

Richard W. Prather

Department of Human Development and Quantitative Methodology
3942 Campus Drive, Suite 3304
College Park, MD 20742

Education

2009 Ph.D., Psychology (Cognitive & Cognitive Neuroscience)
University of Wisconsin-Madison

2002 S.B., Brain and Cognitive Sciences
Massachusetts Institute of Technology

Positions

2021-current Associate Professor
Department of Human Development and Quantitative Methods
Human Development Program
Neuroscience & Cognitive Science Program
University of Maryland, College Park

2014 - 2021 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. Macnamara, B., Prather, R.W., Burgoyne, A. (2023) Beliefs about success are prone to cognitive fallacies. *Nature Reviews Psychology*
2. Prather, R. W. (2023). Does spontaneous focus on relations predict conceptual knowledge of negative numbers? *Journal of Numerical Cognition*.
3. Prather, R.W. (2023) A New Path: Why we need Critical Approaches to Cognitive and Psychological Sciences. *Journal of Applied Research in Memory and Cognition*
4. Medrano J, Prather, RW. (2022) Rethinking executive functions in mathematical cognition. *Journal of Cognition and Development*. *Journal of Cognition and Development*.

5. Medrano J, Crnosija N, Prather RW and Payne-Sturges D (2022) Bridging the environment and neurodevelopment for children's health: Associations between real-time air pollutant exposures and cognitive outcomes. *Front. Psychol.* 13:933327. doi:10.3389/fpsyg.2022.933327
6. Prather, R.W., Benitez, V.L., Kendall Brooks, L. Dancy, C.L., Dilworth-Bart. J., Dutra, N.B., Faison, M.O., Figueroa, M., Holden, L.T.R., Johnson, C., Medrano, J., Miller-Cotto, D. Matthews, P.G., Manly, J.J., Thomas, A.K. (2022). What Can Cognitive Science do for people? *Cognitive Science*. 46(6), e13167.
7. Yuan, Lei, Prather, R. Mix, K., Smith, L. (2021). The first step to learning place value: A role for physical models? *Frontiers in Education: Educational Psychology*.
8. Prather, R. W. (2021) Fear Not of Cognition in Context. *Infant and Child Development*, e2249.
9. Prather, R. W. (2021). Arithmetic knowledge from spontaneous focus on relations. *Developmental Science*. 24:e13009
10. DePascale, M., Prather, R.W., & Ramani, G. (2021) Parent and child spontaneous focus on number, mathematical abilities, and mathematical talk during play activities. *Child Development*, 59.
11. Motz, B., Goldstone, R., Busey, T., Prather, R. (2021) Visual search asymmetry due to the relative magnitude represented by number symbols. *Vision*, 5, 42
12. Yuan, L., Prather, R. W., Mix, K., & Smith, L (2020). Number representations drive number-line estimates. *Child Development*, 91(4), e952-e967
13. Yuan, L., Prather, R. W., Mix, K., Smith, L (2019). Preschoolers and multi-digit numbers: A path to mathematics through the symbols themselves. *Cognition*, 189, 89-104. <https://doi.org/10.1016/j.cognition.2019.03.013>
14. Prather, R.W. (2019) Individual differences in numerical comparison is independent of numerical precision. *Journal of Numerical Cognition*, 5(2),
15. 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.
16. Prather, R.W. (2014) Neural coding variation mediates precision in numerical discrimination. *Cognition*, 133, 601 – 610.
17. 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.
18. Prather, R.W. (2012). Connecting neural coding to number cognition: A computational account. *Developmental Science*, 15(4), 589-600.

19. Prather, R.W. (2012) Implicit learning of arithmetic regularities is facilitated by proximal contrast. *PLoS ONE* 7(10): e48868.
20. 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.
21. 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.
22. 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.
23. 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.W. (2024) Cognitive Science and the Myth of the Normal Human. *PsyArXiv*. https://doi.org/10.31234/osf.io/wap29_v2

Prather, R.W. (2021) Reconstructing the Study of Human Cognition. *PsyArXiv*. <https://doi.org/10.31234/osf.io/45a2q>

Prather, R.W., Heverly-Fitt, S. (2018) Predicting Numerical Comparison using Neural Networks and Electrophysiological Data. <https://doi.org/10.31234/osf.io/2a3sn>

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

Publications (invited)

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

Awarded Funding

2024	University of Maryland
2020 - 2023	New Schools Venture Fund EF+Math Program, "Accurate, precise and useful models of the learner" (PI: Prather, R. W., Co-I: Buss, A., Co-I: Goffney, I., Co-I: O'Neal, C., Co-I: Blankson, A. N., Co-I: Davenport, J., Co-I: Walters, K. Award period: 05/01/2020 – 10/01/2023; Total costs: \$1,027,000
2019	University of Maryland Catalyst New Directions Fund. "Environmental inequalities in neurocognitive development" (Prather, R. W. (Co-PI), Payne-Sturges, D. (Co-PI); Award Period 9/01/2019 - 9/01/2021; Total Costs \$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)

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

Invited Talks

Northwestern University Cognition in Context Workshop

Who gets to be normal in cognitive science?
Johns Hopkins University

Reconstructing the Study of Human Cognition
Princeton University, Fall 2021
University of California, Merced, March 2021
University of Virginia, October 2020
University of Chicago, February 2021

University of Wisconsin-Madison, March 2021

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

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.

Selected Conference Presentations and Proceedings

Prather, R.W. (2024) Dream a little bigger: Critical approaches to cognitive development. Why Basic Cognitive Developmental Science Needs Diversity Preconference workshop keynote.

Prather, R. W. (2023) Critical approaches to studying cognition in young children. American Psychological Association.

Prather, R. W. (2022) Accurate, Precise, Equitable and Useful Models of the State of the Learner. *Society for Research in Educational Effectiveness*

Prather, et a; (2019) An asset based quantitative framework to characterize cognitive development of African-American children. Cognitive Development Society

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.

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

Teaching Experience

Graduate Research Methods	Spring 2018, Spring 2019, Spring 2020, Spring 2023
Research Methods (U)	Spring 2022, Fall 2022, Spring 2024
Cognitive Development (G)	Fall 2014, Fall 2016, Fall 2017
Cognitive Development (U)	Fall 2014, Spring 2015, Spring 2016, Fall 2016, Spring 2017, Spring 2018, Spring 2019, Spring 2020

Advising Experience

2023 – present	Graduate student Miaofan Chen
2020 – 2022	Postdoctoral Scholar Dr. Lauren Kendall-Brooks
2019 – 2023	Graduate Student Joshua Medrano
2016 – 2018	Graduate Student Kelly Banks
Dissertation Committee	Raychel Gordon, Michael Rizzo, Jeeyoung Noh, Nicole Scalise, Lauren Stringer Trakhmam, Hailey Gibbs, Alexander D'Esterre, Amanda Burkholder, Emily Daubert
Portfolio Committee	Emily Daubert
2014-2016	Graduate Assistant Sara Heverly-Fitt

Academic & Professional Service

Editorial Board Journal of Experimental Psychology: General, Infant and Child Development, Journal of Numerical Cognition, Journal of Cognition and Development

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,

2017 Cognitive Neuroscience Society: 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