

Kristin Eileen Grunewald Sanders

390 Corbett Hall, Notre Dame, IN 46556
ksande22@nd.edu

Education

PhD in Psychology, Brain Behavior and Cognition 2019

Northwestern University, Evanston, IL

Dissertation: “How “sleeping on it” works: The cognitive mechanisms and neural signatures of sleep-facilitated problem solving”

MS in Psychology, Brain Behavior and Cognition 2015

Northwestern University, Evanston, IL

Masters’ Thesis: “The impact of feedback on intuition in problem solving”

BS in Psychology, Minor in French Studies 2010

University of Maryland, College Park, MD

Honors Thesis: “The role of lexical-semantic inhibition in intuitive coherence judgments”

Grants and Funding

2019-2020 Northwestern University Graduate Research Grant

“Neural correlates of cueing-facilitated problem solving during sleep”

Principal Investigator

\$2,360

2015-2019 National Institutes of Health, National Institute of Child Health and Human Development

“Targeted problem reactivation and incubation during slow-wave sleep”

Co-author (PI: Mark Beeman and CoI: Ken Paller)

Direct Costs: \$100,000

2015-2016 Northwestern University Advanced Cognitive Science Fellowship

“Sleep Facilitation of Problem Solving”

Principal Investigator

Full tuition and stipend, travel funds

Research Experience

Postdoctoral Researcher, 2020-present

University of Notre Dame, Dr. Jessica Payne

- Designing experiments at the intersection of sleep, memory, and problem solving

Graduate Student, 2013-2019

Northwestern University, Dr. Mark Beeman

- Developed, conducted, and analyzed an overnight, laboratory, EEG study to understand the neural mechanisms of the impact of memory reactivation during sleep on problem solving.
- Designed and executed a program of research demonstrating that memory reactivation of unsolved problems during sleep facilitates problem solving the following morning.
- Developed a series of experiments and stimuli demonstrating the persistence and characteristics of long-term memory for visual and complex verbal problems solved with an Aha! experience.

- Designed and executed an experiment exploring the relationship between intuitive solvability judgments and insight solutions in problem solving.
- Designed and executed a series of experiments examining semantic priming and the impact of explicit feedback on intuitive solvability judgments in problem solving.
- Collaborated with lab members to implement and analyze an fMRI study investigating the relationship between attentional control and insight problem solving.

Research Assistant, 2015-2018

Northwestern University, Dr. Richard Zinbarg

- Contributed to the analysis of a multi-site study examining the impact and specificity of language intervention on language recovery after stroke including behavioral, resting state, and perfusion analyses.
- Utilized mixed-effects linear regression to analyze a large neuroimaging data set by interfacing with a high performance computing cluster.
- Collaborated across multiple teams at different universities.

Faculty Research Assistant, 2011-2013

Center for Advanced Study of Language

Divergent Thinking in Language Analysis, Dr. Henk Haarmann

- Implemented and analyzed a research study on how motivational state and executive control fatigue impact creative idea generation.
- Contributed to the implementation and analysis of two studies examining the effects of alpha brainwave entrainment and bilateral muscle contraction on creative idea generation through the use of EEG spectral analysis.

Faculty Research Assistant, 2011-2013

Center for Advanced Study of Language

Measuring Language and Analysis, Dr. Petra Bradley

- Analyzed and reported data in a technical report examining the adoption of new technology in an organization and its impact on workflow.
- Led meetings and contributed to the design of an empirical research study to examine the impact of information availability on information search strategies.
- Helped create a catalog of current and potential metrics that could be used to measure analytic tasks, processes, and products.

Faculty Research Assistant, 2010

Center for Advanced Study of Language

Neuroimaging Distorted Language, Dr. Joseph Dien

- Utilized fNIRS, EEG, and fMRI to understand how distorted text and audio are processed in the brain.

Psychology Honors Thesis, 2009-2010

University of Maryland, College Park, Dr. Henk Haarmann

- Designed, conducted, and analyzed a study examining the association between intuition in creative problem solving and latent semantic inhibition.

Undergraduate Research Assistant, 2008-2009

Center for Advanced Study of Language

Divergent Thinking in Language Analysis, Dr. Henk Haarmann

- Contributed to the design, implementation, and analysis of an EEG study that investigated the ability to increase alpha brainwave activity through neurofeedback.

Honors Humanities Independent Research 2007-2008

University of Maryland, College Park

Dr. Patrick Grzanka

- Researched, produced, and presented a creative project that satirized and examined issues related to internet psychology and subcultures.

Undergraduate Research Assistant, 2007

University of Maryland, College Park

Aphasia Research Center, Dr. Yasmeen Shah

- Prepared behavioral and MEG data for analysis from linguistic study of agrammatic aphasia.

Publications

Sanders, K. E. G., Osburn, S., Paller, K. A., Beeman, M. (2019). Targeted memory reactivation during sleep improves next-day problem solving. *Psychological Science*. 30(11), 1616–1624. doi:10.1177/0956797619873344

Bowden, E. M. & **Grunewald, K.** (2018). Whose insight is it anyway? In F. Vallée-Tourangeau (Ed.), *Insight On the Origin of New Ideas: Current Issues in Thinking and Reasoning*. Psychology Press.

Grunewald, K. & Beeman, M. (2018). Insight. In M. Bornstein, M.E. Arterberry, K.L. Fingerman, & J.E. Lansford (Eds.), *The SAGE Encyclopedia of Lifespan Human Development*. New York: Sage.

Thompson, C. K., Walenski, M., Chen, Y., Caplan, D., Kiran, S., Rapp, B., **Grunewald, K.**, Nunez, M., Zinbarg, R., & Parrish, T. B. (2017). Intrahemispheric perfusion in chronic stroke-induced aphasia. *Neural Plasticity*, 2017, e2361691. doi:10.1155/2017/2361691

O'Rourke, P., Haarmann, H. J., George, T., Smaliy, A., **Grunewald, K.**, & Dien, J. (2015). Hemispheric alpha asymmetry and self-rated originality of ideas. *Laterality: Asymmetries of Body, Brain and Cognition*, 20(6), 685-698. doi:10.1080/1357650X.2015.1037309

Haarmann, H. J., O'Rourke, P., George, T., Smaliy, A., **Grunewald, K.**, & Dien, J. (2013). Neural oscillatory signature of original problem solving. In D. D. Schmorow & C. M. Fidopiastis (Eds.), *Foundations of Augmented Cognition: 7th International Conference, AC 2013, Held as Part of HCI International 2013, Las Vegas, NV, USA, July 21-26, 2013. Proceedings* (pp. 308–315). Berlin, Heidelberg: Springer Berlin Heidelberg. doi:10.1007/978-3-642-39454-6_32

Posters & Presentations

- Sanders, K. E. G.,** Dastrup, K. R. H., Patterson, L., Ghosh, A., Paller, K. A., Beeman, M. (2019, March). *Facilitating problem solving with targeted memory reactivation during in-lab overnight sleep.* Poster presented at the 27th Annual Cognitive Neuroscience Society Meeting, Boston, MA.
- Grunewald, K.,** Riley, K., McCullough, S., Paller, K. A., Beeman, M. (2019, November). *Targeted problem reactivation during sleep impacts memory for the problem solution one week later.* Poster presented at the 60th Annual meeting of the Psychonomic Society, Montréal, Canada.
- Dastrup, K., **Grunewald, K.,** Krause, C., Paller, K., Beeman, M. (2019, May). *The relationship between schizotypal personality traits, sleep, and problem solving.* Poster presented at the 31st Association for Psychological Science Annual Convention, Washington, D.C.
- Patterson, L., **Grunewald, K.,** Paller, K., Beeman, M. (2019, April). *The role of mood states in sleep-facilitated problem-solving.* Poster presented at the 91st Annual meeting of the Midwestern Psychological Association, Chicago, IL.
- Grunewald, K.** (2019, March). *Cueing creative problem solving during sleep: Links to restructuring.* Research presented at the 5th Annual Meeting of the Society for the Neuroscience of Creativity, San Francisco, CA.
- Grunewald, K.,** Paller, K. A., Beeman, M. (2018, November). *Cueing problems during sleep to enhance solving and test mechanisms.* Poster presented at the 59th Annual meeting of the Psychonomic Society, New Orleans, LA.
- Dickerson, N., Wiley, R., Higgins, J. P., **Grunewald, K.,** Caplan, D., Kiran, S., Parrish, T., Zinbarg, R., Thompson, C. K., Rapp, B. (2018, October). *Is resting state fMRI activity sensitive to the severity of acquired language impairments?* Poster presented at the 56th Annual Academy of Aphasia Meeting, Montreal, Canada.
- Grunewald, K.,** Osburn, S., Paller, K. A., Beeman, M. (2018, March). *The role of sleep in memory and problem solving.* Poster presented at the 25th Annual Cognitive Neuroscience Society Meeting, Boston, MA.
- Grunewald, K.,** Osburn, S., Paller, K. A., Beeman, M. (2018, March). *The role of sleep in memory and problem solving.* Poster presented at the 4th Annual Meeting of the Society for the Neuroscience of Creativity, Boston, MA.
- Grunewald, K.,** Saporta, A., Beeman, M. (2017, November). *The impact of the insight experience on memory.* Poster presented at the 58th Annual meeting of the Psychonomic Society, Vancouver, Canada.
- Grunewald, K.** (2017, June). *Enhancing problem solving with targeted memory reactivation during sleep.* Research presented at Cognitive Brain Mapping Group Annual Data Blitz, Evanston, IL.
- Grunewald, K.** (2017, May). *What solutions may come: Enhancing problem solving by targeted memory reactivation during sleep.* Research presented at Cognitive Brain Mapping Group Weekly Meeting, Evanston, IL.
- Grunewald, K.,** Osburn, S., George, K., Paller, K., & Beeman, M. (2017, March). *Sleep on it – The impact of problem reactivation during sleep on problem solving.* Poster presented at the 24th Annual Cognitive Neuroscience Society Meeting, San Francisco, CA.
- Grunewald, K.** & Nothelfer, C. (2017, January). *Excel Tips and Tricks.* Presentation and Tutorial presented as part of the Advancement of Research Expertise Series, Evanston, IL.
- Grunewald, K.** (2016, May). *How does sleep facilitate problem solving?* Research presented at CogSci Fest 2016, Evanston, IL.
- Grunewald, K.** (2016, May). *Intuition in Problem Solving: Relationships between Sensitivity and Solution Retrieval.* Poster presented at the 28th Association for Psychological Science Annual Convention, Chicago, IL.
- Grunewald, K.,** Beeman, M. (2015, November). *The Role of Feedback in Intuition.* Poster presented at the 56th Annual meeting of the Psychonomics Society, Chicago, IL.

- Grunewald, K.** & Nothelfer, C. (2015, March). *Excel Tips and Tricks*. Presentation and Tutorial presented as part of the Advancement of Research Expertise Series, Evanston, IL.
- Grunewald, K.**, Beeman, M. (2014, November). *Mechanisms of intuition*. Poster presented at the 55th Annual meeting of the Psychonomics Society, Long Beach, CA.
- George, T., Haarmann H., **Grunewald, K.**, Dien, J., O'Rourke, P. (2013, April). *Beyond alpha: the beta bands index originality during divergent thinking*. Poster presented at the 20th Annual Meeting of the Cognitive Neuroscience Society, San Francisco, CA
- Haarmann, H., O'Rourke P., George, T., Smaliy, A. **Grunewald, K.**, Dien, J. (2013, July). *Neural Oscillatory Signature of Original Problem Solving*. Paper presentation, 15th annual meeting of the International Conference on Human-Computer Interaction, Las Vegas, NV.
- Blok, S. V., **Grunewald, K. E.**, Freynik, S., Novick, J. M., Haarmann, H. J. (2012, November). *Creative Ideation Under Pressure*. Poster presented at the 53rd Annual Meeting of the Psychonomics Society, Minneapolis, MN.
- O'Rourke, P., Haarmann, H., George, T., **Grunewald, K.**, Smaliy, A., & Dien, J. (2012, March). *Verbal Creativity and Alpha: A brainwave entrainment study*. Poster presented at the 19th annual meeting of the Cognitive Neuroscience Society, Chicago, IL.
- Grunewald, K.**, O'Rourke, P., George, T., Smaliy, A., Cook, J., Haarmann, H. (2011, September). *Neural Signatures of Verbal Creativity*. Poster session presented at Language Science Day, College Park, MD.
- Grunewald, K.**, Novick, J., & Haarmann, H.J. (2010, November). *Activation dynamics of creative intuition*. Paper presented at the 51st Annual Meeting of the Psychonomics Society, St. Louis, MO.
- Haarmann, H. J., George, T. G., Smaliy, A., **Grunewald, K.**, & Novick, J. M. (2009, March). *Alpha neurofeedback training and its implications for studies of cognitive creativity*. Poster presented at the 16th annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
- Grunewald, K.** (2008, April). *Wonderland.com: Reimagining Lewis Carroll through the looking glass of identity and cybercultures*. Panel presented at the POPsmARTs Undergraduate Research Symposium, College Park, MD.

Technical Reports

- Haarmann, H. J., O'Rourke, P., Dien, J., George, T. G., & **Grunewald, K. E.** (2012). *The effect of unilateral muscle contractions on divergent thinking* (TTO 3503 Technical Report). College Park, MD: University of Maryland Center for Advanced Study of Language.
- Haarmann, H. J., George, T. G., Berens, M. S., **Grunewald, K. E.**, & Freynik, S. (2012). *The efficacy of a divergent thinking course for analysts: Findings reveal greater flexibility and originality of solutions* (TTO 7001-3503 Technical Report). College Park, MD: University of Maryland Center for Advanced Study of Language.
- Bradley, P., Saner, L., Michael, E., Harbison, J. I., Burns, W., Castle, S., **Grunewald, K.** (2012). *Time on task: A snapshot of language and intelligence analysts' time spent on their non-primary work tasks* (TTO 3451 Technical Report 1.2). College Park, MD: University of Maryland Center for Advanced Study of Language.
- Bradley, P., Saner, L., Castle, S., **Grunewald, K.**, Michael, E., Bloomfield, A., Harbison, J. I., Wayland, S., Burns, W., Goodman, S., Falk, M. (2012). *Metrics for analysis: A collection of metrics developed and collected for STC3 and the larger Intelligence Community*. (TTO 3451 Technical Report 1.3). College Park, MD: University of Maryland Center for Advanced Study of Language.

- Haarmann, H. J., Berens, M. S., O'Rourke, P., Blok, S. V., Smaliy, S., George, T. G., **Grunewald, K. E.**, Cook, J., Dien, J., & Freynik, S. (2011). *Improving assessment of analyst-relevant divergent thinking: Test validation, automated scoring, and brain signature* (TTO 3503 Technical Report). College Park, MD: University of Maryland Center for Advanced Study of Language.
- Bloomfield, A., Harbison, J. I., Michael, E., Bradley, P., Burns, W., **Grunewald, K.**, Castle, S., Saner, L., Blake, C., Blodgett, A. (2011). *Metrics for analysis: A catalog of source material, task, process, and product metrics* (TTO 3451 Technical Report). College Park, MD: University of Maryland Center for Advanced Study of Language.
- Haarmann, H. J., George, T. G., Smaliy, A., **Grunewald, K.**, & Novick, J. (2008). *A method for quickly increasing alpha brain waves through neurofeedback: Implications for divergent thinking and creative problem solving* (TTO 3502 Technical Report E.3.2). College Park, MD: University of Maryland Center for Advanced Study of Language.

Skills/Training

- Programming Languages: R, Matlab
- Experiment Design: E-Prime/E-Basic, Matlab, Presentation, Superlab
- Statistics software: R, SPSS
- Neuroimaging:
 - EEG: multi-sensor application, EEGLab, Sleep staging
 - fMRI: SPM, AFNI, 3 fMRI methodology courses
- Neuroanatomy: Advanced neuroanatomy with brain dissection lab

Teaching and Mentoring Experience

- **Discussion/Lab Section Leader**
 - Spring 2017, Research Methods, Dr. Greg Miller
 - Prepared and taught a 2-hour lab section of 23 students
 - Fall 2015, Developmental Psychology, Dr. Sara Broaders
 - Prepared and led a weekly discussion section of 25 students
 - Fall 2014, Developmental Psychology, Dr. Sara Broaders
 - Prepared and led a weekly discussion section of 20 students
- **Teaching Assistant**
 - Spring 2019, Research Methods, Dr. Paul Reber
 - Fall 2016, Introduction to Neuroscience, Dr. Eric Gobel
 - Fall 2015, Developmental Psychology, Dr. Sara Broaders
 - Spring 2015, Research Methods, Dr. Ginger Pennington
 - Fall 2014, Developmental Psychology, Dr. Sara Broaders
 - Spring 2014, Personality Psychology, Dr. Robin Nusslock
 - Winter 2014, Introduction to Psychology, Dr. Renee Engeln
- **Undergraduate Mentoring**
 - Summer 2019 – co-mentored an Undergraduate Research Grant summer project on the benefit of exercise during problem incubation.
 - Spring 2019 – supervised an undergraduate research assistant's individual analysis on the relation between mood, sleep, and problem solving.

- Summer 2018 – co-mentored a Bioscientist program student’s summer project on the relation between mood, attention, and problem solving.
- Summer 2017 – mentored a Summer Research Opportunity Program student’s project on the relation between schizotypal personality traits, creative problem solving, and sleep.

Service

- **Academic**
 - Search committee member for two Diversity Science faculty positions at Northwestern University (2015-2016)
 - Organizer for Northwestern Prospective Student Weekend (2015)
 - Panel member for panel on graduate student experience (Sneak Peek, 2014)
 - Search committee member for an fMRI researcher position at CASL (2012-2013)
- **Community**
 - Science Fair Judge (2015, 2017)
 - Kits for Kats volunteer teaching middle school students basic programming skills (2014)
 - Group leader for a neuroscience outreach day (Brain Fair, 2014)
 - ESL volunteer teacher (2011-2012)

Awards and Honors

- Walter Dill Scott Scholarship (2018)
- Phi Beta Kappa (2010)
- Cum laude (2010)
- Honors Psychology Citation (2010)
- University of Pennsylvania Cognitive Neuroscience Workshop (2009)
- Honors Humanities Citation (2008)
- University of Maryland President’s Scholarship for Out-of-State Students (2006-2008)

Professional Organizations

- Cognitive Neuroscience Society
- Society for the Neuroscience of Creativity
- Psychonomic Society
- Association for Psychological Science

References

Dr. Mark Beeman, Northwestern University, mbeeman@northwestern.edu

Dr. Ken Paller, Northwestern University, kap@northwestern.edu