional Diffusion MRI Tractography Study. Poster presented at *the 27th Annual Meeting of Cognitive Neuroscience Society Annual Meeting*, Virtual Conference due to COVID-19.
- Sterling-Alves, I., Park, Y., Kalra, P.B., Binzak, J.V., Matthews, P.G., & Hubbard, E.M. (May, 2020). Educational Experience Connect Symbolic Fractions to Parietofrontal Nonsymbolic Ratio Processing Systems. Poster presented at *the 27th Annual Meeting of Cognitive Neuroscience Society Annual Meeting*, Virtual Conference due to COVID-19.
- Matthews, P. G., Hubbard, E. M., Kalra, P. & Park, Y. (2020, Apr 17 - 21) *The Comparative Importance of Two Types of Relational Reasoning for Supporting Fractions Knowledge* [Symposium]. AERA Annual Meeting San Francisco, CA <http://tinyurl.com/yx2d4jfx> (Conference Canceled)
- Matthews, P.G. (July, 2019) So What's the Big Idea? The Importance of Knowledge Structures for Promoting School Learning. Paper presented at the Rumelhart Symposium of the 41st Annual Conference of the Cognitive Science Society. Montreal, Quebec, Canada.
- Park, Y., Binzak, J.V., Toomarian, E.Y., Kalra, P., Matthews, P.G., & Hubbard, E.M. (April, 2019). Differences in processing symbolic vs. non-symbolic representations ratios: Behavioral and neural evidence. *Paper submitted as part of a symposium to American Education Research Association, Toronto, Canada.*
- Toomarian, E.Y., Park, Y., Matthews, P.G., & Hubbard, E.M. (April, 2019). Spatial-numerical associations of fractions: Evidence from internal and external representations. *Paper submitted as part of a symposium to American Education Research Association, Toronto, Canada.*
- Park, Y., Viegut, A.A., & Matthews, P.G. (March, 2019). The development of multiple non-symbolic ratio representations in children. *2019 Biennial Meeting on Society for Research in Child Development*, Baltimore, MD.
- Viegut, A.A. Park, Y. & Matthews, P.G. (March, 2019). Number Line Estimation is More than Numerical: Evidence from Nonstandard Number Lines, *2019 Biennial Meeting on Society for Research in Child Development*, Baltimore, MD.
- Matthews, P.G., Binzak, J.V., Kalra, P.B., Park, Y., & Hubbard, E.M. (March, 2019). Perceptual Routes to Rational Numbers. *Paper submitted as part of a symposium to 2019 Biennial Meeting on Society for Research in Child Development*, Baltimore, MD.
- Park, Y., Binzak, J.V., Dean, D.3<sup>rd</sup>, Alexander, A., Matthews, P.G., & Hubbard, E.M. (Sep, 2018). Developmental changes in white matter tracts for symbolic and non-symbolic fractions, *6<sup>th</sup> Biennial conference on International Mind, Brain and Education Society*, Los Angeles, CA.
- Viegut, A.A. Park, Y., Hubbard, E.M. & Matthews, P.G. (Sep, 2018). Differential improvement in fraction estimation in 2<sup>nd</sup> vs. 5<sup>th</sup> grade children: Longitudinal Analysis, *6<sup>th</sup> Biennial conference on International Mind, Brain and Education Society*, Los Angeles, CA.
- Park, Y., Binzak, J.V., Toomarian, E.Y., Kalra, P. Matthews, P.G. & Hubbard, E.M. (2018, July). *Developmental changes in children's processing of nonsymbolic ratio magnitudes: A cross-sectional fMRI study*. Poster presented at the 40th Annual Meeting of the Cognitive Science Society, Madison, WI.

- Binzak, J.V., Toomarian, E.Y., Matthews, P.G., & Hubbard, E.M. (2018, July). *Fractions War: An iOS game to measure and train magnitude processing with fractions*. Poster presented at the 40th Annual Meeting of the Cognitive Science Society, Madison, WI.
- Meng, R., Matthews, G. & Hubbard, E.M. (2018, July). *Non-symbolic ratio sense supports symbolic fraction success*. Poster presented at the 40th Annual Meeting of the Cognitive Science Society, Madison, WI.
- Matthews, P.G., Meng, R., Binzak, J.V., Toomarian, E.Y. & Hubbard, E.M. (2018, April). *Similar behavioral effects for nonsymbolic ratio processing and symbolic fractions suggests common mechanisms*. Talk presented at the Math Cognition Learning Society Meeting, Oxford, UK.
- Kalra, P.B., Binzak, J.V., Park, Y., Toomarian, E.Y., Matthews, P.G. & Hubbard, E.M. (2018, March). *Individual differences in IPS and PFC function predict fraction knowledge in children*. Poster presented at the Cognitive Neuroscience Society Meeting, Boston, MA.
- Binzak, J.V., Park, Y., Toomarian, E.Y., Kalra, P.B., Chuang, Y.-S., Matthews, P.G. & Hubbard, E.M. (2018, March). *Neurocognitive relationships between nonsymbolic and symbolic ratio processing in children and adults*. Poster presented at the Cognitive Neuroscience Society Meeting, Boston, MA.
- Kalish, C. W., Meng, R, Seng, A. & Matthews P. G. (2017, July). *Optimizing mathematics learning Effects of continuous and nominal practice format on transfer of arithmetic skills*. Poster presented at the 39th Annual Conference of the Cognitive Science Society. London, UK.
- Meng, R. & Matthews, P. G. (2017, July). *Presentation format modulates adults' automatic processing of proportions*. Poster presented at the 39th Annual Conference of the Cognitive Science Society. London, UK.
- Hubbard, E. M., Binzak, J. V. & Matthews, P. G. (2017, July). *Grounding fractions in the RPS: Common distance effects for symbolic fractions and non-symbolic ratios suggest shared processing*. Talk presented at the 5<sup>th</sup> annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.
- Meng, R. & Matthews, P. G. (2017, July). *Presentation format modulates adults' automatic processing of proportions*. Poster presented at the 5<sup>th</sup> annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.
- Park, Y. E. & Matthews, P. G. (2017, July). *Proportional reasoning in the context of continuous vs. discretized: Adults go wrong where children go wrong*. Poster presented at the 5<sup>th</sup> annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.
- Matthews, P. G. (2017, May) Getting a feel for fractions: Moving From perceptually privileged representations to formal symbols. In D. H. Uttal (Chair), *On the Interaction Between Embodied and Symbolic Mathematics Knowledge: Implications for Instruction*. Symposium conducted at the meeting of the American Educational Research Association, San Antonio, TX.
- Matthews, P. G. & Fyfe, E. R. (2017, April). *Assessing knowledge of symbolic math equivalence among middle school algebra and pre-algebra students*. Poster presented at the Biennial Meeting of the Society for Research in Child Development (SRCD), Austin, TX.
- Ziols, R. & Matthews, P.G. (2016, August). *Beyond comparison and counting: What a "sense of proportion" might mean for mathematics education*. Talk presented at the 13<sup>th</sup> International Congress on Mathematical Education, Hamburg, Germany.
- Meng, R., Matthews, P. G., Toomarian, E. Y., & Hubbard, E. M. (2016, July). *The relational SNARC: Spatial representation of nonsymbolic ratios?* Paper presented at the 4<sup>th</sup> Annual Midwest Meeting on Mathematical Thinking, Madison, WI.
- Binzak, J. V., Toomarian, E. Y., Matthews, P. G., & Hubbard, E. M. (2016, July). *New computer and tablet-based programs for exploring links between nonsymbolic ratio processing and symbolic*

- fractions knowledge*. Poster presented at the 4<sup>th</sup> Annual Midwest Meeting on Mathematical Thinking, Madison, WI.
- Leatham, K. R., Matthews, P. G., Cai, J. & Langrall, C. W. (2016, April). *The role of theoretical frameworks in research dissemination*. Talk presented at the Annual Research Conference of National Council of Teachers of Mathematics, San Francisco, CA.
- Matthews, P. G. (2015, August) *The ratio processing system: A developmental approach*. Paper presented at the 3<sup>rd</sup> annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.
- Hopkins, R. C., & Matthews, P. G. (2015, August). *Adult differences in fraction knowledge: Measuring reasoning with problem-solving strategies*. Poster presented at the 3<sup>rd</sup> annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.
- Matthews, P. G. (2015, March). *Delimiting and leveraging children's natural sense of proportion*. Poster presented at the Biennial Meeting of the Society for Research in Child Development (SRCD), Philadelphia, PA.
- Matthews, P. G. (2015, April). An alternative route to fractions knowledge. In P.G. Matthews & C. Williams (Chairs), *Fractions Learning: One Subject, Multiple Perspectives*. Symposium conducted at the meeting of the American Educational Research Association, Chicago.
- Hubbard, E. M., Matthews, P.G., & Samek, A. S. (2015, January). *Using interactive compound interest visualizations to improve financial literacy*. Paper presented at the annual Meeting of the American Economic Association, Boston, MA.
- Lewis, M.R., Matthews, P.G. & Hubbard, E.M. (July, 2014). *The Neurocognitive Roots of Fraction Knowledge*. Cognitive Science Society, Quebec City, QB, Canada.
- Matthews, P. G. (2014, July) *The perceptual roots of fraction knowledge: Foundations for understanding magnitude*. Paper presented at the 2<sup>nd</sup> Annual Midwest Meeting on Mathematical Thinking, Madison, WI.
- Lewis, M. R., Matthews, P. G., & Hubbard, E. M. (2014, July). *The perceptual roots of fraction knowledge: A neurocognitive approach*. Paper presented at the 2<sup>nd</sup> annual Midwest Meeting on Mathematical Thinking, Madison, WI.
- Ziols, R., Matthews, P.G., Lewis, M.R., Toomarian, E.Y. & Hubbard, E.M. (2014, July). *Refining fraction constructs: An exploratory study of preference and generalization*. 2<sup>nd</sup> Annual Midwest Meeting on Mathematical Thinking. Madison, WI.
- Lewis, M.R., Matthews, P.G. & Hubbard, E.M. (2014, May). *The "Rational Brain System" and fraction learning*. NICHD Mathematical Cognition Conference, Washington, DC.
- Matthews, P. G. (2013, July). *Perhaps fractions are natural numbers too: A rational approach to number sense*. Paper presented at 1st annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.
- Lewis, M.R., Matthews, P. G., & Hubbard, E. M. (2013, July). *Mappings between nonsymbolic ratios and arabic fractions*. Poster presented at the 1st annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.
- Matthews, P. G. (2013, June). *Evaluating the interpretation of number line estimation tasks*. Paper presented at a symposium co-organized by P.G. Matthews and E. Amsel on Developmental and Instructional issues in mathematical reasoning, at the 2013 Annual Meeting of the Jean Piaget Society, Chicago, IL.
- Bryd, C. E., McNeil, N. M., Chesney, D. L., Matthews, P. G. (2013, April). *Children's "arithmetic-specific" interpretation of the equal sign constitutes risk for poor learning of early algebra*. Poster presented at the Biennial Meeting of the Society for Research in Child Development (SRCD), Seattle, WA.
- Chesney, D. L., McNeil, N. M., Matthews, P. G., Bryd, C. E., Petersen, L. A., Wheeler, M. C., Fyfe, E. R., & Dunwiddie, A. E. (2013, April). Organization matters: Children's mental organization of arithmetic knowledge correlates with understanding of math equivalence. In B. Rittle-Johnson

(Chair), *Representation, Concepts, and Problem-Solving: Mathematics*. Paper symposium presented at the Biennial Meeting of the Society for Research in Child Development (SRCD), Seattle, WA.

- Chesney, D. L., Matthews, P. G., & McNeil, N. M. (2013, May). *Fraction format affects adults' performance on magnitude comparison problems*. Poster presented at the annual convention for the Association for Psychological Sciences, Washington, D.C.
- Chesney, D. L. & Matthews, P. G. (2012, May). *Proportions on the line: Line estimation tasks are proportion judgment tasks*. Poster presented at the annual convention for the Association for Psychological Sciences, Chicago, Illinois.
- Matthews, P. G., Rittle-Johnson, B., Taylor, R. T., & McEldoon, K. L. (2011, April). *Understanding the equal sign as a gateway to algebraic thinking*. Poster presented at the 2011 Biennial Meeting of the Society for Research in Child Development, Montreal.
- Matthews, P. G. (2010, August). *Are Hindu-Arabic numerals concrete or abstract symbols?* Poster presented at the 32nd Annual Conference of the Cognitive Science Society. Portland, OR.
- Rittle-Johnson, B., Matthews, P. G., Taylor, R. T., & McEldoon, K. L. (2010, March). *Understanding the equal sign as a gateway to algebraic thinking*. Paper presented at the Society for Research in Educational Effectiveness. Washington, DC.
- Matthews, P. G. & Rittle-Johnson, B. (2009, April). Dual dimensions for concreteness? In P.G. Matthews (Chair), *Unpacking concreteness – understanding how symbol choice affects learning and transfer*. Symposium presented at the Biennial Meeting of the Society for Research in Child Development, Denver, CO.
- Rittle-Johnson, B., Matthews, P. G. & Saylor, M. M. (2009, April). *Promoting explanations to support mathematics learning*. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Denver, CO.
- Taylor, R. S., Rittle-Johnson, B., Matthews, P. G. & McEldoon, K. L. (2009, March). *Mapping children's understanding of mathematical equivalence*. Paper presented at the conference of the Society for Research in Educational Effectiveness. Crystal City, VA.
- Matthews, P. G. & Rittle-Johnson, B. (2008, June). *In search of transfer: Concrete may lay a weak foundation*. Poster presented at the 2008 Institute of Education Sciences Research Conference, Washington, D.C.
- Go, S. C., Matthews, P. G., Rittle-Johnson, B., & Carr, T. H. (2007, November). *When adults think like kids about equality: schema activation and time pressure in mathematical problem solving*. Paper presented at the 2007 Annual Meeting of the Psychonomic Society, Long Beach, CA.
- Matthews, P. G., & Rittle-Johnson, B. (2007, April). *Concepts or procedures? Making the most of self-explanations*. Poster presented at the 2007 Institute of Education Sciences Research Conference, Washington, D.C.
- Matthews, P. G., & Rittle-Johnson, B. (2007, April). *Concepts or procedures? Optimizing the use of self-explanations to Correct Misconceptions*. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Boston, MA.
- Cordray, D. S., Hurley, S. M., & Matthews, P. G. (2006, April). *The ExpERT Program*. Poster presented at the Annual Meeting of the American Educational Research Association, San Francisco, CA.

### **INVITED PRESENTATIONS**

- Harvard University, Lab for Developmental Studies Speaker Series (March 8, 2021)  
 University of Pittsburgh, Cognitive Psychology Virtual Brownbag (February 3, 2021)  
 Tufts University, Cognitive and Brain Sciences Speaker Series (November 13, 2020)  
 Vanderbilt University Developmental Lunch Bunch (November 22, 2019)

Carnegie Mellon PIERS Educational Research Speaker Series (February 4, 2019)  
University of Maryland Cognitive Science Colloquium (October 18, 2018).  
Northwestern University (January 16, 2018). Are Fractions Natural Numbers, Too? Perceptual foundations for understanding numerical magnitudes.  
University of Chicago Developmental Brownbag (April 10, 2017). Are Fractions Natural Numbers, Too? Perceptual Foundations for Understanding Numerical Magnitudes.  
SESAME Workshop, UC Berkeley (March 7, 2016). An Eye for Ratio Processing: A Perceptual Route to Relational Thinking?  
Wisconsin Center for Education Research 50th anniversary meeting (October 20, 2015). Leveraging the rational brain to promote fractions competence. With Hubbard, E. and & Rau, M. A.

### **CONFERENCE ORGANIZING RESPONSIBILITIES**

Co-host with Sashank Varma and Edward Hubbard (July, 2017). 5<sup>th</sup> Annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.  
Co-host with Sashank Varma and Edward Hubbard (July, 2016). 4<sup>th</sup> Annual Midwest Meeting on Mathematical Thinking, Madison, WI.  
Co-organizer with Sashank Varma and Edward Hubbard (August, 2015). 3<sup>rd</sup> Annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.  
Co-host with Sashank Varma and Edward Hubbard (July, 2014). 2<sup>nd</sup> Annual Midwest Meeting on Mathematical Thinking, Madison, WI.  
Co-organizer with Sashank Varma (July, 2013). 1<sup>st</sup> Annual Midwest Meeting on Mathematical Thinking, Minneapolis, MN.

### **TEACHING**

Ed Psych 712, Graduate Diversity Seminar  
Ed Psych 506, The Impact of Race and Gender: An Educational Psychologist's Perspective  
WCER Fellows Pro-Seminar, University of Wisconsin-Madison (Graduate level professional development seminar)  
Ed Psych 331, Development – Childhood through Adolescence, University of Wisconsin-Madison (Undergraduate Level)  
Ed Psych 506, Exploring the Number Sense, University of Wisconsin-Madison (Undergraduate/Graduate Level)  
Ed Psych 711/925, The Development of Mathematical Thinking, University of Wisconsin-Madison (Graduate Level)  
Psy 301, Experimental Psychology I: Statistics, University of Notre Dame (Undergraduate Level)

### **MENTORING**

Primary Doctoral Advisor for Ronald Hopkins (Fall 2014 – Summer 2020), Rui Meng (Fall 2015 – Spring 2018), Yunji Park (Fall 2016 – Present), Sarah Lord (Fall 2016 – Present), Alexandria Viegut (Fall 2017 – Present); and Robert Quintana (Fall 2019 – Present)  
Masters or Prelim Committee Member for Hsun-yu Chan (2012), Jichan Kim (2014), Andrea Donovan (2014), Ryan Ziols (2015), Yorel Lashley (2016), Hannah Kang (2016), Elizabeth Toomarian (2016), John Binzak (2016), Sarah Brown (2016), Julie Johnson (2017), Lifan Yu (2017), Mary Cate Komoski (2017), Emma Lazaroff (2018), Rui Meng (2018), Brooke Wollner (2018), Menggou Jing (2019), Yunji Park (2019), Emma Lazaroff (2019), Ron Hopkins, Alexandria Viegut, Isabella Starling-Alves, Aygul Hoffman  
Dissertation Committee Member for graduates Noelle Crooks (Psychology, 2014), Pooja Sidney (Psychology, 2016), Jichan Kim (Educational Psychology, 2016), Sonia Ibarra (Curriculum and Instruction, 2015), Fatih Dogan (Curriculum and instruction, 2015), Natalia Bailey (Curriculum and Instruction, 2017), Kelly Harrigan (Curriculum and Instruction, 2017), Yorel Lashley

(Educational Psychology, 2018), April Murphy (Psychology, 2018), Sarah Brown (Psychology, 2018), Elizabeth Toomarian (Educational Psychology, 2018). Current students John Binzak (Educational Psychology), Dana Sorenson (Educational Psychology), Julie Johnson (Educational Psychology) and Sarah Lord (Curriculum and Instruction).

Mentor for Postdoctoral Researcher Priya Kalra (co-mentored with Edward Hubbard), Emily Szkudlarek (co-mentored with Martha alilbali)

UW Undergraduate Research Scholar advisees

Brian Brito (2012), Catherine Finedore (2012), Kimberley Lense (2015); Sai Xiong (2016); Joao Catao (2017)

Mentor for University of Wisconsin Undergraduate Research Assistants, Typically 4-8 per semester.

Mentor for Chancellor's Scholar Denzel Bibbs (Fall 2014 – Spring 2019)

## **PROFESSIONAL SERVICE**

Associate Editor for *Journal of Research in Mathematics Education* (Fall 2019 – Present)

Editorial Board Member for *Journal of Research in Mathematics Education* (Spring 2014 – Spring 2017)

Member, Wisconsin Education Research Advisory Council (2017 – Present)

Member, Wisconsin Minnesota Collaborative Consortium 10 Advisory board

Advisory Board Member, Rita Allen Foundation, Civic Science

Advisory Board Member, Reviewer Zero

Member, DPI Research Evaluation Partnership Workgroup (WI DPI + UW Madison)

### Grant Reviewer

IES

Basic Processes Panel Reviewer 2017

Basic Processes Standing Panel Reviewer 2018 – Present

NIH

LD Hub Panel Reviewer 2016

CP Panel Reviewer 2016

CP Panel Reviewer 2017

CP Panel Reviewer 2018

CP Panel Standing Reviewer 2019 – Present

NSF

REESE Panel Reviewer 2012

ECR Panel Reviewer 2015

Ad Hoc Reviewer 2016

Ad Hoc Reviewer 2017

ECR Panel Reviewer 2018

ECR Panel Reviewer 2019

### Ad hoc manuscript reviewer for

Acta Psychologica; American Educational Research Association; AERA Open; British Journal of Developmental Psychology; Canadian Journal of Experimental Psychology; Child Development; Cognitive Science Society; Cognitive Science; Cognitive Development; Developmental Psychology; Developmental Science; Educational Studies in Mathematics; Educational Psychology Review;

Frontiers in Psychology; Infancia y Aprendizaje; Instructional Science; Journal of Cognition and Instruction; Journal of Educational Psychology; Journal of Experimental Child Psychology; Journal of Experimental Psychology: Applied; Journal of Experimental Psychology, Learning memory and Cognition; Journal of Learning and Individual Differences; Journal of Learning and Instruction; Journal of Numerical Cognition; Journal of Research on Educational Effectiveness; Journal for Research in Mathematics Education; Journal of Urban Mathematics Education; Mathematical Thinking and Learning; Memory & Cognition; Quarterly Journal of Experimental Psychology; Research in Mathematics Education; Science; SRCD; Studies in Educational Evaluation

### **DEPARTMENTAL AND UNIVERSITY SERVICE**

Member, Mercile J Lee Scholars Director Search Committee 2020  
Chair, Department of Educational Psychology Diversity Committee 2019-2020  
Chair, WCER Director Search Committee 2019  
Chair, WCER Associate Director Search Committee 2019  
Member, University of Wisconsin-Madison Provost Search Committee 2019  
Department of Educational Psychology Learning Sciences Assistant Professor Search Committee 2019  
Chair Department of Educational Psychology RAFA Committee (2019 – 2020)  
Diversity Liaison, DDEEA (2019 –2021)  
Department of Educational Psychology Prevention, Intervention, & Enhancement Training Grant Steering Committee (2018-2019)  
Education Graduate Research Scholars (Ed-GRS) Review Committee (2018)  
WCER Fellows Program Coordinator (2017 – Present). This fellowship is funded by WCER and donors and aims to diversify the School of Education and WCER graduate student population.  
WCER Fellows Program Designer (2016 – 2017)  
Graduate School Representative to the Institute for the Recruitment of Teachers in Andover, MA (Summer 2017)  
Departmental Recruitment, Admissions, Fellowships, and Awards Committee (Fall 2014 - Present)  
Departmental Delegate to the University Senate (Fall 2014 – Spring 2017)  
Coordinating Committee Member for Wisconsin Ideas in Education Series (Spring 2014 – Fall 2016)  
Departmental Faculty and Staff Honors Committee (Fall 2013 – Spring 2014)  
Departmental Student Affairs Committee (Fall 2012 – Spring 2013)

### **SPECIAL INVITATIONS**

IES Technical Working Group: Neuromyths, Neurotruths, Student Learning, and Teachers' Understanding (June, 2018)  
White House Office of Science and Technology Policy (OSTP) Workshop: Bridging Neuroscience and Learning (January, 2015)  
NICHD Third Annual Math Cognition Conference: Typical and Atypical Learning of Complex Arithmetic Skills and Higher-Order Math Concepts (May 2015)