Richard W. Prather

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(June, 2019)

Education

2009	Ph.D., Psychology (Cognitive & Cognitive Neuroscience) University of Wisconsin-Madison
2002	S.B., Brain and Cognitive Sciences Massachusetts Institute of Technology

Positions

2014 - current	Assistant Professor Department of Human Development and Quantitative Methods Human Development Program Neuroscience & Cognitive Science Program University of Maryland, College Park
2009 – 2014	Postdoctoral Researcher, Indiana University, Department of Psychological and Brain Sciences

Publications

1. Yuan, L., Prather, R.W., Mix, K., Smith, L (2019). Does number representation matter in the number line task? *Child Development*

2. Prather, R.W. (in principle accepted). Does spontaneous focus on relations predict conceptual knowledge of negative numbers? *Journal of Numerical Cognition*

3. Yuan, L., Prather, R.W., Mix, K., Smith, L (2019). Preschoolers and Multi-digit Numbers: A Path to Mathematics through the Symbols Themselves. *Cognition*

4. Prather, R.W. (in principle accepted) Arithmetic knowledge from spontaneous focus on relations. *Developmental Science*.

5. Prather, R.W. (2019) Individual differences in numerical comparison is independent of numerical precision. *Journal of Numerical Cognition*.

6. Prather, R.W. (2018) Neural coding partially accounts for the relationship between children's number-line estimation and number comparison performance. *Journal of Cognition and Development*, 19(2), 201-219.

7. Prather, R.W. (2014) Neural coding variation mediates precision in numerical discrimination. *Cognition*, 133, 601 – 610.

8. Mix, K., Prather, R.W., Smith, L.B., Stockton, J.D. (2014) Young Children's Interpretation of Multi-Digit Number Names: From Emerging Competence to Mastery. *Child Development. May-Jun; 85(3), 1306-19.*

9. Prather, R.W. (2012). Connecting neural coding to number cognition: A computational account. *Developmental Science*, 15(4), 589-600.

10. Prather, R.W. (2012) Implicit learning of arithmetic regularities is facilitated by proximal contrast. *PLoS ONE 7(10): e48868.*

11. Hattikudur, S., Prather, R.W., Asquith, P., Knuth, E., Nathan, M. J., & Alibali, M. W. (2012). Constructing graphical representations: Middle schoolers' developing knowledge about slope and intercept. *School Science and Mathematics*, 112(4), 230-240.

12. Prather, R.W. & Alibali, M.W. (2011). Children's acquisition of arithmetic principles: The role of experience. *Journal of Cognition and Development*, 12(3), 332-354.

13. Prather, R. W. & Alibali, M. W. (2009). Development of arithmetic principle knowledge: How do we know what learners know? *Developmental Review*, 29(4), 221-248.

14. Prather, R. W. & Alibali, M. W. (2008). Understanding and using principles of arithmetic: Operations involving negative numbers. *Cognitive Science,* 32(2), 445-457

Preprints

Prather, R. (2018, February 22). Task dynamics reveal how learners construct fraction values. https://doi.org/10.31234/osf.io/u7zys

In progress

Prather, R.W., Heverly-Fitt, S. (in review) Predicting Numerical Comparison using Neural Networks and Electrophysiological data. *Computational Brain and Behavior*

Publications (invited)

Should the Science March Stick to Just Science? *Scientific American*, April 3, 2017.

Press Coverage

"Kids may be ready for math earlier than you think, new research suggests." *The Washington Post*. December 17, 2013

"SFN Neuroblogging Ideas of Number" *Scientific American*. November 16, 2011.

Honors and Awards

2013	*Training Program in Integrative Developmental Process* National Institute of Child Health and Development (5T32HD007475) *(Role: Postdoctoral Researchers)*
2009	*Making Sense of Mathematical Manipulatives* Institute of Educational Sciences (R305A080287) *(Role: Postdoctoral Researcher)*
2012	Developmental Science Early Career Researcher Prize Editors: Nelson, C. A., de Haan, M., Quinn, P. and Ansari, D. (2013), A Winner of 2012 Developmental Science Early Career Research Prize. Developmental Science, 16: 792.
2007 - 2009	Interdisciplinary Training Program Predoctoral Fellowship (#R305C050055) University of Wisconsin, Institute of Education Sciences, Department of Education
2005	Roderick Menzies Memorial Research Award, University of Wisconsin Department of Psychology
2002 - 2005	Minority Fellowship Program Pre-doctoral Fellowship, American Psychological Association

Funding

Awarded

2019	University of Maryland Catalyst New Directions Fund ($33,101)
2018	University of Maryland Brain and Behavior Initiative Seed Grant ($51,198). PI: Prather
2017	Research and Scholarship Award ($10,000 for teaching buyout)
2015	University of Maryland Support Program for Advancing Research and Collaboration ($15,000)

Submitted

Spencer Foundation Small Grant (July 2019)

University of Maryland VPR Catalyst fund. (May 2019)

NSF: CAREER Combining deep learning and neuroimaging approaches to improve children's arithmetic knowledge (2017)

NSF – Directorate for Developmental Science (Spring 2017) *Individualized training for arithmetic learning via neuroimaging and computational modeling*

Tier 1 Seed Grant (Winter 2017).

NSF – Directorate for Education and Human Resources. *Precise and Generalizable Prediction of Behavior via Neural-Mathematical Models* (Spring 2016)

NICHD: Exploratory/Developmental Research Award (R21): Early Mathematics interventions and training
(Spring 2015)

Jacobs Foundation: *Prediction of Children's Learning via Neural-Computational Models* (Spring 2016)

Jacobs Foundation: *Prediction of Children's Learning via Neural-Computational Models* (Spring 2017)

Searle foundation Scholars: *Precise Behavioral Prediction via Neural-Mathematical Models* (Fall 2016)

Simons: *Precise and Generalizable Prediction of Behavior via Neural-Mathematical Models (Fall 2016)*

Spencer Foundation: *Improving Children's Arithmetic using Neural-Computational Models (*Spring 2016*)*

Foundation for Child Development: *Precision interventions: Individualized early math interventions for students at every skill level (*Spring 2015)

Invited Talks

Cognition in Context
University of Massachusetts - Amherst, September 2019

The Math behind how your Brain Learns Math
Duke University, January 2019
North Dakota State, April 2019

Biological Evidence of the Effectiveness of Educational Technology
American Association of Law Libraries Annual Meeting July 16th, 2018

Alumni honor Day Talks
SPINES: Marine Biological Laboratory, June 29th, 2018

How do learners construct fraction values?
Wisconsin Ideas in Education Series: University of Wisconsin, September 2017
Georgetown University, January, 2018

Ready at Five Research Symposium: Keynote Speaker, May 2014

Neural Coding and the Development of Number Cognition
University of Richmond, Department of Psychology, December 2013
University of Buffalo, Department of Psychology, December 2013
University of Maryland, Department of Human Development, November 2013
University of Tennessee, Department of Psychology, September 2013

How neural population codes help us understand numerical cognition

University of Illinois, School of Education	December 2012
Tufts University, Department of Psychology	December 2012
University of Pittsburgh	January 2012

Conference Presentations & Posters

Prather, R.W. (2019). Arithmetic knowledge from spontaneous focus on relations. Symposia presentation at the Mathematical Cognition and Learning Society

Prather, R.W. (2018) Task dynamics reveal how fraction values are constructed. Oral presentation at Cognitive Science Society

Richard Prather(2017). *Children's numerical comparison is independent of number representation*. Cognitive Development Society

Richard Prather & Sara Heverly-Fitt (2017) Dynamic System model prediction of individual differences in numerical development. Society for Research in Child Development

Richard Prather & Sara Heverly-Fitt (2016) Prediction of Single-Trial Behavior using a Layered Dynamic Systems Model with Evolutionary Algorithm Updating, Cognitive Science Society

Richard Prather & Sara Heverly-Fitt (2016) Computational Model and ERP Enabled Prediction of Single Trial Behavior on a Numerical Comparison Task, Cognitive Neuroscience Society

Richard Prather (2015) Predicting Behavior on Mathematical Tasks via Computational Models, Society for Research in Child Development

Richard Prather (2015) Mathematical Models of Developmental Changes in Number Cognition, Cognitive Science Society

Prather, R.W. (2013) Neural coding variation mediates precision of number discrimination. Society for Neuroscience Conference. Development of Numerical Cognition Nanosymposium.

Prather, R.W. (2012) Learning numbers without numbers: Transfer of learning across magnitude domains. Society for Neuroscience Conference. Development of Numerical Cognition Nanosymposium.

Prather, R.W. (2012) The influence of neural coding on numerical cognition. Poster presented at the Society for Cognitive Neuroscience

Prather, R. W. (2011) Further connecting neural coding to number cognition. Society for Neuroscience Conference. Neural Bases of Human Cognition and Attention Nanosymposium. [Featured in Scientific American]

Prather, R. W., Stitzel, C., Byrge, L., Street, S., Boyer, T., Smith, L.B. (2011) Counting and estimating: Developmental relations between magnitude estimation and counting skill. Cognitive Development Society Conference 2011.
Mix, K., Prather, RW, Stitzel, C., Smith, L. (2010). Place-Value Concepts and Multidigit Calculation: Effects of Concrete Models. Poster presented at the Institute of Education Sciences Research Conference.

Prather, R.W. & Alibali, M.W. (2009) Children's Acquisition of Arithmetic Principles. Presented at the Biennial Meeting of the Society for Research in Child Development, Denver, Colorado.

Alibali, M.W., Prather, R.W., McNeil, N.M. (2009) Are Abstract or Concrete Materials Most Beneficial for Learning? It Depends on Problem Difficulty and Learners Skills. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Denver, Colorado.

Prather, R.W. & Alibali, M.W. (2008). Knowledge and acquisition of arithmetic principles. Poster presented at the Institute of Education Sciences Research Conference, Washington, DC.

Prather, R.W. & Alibali, M.W. (2007). *Children's arithmetic principle knowledge: How do we know what they know?* Poster presented at the Biennial Meeting of the Cognitive Development Society, Santa Fe, NM.

Prather, R. W. & Alibali, M. W. (2007). *Knowledge of an arithmetic principle in symbolic and verbal contexts: Do children know what adults know?* Poster presented at the Biennial Meeting of the Society for Research in Child Development, Boston, Massachusetts.

Alibali, M. W. & Prather, R. W. (2007). *Improvements in problem encoding lead to changes in strategy evaluations*. Poster presented at the Biennial Meeting of the Society for Research in Child Development, Boston, Massachusetts.

Hattikudur, S., Prather, R. W., Asquith, P., Knuth, E., Nathan, M. J., & Alibali, M. W. (2007). *Graphing slope and intercept in middle school.* Poster presented at the Biennial Meeting of the Society for Research in Child Development, Boston, Massachusetts.

Hattikudur, S., Prather, R. W., Asquith, P., Knuth, E., Nathan, M. J., & Alibali, M. W. (2007). *Constructing graphical rep resentations: Exploring middle schoolers' intuitions and developing knowledge about slope and intercept*. Poster presented at the Annual Meeting of the American Educational Research Association, Chicago, Illinois.

Conference Proceedings

Prather, R.W. (2018) Task dynamics reveal how fraction values are constructed. *Proceedings of the Annual Conference of the Cognitive Science Society*. Mahwah, NJ: Erlbaum.

Prather, R.W. (2010) Change in Stimuli Encoding Facilitates Principle Acquisition. *Proceedings of the Annual Conference of the Cognitive Science Society*. Mahwah, NJ: Erlbaum.

Street, S., Prather, R.W., Stitzel, C., Smith, L.B., Mix, K. (2010) Preschoolers' Writing of Multidigit Numbers: From an Additive to a Multiplicative Representational System? *Proceedings of the Annual Conference of the Cognitive Science Society*. Mahwah, NJ: Erlbaum.

Prather, R. W. & Alibali, M. W. (2008). Implicit learning of arithmetic principles. In J. McClelland & J. Weng (Eds.), *Proceedings of the 7th IEEE International Conference on Development and Learning*.

Prather, R. W. (2007). Implicit learning of arithmetic principles. In D. Macnamara & G. Trafton (Eds.), *Proceedings of the Twenty-Ninth Annual Conference of the Cognitive Science Society* (p. 1839*)*. Mahwah, NJ: Erlbaum.

Prather, R. W. & Alibali, M. W. (2004). Principles of arithmetic with positive and negative numbers. In K. Forbus, D. Gentner & T. Regier (Eds.), *Proceedings of the Twenty-Sixth Annual Conference of the Cognitive Science Society* (p. 1620). Mahwah, NJ: Erlbaum.

Prather, R. W. & Boroditsky, L. (2003). *Left of zero: Representations of negative numbers on the mental number line*. In R. Alterman & D. Kirsch (Eds.), *Proceedings of the Twenty-Fifth Annual Conference of the Cognitive Science Society* (p. 1394*)*. Mahwah, NJ: Erlbaum.

Davachi, L., Prather, R., & Wagner, A. D. (2002). Integration cost: Fractionating configural representations in working memory. *Abstracts of the Cognitive Neuroscience Society Meeting*, 9, 62.

Teaching Experience

Cognitive Development (UG)	Fall 2014, Spring 2015, Spring 2016, Fall 2016, Spring 2017, Spring 2018, Spring 2019
Cognitive Development (G)	Fall 2014, Fall 2017

Research Methods (G)	Spring 2018, Spring 2019
Cognitive Psychology	Fall 2012, Spring 2013

Advising Experience

2019	Josh Medrano, Matt Foley (masters)
2016 – 2018	Graduate Student Kelly Banks
Dissertation Committee	Michael Rizzo, Jeeyoung Noh, Nicole Scalise, Lauren Stringer Trakhmam
Portfolio Committee	Emily Daubert, Alexander D'Esterre, Nicole Scalise
2014-2016	Graduate Assistant Sara Heverly-Fitt

Academic & Professional Service

2019	Center for Young Children, Advisory Board
2017-2019	Cognitive Neuroscience Society: Chair of equity and diversity committee
2008	*Diversity Day 2008* Moderated panel on departmental diversity issues
2006 - 2009	Climate and Diversity Committee, University of Wisconsin, Department of Psychology

National Science Foundation Grant Review Panel

Ad hoc reviewer: Developmental Psychology, Child Development, Cognition, Journal of Cognition and Development, Journal of Experimental Child Psychology, Frontiers in Developmental Psychology, School Science and Mathematics, Cognitive Science Society Conference

Membership in professional organizations

Cognitive Development Society (CDS)
Society for Research in Child Development (SRCD)
Cognitive Science Society (CSS)
Society for Neuroscience (SfN)
Cognitive Neuroscience Society (CNS)

Departmental

Educational Psychology Colloquium Chair 2018-2019
Graduate Admissions Committee 2014, 2015, 2016
Recording Secretary 2019
Search Committee HDQM faculty search 2017
Search Committee HDQM faculty search 2019

College

College Senate Spring 2018

Campus

Campus Senate Fall 2017, Fall 2019-Spring 2021
NACS Graduate Admissions Committee 2016-19
Brain and Behavior Initiative Steering Committee

Outreach

BlackandSTEM Social Media
Language Science Center: Professional Development Workshop
Developmental Science Field Committee: Professional Development workshop
Cognitive Neuroscience Society professional development workshop

Additional Training

2013	Developmental Cognitive Neuroscience Summer institute, University of Maryland, College Park, MD
2008	Dynamic Field Theory Summer School. University of Iowa, Iowa City, Iowa.
2002	Summer Program in Neuroscience, Ethics, and Survival Skills, Marine Biological Laboratory, Woods Hole, Massachusetts