

## HILLARY SCHWARB, PH.D.

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### EDUCATION

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PhD	Georgia Institute of Technology, Atlanta, GA	2012 Psychology
MS	Georgia Institute of Technology, Atlanta, GA	2008 Psychology
BA	University of Notre Dame, Notre Dame, IN	2005 Psychology
BA	University of Notre Dame, Notre Dame, IN	2005 French Literature

### PROFESSIONAL EXPERIENCE

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2019-Present	Research Scientist, Biomedical Imaging Center, Interdisciplinary Health Sciences Institute, University of Illinois
2017-2019	Visiting Research Scientist, Biomedical Imaging Center, Interdisciplinary Health Sciences Institute, University of Illinois
2014-Present	Instructor, Department of Psychology, University of Illinois
2012-2017	Post-doctoral research associate, advised by Dr. Neal J. Cohen, University of Illinois
2005-2012	Graduate Student, Advisor: Dr. Eric H. Schumacher, Georgia Institute of Technology
2004-2005	Undergraduate Research Assistant, Advisor: Dr. Robert L. West, University of Notre Dame
2004-2005	Undergraduate Research Assistant, Advisor: Dr. Bradley S. Gibson, University of Notre Dame

### GRANTS

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#### Awarded

1R03AG065894-01A1

National Institutes of Health (NIA)

#### **Viscoelastic and volumetric contributions to age-related cognitive decline**

This project investigates differential contributions of regional volume and viscoelasticity (as measured with magnetic resonance elastography) to cognitive abilities and structural brain health in older adults.

11/17/2020 - 11/16/2022

\$50,000 (direct/year)

Role: PI

1R01NS110661-01A1

National Institutes of Health (NINDS)

#### **Relational Memory as a Model of Behavioral (Dys)Function in Adults with Traumatic Brain Injury**

This project seeks to characterize the role of the hippocampus in traumatic brain injury.

3/15/2020-2/28/2025

\$482,295 (Direct/year)

Role: co-PI (PI: Duff)

1R01AG058853

National Institutes of Health (NIA)

### **Mechanical integrity of memory systems in mild cognitive impairment**

The major goals of this project are to measure the mechanical properties of the brain in older adults, determine the relationships of these properties with memory function, and investigate how both structure and function are modified by fitness and exercise.

04/01/2018 - 03/31/2023

\$325,392 (direct/year)

Role: Co-I (PI: Johnson)

### **Pending**

1R21EB031337 (scored: 17%; resubmitted November 2021)

National Institutes of Health (NIMH)

### **Changes in hippocampal microstructure and hippocampal-dependent memory accompanying hormonal fluctuation in naturally cycling women**

This project investigates microstructural changes in the human hippocampus across the menstrual cycle and the relationship between hippocampal microstructure and memory performance with changes in estradiol.

4/1/2021- 3/31/2023

Role: PI

1R21NS122009-01

National Institutes of Health (NINDS)

### **Magnetic resonance elastography as a biomarker of hippocampal epilepsy progression**

This project explores the utility of magnetic resonance imaging for both diagnosing and tracking the progression of temporal lobe epilepsy and mesial temporal sclerosis.

4/1/2021- 3/31/2024

Role: Co-I (PI: Huesmann)

### **Completed**

National Multiple Sclerosis Society, IL-1503-03395

Evaluating Subcortical Degeneration with MR Elastography and its Relation to Cognition and Aerobic Fitness in Multiple Sclerosis

This project used magnetic resonance elastography to evaluate the degeneration of subcortical structures in multiple sclerosis, how this degeneration affects cognitive function and is modulated by aerobic fitness.

10/1/2015 - 9/30/2016

Role: Co-I (PI: Johnson)

### **PUBLICATIONS**

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1. Dulas, M. R., **Schwarb, H.**, Cannavale, C. N., & Cohen, N. J. (2021). Should context hold a special place in hippocampal memory? *Psychology of Learning & Motivation*.
2. Delgorio, P. L., Hiscox, L. V., Daugherty, A. M., Sanjana, F., Pohlig, R. T., Ellison, J. M., Martens, C.R., **Schwarb, H.**, McGarry, M.D.J., & Johnson, C. L. (2021). Effect of Aging on the Viscoelastic Properties of Hippocampal Subfields Assessed with High-Resolution MR Elastography. *Cerebral Cortex*, 31(6), 2799-2811.
3. Steinert, S.W., Daugherty, A.M., Shankar, S., **Schwarb, H.**, Cerjanic, A., Sutton, B.P., & Arble, E.P. (2021). A performance-based measure of emotion response control: A preliminary MRI study, *Scandinavian Journal of Psychology*, 62(3), 321-327.
4. Hiscox, L.V., **Schwarb, H.**, McGarry, M.D.J., & Johnson, C.L. (2021). Aging brain mechanics: Progress and promise of magnetic resonance elastography. *NeuroImage*, 117889.

5. Hiscox, L. V., McGarry, M. D., **Schwarb, H.**, Van Houten, E. E., Pohlig, R. T., Roberts, N., ... & Johnson, C. L. (2020). Standard-space atlas of the viscoelastic properties of the human brain. *Human brain mapping*, 41(18), 5282-5300.
6. Pindus, D.M., Zwilling, C.E., Jarrett, J.S., Talukdar, T., **Schwarb, H.**, Cohen, N.J., Barbey, A.K., Kramer, A.F., & Hillman, C.H. (2020). Opposing associations between sedentary time and decision-making competence in young adults revealed by functional connectivity in the dorsal attention network. *Scientific reports*, 10(1), 1-15.
7. Hiscox, L. V., Johnson, C. L., McGarry, M. D., **Schwarb, H.**, van Beek, E. J., Roberts, N., & Starr, J. M. (2020). Hippocampal viscoelasticity and episodic memory performance in healthy older adults examined with magnetic resonance elastography. *Brain imaging and behavior*, 14(1), 175-185.
8. Huesmann, G. R., **Schwarb, H.**, Smith, D. R., Pohlig, R. T., Anderson, A. T., McGarry, M. D., ... & Johnson, C. L. (2020). Hippocampal stiffness in mesial temporal lobe epilepsy measured with MR elastography: Preliminary comparison with healthy participants. *NeuroImage: Clinical*, 102313.
9. Daugherty, A. M., **Schwarb, H.**, McGarry, M. D., Johnson, C. L., & Cohen, N. J. (2020). Magnetic Resonance Elastography of Human Hippocampal Subfields: CA3-Dentate Gyrus Viscoelasticity Predicts Relational Memory Accuracy. *Journal of Cognitive Neuroscience*, 32(9), 1704-1713..
10. Rigon, A., **Schwarb, H.**, Klooster, N., Cohen, N. J., & Duff, M. C. (2020). Spatial relational memory in individuals with traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology*, 42(1), 14-27.
11. **Schwarb, H.**, Johnson, C. L., Dulas, M. R., McGarry, M. D., Holtrop, J. L., Watson, P. D., ... & Cohen, N. J. (2019). Structural and functional MRI evidence for distinct medial temporal and prefrontal roles in context-dependent relational memory. *Journal of cognitive neuroscience*, 31(12), 1857-1872.
12. McIlvain, G., **Schwarb, H.**, Cohen, N.J., Telzer, E.H., Johnson, C.L. (2018). Mechanical Properties of the In Vivo Adolescent Human Brain. *Developmental Cognitive Neuroscience*, 34, 27-33.
13. Horecka, K. M., Dulas, M. R., **Schwarb, H.** Lucas, H. D., Duff, M., & Cohen, N. J. (2018). Reconstructing relational information. *Hippocampus*, 28(2), 164-177.
14. Johnson, C. L.\*, **Schwarb, H.\***, Horecka, K.M., McGarry, M.D.J., Hillman, C.H., Kramer, A.F., Cohen, N.J., & Barbey, A.K. (2018). Double dissociation of structure-function relationships in memory and fluid intelligence observed with magnetic resonance elastography. *NeuroImage*, 171, 99-106. \*denotes equal contribution
15. Rubin, R.D., **Schwarb, H.**, Lucas, H.D., Dulas, M.R., Cohen, N.J. (2017). Dynamic Hippocampal and Prefrontal Contributions to Memory Processes and Representations Blur the Boundaries of Traditional Cognitive Domains. *Brain Sciences*, 7(7), 82.
16. **Schwarb, H.**, Johnson, C.L., Daugherty, A.M., Hillman, C.H., Kramer, A.F., Cohen, N.J., & Barbey, A.K. (2017). Aerobic fitness, hippocampal viscoelasticity, and relational memory. *Neuroimage*, 153, 179-188.
17. Johnson, C.J., **Schwarb, H.**, McGarry, M.D.J., Anderson, A.T., Huesmann, G.R., Sutton, B.P., & Cohen, N.J. (2016). Viscoelasticity of subcortical gray matter structures. *Human Brain Mapping*, 37(12), 4221-4233.
18. **Schwarb, H.\***, Johnson, C.J.\*, McGarry, M.D.J., & Cohen, N.J. (2016). Hippocampal viscoelasticity and relational memory performance. *Neuroimage*, 132, 534-541. \*denotes equal contribution
19. **Schwarb, H.**, Watson, P.D., Campbell, K., Shander, C.L., Monti, J.M., Cooke, G.E., Wang, J.X., Kramer, A.F., Cohen,

- N.J., (2015). Competition and cooperation among relational memory representations. *PLoS ONE*, *10*(11), e0143832.
20. **Schwarb, H.**, Nail, J., & Schumacher, E.H. (2015). Working memory training improves visual short-term memory capacity. *Psychological Research*, *80*(1), 128-148.
  21. Magnuson, M.E., Thompson, G.J., **Schwarb, H.**, Pan, W.-J., McKinley, R.A., Schumacher, E.H., & Keilholz, S. (2015). Errors on interrupter tasks presented during spatial and verbal working memory performance are linearly linked to large-scale functional network connectivity in high temporal resolution resting state fMRI. *Brain Imaging and Behavior*.
  22. Thompson, G.J., Magnuson, M.E., Merritt, M.D., **Schwarb, H.**, Pan, W.-J., McKinley, R.A., Tripp, L.D., Schumacher, E.H., & Keilholz, S.D. (2013). Short time windows of correlation between large scale functional brain networks predict vigilance intra-individually and inter-individually. *Human Brain Mapping*, *34*(12), 3280-3298.
  23. **Schwarb, H.** & Schumacher, E.H. (2012). Generalized lessons about sequence learning from the study of the serial reaction time task. *Advances in Cognitive Psychology*, *8*(2), 165-178.
  24. Schumacher, E.H., **Schwarb, H.**, Lightman, E., & Hazeltine, E. (2011). Investigating the modality specificity of response selection using a temporal flanker task. *Psychological Research*, *75*(6), 1898-1914.
  25. Hazeltine, E., Lightman, E., **Schwarb, H.**, & Schumacher, E.H. (2011). The boundaries of sequential modulations: Evidence for set-level control. *Journal of Experimental Psychology: Human Perception and Performance*, *37*(6), 1898-1914.
  26. Majeed, W., Magnuson, M., **Schwarb, H.**, Hasenkamp, W., Schumacher, E.H., Barsalou, L. & Keilholz, S.D. (2011). Spatiotemporal dynamics of low frequency BOLD fluctuations in rats and humans. *NeuroImage*, *54*(2), 1140-1150.
  27. **Schwarb, H.** & Schumacher, E.H. (2010). Implicit spatial sequence learning is represented by stimulus-response rules. *Memory & Cognition*, *38*(6), 677-688.
  28. Schumacher, E.H., Seymour, T.L., & **Schwarb, H.** (2010). Brain activation evidence for response conflict in the exclude recognition task. *Brain Research*, *1329*, 113-123.
  29. West, R., **Schwarb, H.**, & Johnson, B.N. (2010). The influence of age and individual differences in executive function and psychological well being on the neural correlates of target processing. *Cortex*, *46*, 550-563.
  30. Schumacher, E.H. & **Schwarb, H.** (2009). Parallel response selection disrupts sequence learning under dual-task conditions. *Journal of Experimental Psychology: General*, *138*, 270-290.
  31. **Schwarb, H.** & Schumacher, E.H. (2009). Neural evidence of a role for spatial response selection in the learning of spatial sequences. *Brain Research*, *1247*, 114-125.
  32. West, R. & **Schwarb, H.** (2006). The influence of aging and frontal status on the neural correlates of regulative and evaluative aspects of cognitive control. *Neuropsychology*, *20*(4), 468-481.

#### POSTER PRESENTATIONS

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1. Delgorio, P.L., Hiscox, L.V., **Schwarb, H.**, & Johnson, C.L. (October, 2020). *Mechanical properties of the human hippocampus: Sexual dimorphism in normal aging*. Poster presented at the annual meeting of the Biomedical Engineering Society, held virtually.

2. **Schwarb, H.**, Delgorio, P.L., Daugherty, A.M., McGarry, M.D.J, Cohen, N.J., & Johnson, C.L. (May, 2020). *MR elastography measures of hippocampal subfield viscoelasticity are related to relational memory outcomes across the lifespan*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, held virtually.
3. Dulas, M.R., **Schwarb, H.**, & Cohen, N.J. (October, 2019). *Memory guided preferential viewing behavior spans context changes*. Poster presented at the annual meeting of the Society for Neuroscience, Chicago, IL.
4. Pindus, D.M., Zwilling, C.E., Jarrett, J.S., Talukdar, T., **Schwarb, H.**, Hillman, C.H., Cohen, N.J., Kramer, A.F., & Barbey, A.K. (October, 2019). *Accelerometer-measured physical activity is positively related to functional connectivity of the dorsal attention network in young adults*. Poster presented at the annual meeting of the Society for Neuroscience, Chicago, IL.
5. Delgorio, P.L., Hiscox, L.V., Sanjana, F., Daugherty, A.M., McGarry, M.D.J., **Schwarb, H.**, Martens, C.R., & Johnson, C.L. (October, 2019). *Healthy aging and stiffness of the brain, hippocampus, and hippocampal subfields*. Poster presented at the annual meeting of the Society for Neuroscience, Chicago, IL.
6. Pindus, D. M., Zwilling, C., Jarret, J., **Schwarb, H.**, Hillman, C. H., Cohen, N. J., ... & Barbey, A. K. (May, 2019). *Accelerometer-Measured Sustained MVPA Is Related to Higher Decision-Making Competence Among Young Adults*. Poster presented at the annual meeting of *Medicine & Science in Sports & Exercise*, 51(6), 474-475.
7. Delgorio, P.L., Hiscox, L., Faria, S., Villermaux, G., McGarry M.D.J., **Schwarb, H.**, Martens, C.R., & Johnson, C.L. (October, 2019). *Viscoelastic properties of the hippocampal subfields in the aging brain*. Poster presented at the annual meeting of the Biomedical Engineering Society, Philadelphia, PA.
8. Kramer, M., Anderson, A.T., Cerjanic, A., **Schwarb, H.**, & Sutton, B.P. (October, 2019). *Evaluating dependence of mechanical properties of human brain tissue on vasodilation using magnetic resonance elastography*. Poster presented at the annual meeting of the Biomedical Engineering Society, Philadelphia, PA.
9. Magoon, E., McIlvain, G., Delgorio, P.L., **Schwarb, H.**, Johnson, C.L. (October, 2019). *Evidence of specialization of hippocampal subfield viscoelasticity and domains of memory performance*. Poster presented at the annual meeting of the Biomedical Engineering Society, Philadelphia, PA.
10. **Schwarb, H.**, Johnson, C.L., Dulas, M.R., Sutton, B.P., Voss, J.L., & Cohen, N.J. (March, 2019). *Structural and functional MRI evidence for distinct medial temporal and prefrontal roles in context-dependent relational memory*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
11. Lara-Cinisomo, S., Akinbode, T., Larsen, R., Sutton, B.P., & **Schwarb, H.** (March, 2019). *The feasibility of assessing pain perception in women with and without postpartum depression using fMRI*. Poster presented at the annual meeting of the International Association for Women's mental Health, Paris, France.
12. Rigon, A., **Schwarb, H.**, Klooster, N., Cohen, N.J., & Duff, M.C. (March, 2019). *Spatial relational memory in individuals with traumatic brain injury*. Poster presented at the International Brain Injury Association annual meeting, Toronto, ON.
13. Dulas, M.R., **Schwarb, H.**, Covington, N.V., Cohen, N.J., & Duff, M.C. (March, 2019). *Traumatic brain injury impairs both spatial and temporal relational memory*. Poster presented at the International Brain Injury Association annual meeting, Toronto, ON.
14. Hiscox, L.V., Sharma, S., **Schwarb, H.**, McGarry, M.D.J., Johnsons, C.L. (June, 2019). *Mechanical properties of the human brain: Development of an MR elastography template*. Poster presented at the Human Brain Mapping annual

meeting, Rome, Italy.

15. Hiscox, L.V., Johnson, C.L., McGarry, M.D.J., **Schwarb, H.**, van Beek, E.J.R., Roberts, N., & Starr, J.M. (June, 2018). *Hemispheric specialization of hippocampal viscoelasticity for memory performance in healthy older adults*. Poster presented at the International Society for Magnetic Resonance in Medicine annual meeting, Paris, France.
16. **Schwarb, H.**, Johnson, C.J., Sutton, B.P., Wszalek, T.M., Huesmann, G.R. (March, 2018). *Mesial temporal lobe epilepsy is characterized by hippocampal stiffness alterations and relational memory deficits*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, Boston, MA.
17. Smith, D.R., **Schwarb, H.**, Pohlig, R.T., Olivero, W.C., Sutton, B.P., Wszalek, T.M., Huesmann, G.R., & Johnson, C.L., (April, 2017). *Hippocampal Stiffness in Mesial Temporal Sclerosis Epilepsy Measured by MR Elastography: Initial Results*. Poster presented at the International Society for Magnetic Resonance in Medicine annual meeting, Honolulu, HI.
18. Johnson, C.L., Thompson, C.A., Sandroff, B.M., Edwards, T.A., Hubbard, E.A., Klaren, R.E., **Schwarb, H.**, Sutton, B.P., Pilutti, L.A., & Motl, R.W. (April, 2017). *Multiple Sclerosis Lesions are Softer than Surrounding White Matter: An MR Elastography Study*. Poster presented at the International Society for Magnetic Resonance in Medicine annual meeting, Honolulu, HI, April 22-27, 2017.
19. **Schwarb, H.**, Johnson, C.L., Hilman, C.H., Kramer, A.F., Cohen, N.J., & Barbey, A.K. (March, 2017). *Double dissociation of structure-function relationship between memory and fluid intelligence using magnetic resonance elastography*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
20. **Schwarb, H.**, Johnson, C.L., Daugherty, A.M., Hillman, C.H., Kramer, A.F., Cohen, N.J., & Barbey, A.K. (November, 2016). *Hippocampal viscoelasticity mediates the benefits of aerobic fitness on memory in healthy young adults*. Poster presented at the annual meeting of the Society for Neuroscience, San Diego, CA.
21. Johnson, C.L., **Schwarb, H.**, Olivero, W.C., Wszalek, T.M., & Huesmann, G.R., (April, 2016). *Magnetic Resonance Elastography of the Hippocampus in Mesial Temporal Sclerosis: Initial Results*. Poster presented at the American Academy of Neurology annual Meeting, Vancouver, British Columbia.
22. **Schwarb, H.**, Johnson, C.L., Holtrop, J.L., Wang, J.X., Watson, P.D., Voss, J.L., & Cohen, N.J. (November, 2015). *Structural and Functional Contributions to Context-Dependent Relational Memory*. Poster presented at the annual meeting of the Society for Neuroscience, Chicago, IL.
23. Johnson, C.L., **Schwarb, H.**, Yambert, R.R., & Olivero, W.C. (September, 2015). *Evidence of thalamic degeneration associated with chronic back pain prior to spinal fusion surgery*. Poster presented at the Annual Meeting of the Congress of Neurological Surgeons, New Orleans, LA.
24. Johnson, C.L., **Schwarb, H.**, McGarry, M.D.J., & Cohen, N.J. (June, 2015). *Viscoelasticity of hippocampal tissue in healthy young adults relates to memory task performance*. Poster presented at the Human Brain Mapping annual meeting, Honolulu, HI.
25. Johnson, C.L., **Schwarb, H.**, McGarry, M.D.J., Sutton, B.P., Cohen, N.J. (May, 2015). *Viscoelasticity of Subcortical Gray Matter Structures*. Poster presented at the International Society for Magnetic Resonance in Medicine annual meeting, Toronto, ON. **[summa cum laude award]**
26. **Schwarb, H.**, Johnson, C.L., McGarry, M.D.J., & Cohen, N.J. (March, 2015). *The relationship between hippocampal viscoelasticity and relational memory performance in healthy young adults: A magnetic resonance elastography study*. Poster presented at the Cognitive Neuroscience Society annual meeting, San Francisco, CA.

27. Johnson, C.L., **Schwarb, H.**, McGarry, M.D.J., & Cohen, N.J. (November, 2014). *High-Resolution Elastography of the Hippocampus Relates to Memory Performance*. Poster presented at the Brain Grand Challenges Conference, Washington, DC. [young investigator award]
28. **Schwarb, H.**, Watson, P.M., Shander, C., Monti, J.M., Cooke, G.E., Kramer, A.F., & Cohen, N.J (April, 2014). *Hippocampal integrity influences relational, but not rule-driven memory in older adults*. Poster accepted to the annual meeting of the Cognitive Neuroscience Society, Boston, MA.
29. Watson, P.M., **Schwarb, H.**, Shander, C., Monti, J.M., Cooke, G.E., Kramer, A.F., & Cohen, N.J (April, 2014). *Striatal integrity influences rule-driven, but not relational memory in older adults*. Poster accepted to the annual meeting of the Cognitive Neuroscience Society, Boston, MA.
30. **Schwarb, H.**, Watson, P.M., Campbell, K., Wang, J.X., Voss, J.L., & Cohen, N.J (November, 2013). *Competing representations in context-guided relational memory: An eye tracking study*. Poster presented at the annual meeting of the Society for Neuroscience, San Diego, CA.
31. Gross, E. Z., **Schwarb, H.**, Ryals, A. J., Rogers, L.M., Dokucu, M., Cohen, N.J, Voss, J.L. (November, 2013). *Distinct prefrontal contributions to context-dependent association learning identified using theta-burst repetitive TMS*. Poster presented at the annual meeting of the Society for Neuroscience, San Diego, CA.
32. Watson, P.M., Wang, J. X., **Schwarb, H.**, & Cohen, N.J (April, 2013). *Event reconstruction reveals relational representations that do not overlap with the semantic information present in the experiment*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
33. **Schwarb, H.**, Keilholz, S.D., McKinley, R.A., Tripp, L., & Schumacher, E.H. (October, 2012). *Distinct neural correlates of visual working memory and resolution: An fMRI investigation*. Poster presented at the annual meeting of the Society for Neuroscience, New Orleans, LA.
34. Cookson, S.L., Nail, J., **Schwarb, H.**, Sultan, Z., McKinley, R.A., Tripp, L., Keilholz, S.D., & Schumacher, E.H. (October, 2012). *Effects of prolonged vigilance on frontal-parietal brain activity*. Poster presented at the annual meeting of the Society for Neuroscience, New Orleans, LA.
35. Roberts, B.M., Shin, J., Thompson, G., **Schwarb, H.**, Keilholz, S.D., & Schumacher, E.H. (October, 2012). *Putting names to faces: Dynamic fronto-temporal network modulations during rest support subsequent memory performance*. Poster presented at the annual meeting of the Society for Neuroscience, New Orleans, LA.
36. Grooms, J., Thompson, G.J., **Schwarb, H.**, Schumacher, E.H., Schmidt, R., Epstein, C., & Keilholz, S.D. (October, 2012). *Low frequency EEG correlates of fMRI in resting state*. Poster presented at the annual meeting of the Biomedical Engineering Society, Atlanta, GA.
37. Merritt, M.D., Thompson, G.J., Mangunson, M.E., **Schwarb, H.**, Pan, W-J, Tripp, L. D., McKinley, R.A., Schumacher, E.H., & Keilholz, S.D. (October, 2012). *BOLD signal changes in resting state networks are related to performance on a vigilance task*. Poster presented at the annual meeting of the Biomedical Engineering Society, Atlanta, GA.
38. Thompson, G.J., Magnuson, M.E., Merritt, M.D., **Schwarb, H.**, Pan, W-J, McKinley, R.A., Tripp, L. D., Schumacher, E.H., & Keilholz, S.D. (June, 2012). *Resting state networks generated from twelve second segments of fMRI scans are behaviorally relevant*. Poster presented at the annual meeting of the Organization for Human Brain Mapping, Beijing, China.
39. Pan, W-J, Magnuson, M.E., Thompson, G.J., **Schwarb, H.**, Schumacher, E.H., & Keilholz, S.D. (June, 2012). *Brain*

*structures associated with working memory performance: A voxel based morphometric study.* Poster presented at the annual meeting of the Organization for Human Brain Mapping, Beijing, China.

40. **Schwarb, H.**, Keilholz, S.D., McKinley, R.A., Tripp, L. & Schumacher, E.H. (March, 2012). *Number/resolution vs. stimulus complexity: A unifying account of the neural correlates of visual working memory capacity.* Poster presented at the annual meeting of the Cognitive Neuroscience Society, Chicago, IL.
41. Nail, J., **Schwarb, H.**, Sultan, Z., McKinley, A., Tripp, L. Kielholz, S.D., & Schumacher, E.H. (March, 2012). *Cortical activation changes with performance fluctuations on a sustained attention task.* Poster presented at the annual meeting of the Cognitive Neuroscience Society, Chicago, IL.
42. Roberts, B., Thompson, G., Shin, J., **Schwarb, H.**, Keilholz, S.D., & Schumacher, E.H. (March, 2012). *Functional connectivity and subsequent memory: increased neural co-activation during post-task resting states is related to later memory performance.* Poster presented at the annual meeting of the Cognitive Neuroscience Society, Chicago, IL.
43. Magnuson, M., Thompson, G., **Schwarb, H.**, Roberts, B., Pan, W-J., McKinley, A., Tripp, L., Schumacher, E.H., & Keilholz, S.D. (March, 2012). *Strength of correlation in and between resting state functional networks is linearly related to performance on a variety of cognitive tasks.* Poster presented at the annual meeting of the Cognitive Neuroscience Society, Chicago, IL.
44. **Schwarb, H.**, McKinley, R.A., Nail, J., Sultan, Z., & Schumacher, E.H. (November, 2011). *Moderate amounts of attentional control training can improve performance on a variety of untrained working memory tasks.* Poster presented at the annual meeting of the Psychonomic Society, Seattle, WA.
45. Thompson, G., Magnuson, M., Merritt, M.D., **Schwarb, H.**, Pan, W., Schumacher, E.H., & Keilholz, S.D. (June, 2011). *Changes in default mode relative to task positive mode in short time intervals predict vigilance.* Poster presented at the Human Brain Mapping annual meeting, Quebec City, QC.
46. **Schwarb, H.**, Thompson, G., Majeed, W., McKinley, R.A., Merritt, M.D., Schumacher, E.H., & Keilholz, S.D. (April, 2011). *Spatiotemporal dynamics of low frequency BOLD fluctuations in the default network may predict psychomotor vigilance task performance.* Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
47. Redick, T. S., Ahrens, A.N., **Schwarb, H.**, Dulas, M.R., Schumacher, E.H., & Engle, R.W. (April, 2011). *Functional MRI investigation of variation in working memory capacity: Looking forward or looking backward?* Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
48. **Schwarb, H.**, Seymour, T.L. & Schumacher, E.H. (April, 2010). *EMG and fMRI evidence for response conflict in the exclude-recognition task.* Poster presented at the annual meeting of the Cognitive Neuroscience Society, Montreal, QC.
49. **Schwarb, H.**, & Schumacher, E.H. (November, 2009). *Implicit sequence learning is represented by stimulus-response rules.* Poster presented at the annual meeting of the Psychonomic Society, Boston, MA.
50. **Schwarb, H.**, Patel, N., Burris, C.J., & Schumacher, E.H. (March, 2009). *Neural evidence of a role for spatial response selection in the learning of spatial sequences.* Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
51. Adedore, T.A., **Schwarb, H.**, & Schumacher, E.H. (March, 2009). *Effective connectivity evidence for a relationship between spatial response selection and spatial sequence learning.* Poster presented at the annual meeting of the



Cognitive Neuroscience Society, San Francisco, CA.

52. Lightman, E.J., **Schwarb, H.**, Hazeltine, E., Patel, N., & Schumacher, E.H. (March, 2009). Investigating control mechanisms with and between modality with a temporal flanker task. Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
53. **Schwarb, H.**, Hazeltine, E., Schumacher, E.H., & Seymour, T.L. (November, 2008). *Investigating modality-specific control mechanisms with a temporal flanker task*. Poster presented at the annual meeting of the Psychonomic Society, Chicago, IL.
54. **Schwarb, H.**, Hazeltine, E., & Schumacher, E.H. (May, 2008). *Effects of stimulus-response congruency on temporal flanker task performance: Evidence for modality-specific control mechanisms*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
55. West, R., Travers, S., & **Schwarb, H.** (April, 2008). *Why the Shift?: Effects of Aging on the Target P3*. Poster presented at the Cognitive Aging Conference, Atlanta, GA.
56. **Schwarb, H.**, & Schumacher, E.H. (November, 2007). *Behavioral and brain activation evidence that spatial response selection mediates spatial sequence learning*. Poster presented at the annual meeting of the Society for Neuroscience, San Diego, CA.
57. **Schwarb, H.**, & Schumacher, E.H. (May, 2007). *Dissociating the neural mechanisms for procedural skill and sequence learning using functional neuroimaging*. Poster presented at the annual meeting of the Cognitive Neuroscience Society, New York, NY.
58. **Schwarb, H.**, & Schumacher, E.H. (November, 2006). *The effect of dual-task processing overlap on sequence learning*. Poster presented at the annual meeting of the Psychonomic Society, Houston, TX.
59. West, R., & **Schwarb, H.** (April, 2006). *Effects of aging on the neural correlates of regulative and evaluative control*. Poster presented at the Cognitive Aging Conference, Atlanta, GA.
60. West, R., Agganis, B., Bowry, R., & **Schwarb, H.** (April, 2005). *ERP correlates of cognitive control that are insensitive to response conflict*. Poster presented at the Cognitive Neuroscience Society, New York, NY.

#### INVITED TALKS

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1. **Schwarb, H.** (March, 2021). Competition and cooperation in the relational memory network. Psychology Speakers Series, DePauw University.
2. **Schwarb, H.** (January, 2018). Magnetic resonance elastography: A new tool for cognitive neuroscience. Presented at the Center for Advanced Brain Imaging, Georgia Institute of Technology, Atlanta, GA.
3. **Schwarb, H.** (April, 2017). *Memory and the elastic brain*. Presented at TedX UIUC, Urbana, IL.  
<https://www.youtube.com/watch?v=uDvxasgHn6A>
4. **Schwarb, H.** (November, 2016). *Investigative tools and techniques in cognitive neuroscience research*. Presented to the Carle Hospital Neuroscience Research Unit, Urbana, IL.
5. **Schwarb, H.** (April, 2016). *Magnetic resonance elastography: Technique and application*. Presented at the annual Neuroscience Program Undergraduate Research Symposium, University of Illinois, Urbana, IL.

6. **Schwarb, H.** (February, 2015). *Hippocampal integrity and relational memory performance: Neural elasticity and behavior*. Presented to the Purdue Applied Cognition group, Purdue University, West Lafayette, IN.
7. **Schwarb, H.** (September, 2014). *Magnetic resonance elastography and normal memory function*. Presented to the Research in Cognitive Neuroscience course, Psychology Department, Agnes Scott College, Decatur, GA.
8. **Schwarb, H.,** Nail, J., Sultan, Z., & Schumacher, E.H. (December, 2011). *Sustained attentional control: Cortical activation changes across time*. Presented at Magnetic Resonance at Georgia Tech Workshop, Wallace Coulter Department of Biomedical Engineering and Parker H. Petit Institute for Bioengineering and Bioscience, Georgia Institute of Technology, Atlanta, GA.

## PRESENTATIONS

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1. **Schwarb, H.** (February, 2021). Investigating the Relational Memory Network across Neuroimaging Techniques and Patient Populations. Presented at the Brain and Cognition Seminar, Urbana, IL.
2. Delgorio, P.L., Hiscox, L.V., Pohlig, R.T., Sanjana, F., Daugherty, A.M., **Schwarb, H.**, Martens, C.R., McGarry, M.D.J., & Johnson, C.L. (August, 2020). *Reliable high-resolution MRE elastography protocol to assess hippocampal subfield viscoelasticity in aging*. Presented at the annual meeting of the International Society of Magnetic Resonance in Medicine, held virtually.
3. **Schwarb, H.** (November, 2019). *The organization of relational memory representations influences behavioral outcomes*. Presented at the Cognition Seminar, Urbana, IL.
4. Anderson, A.T., **Schwarb, H.** Huesmann, G. R. (April, 2018). *Human Brain Stiffness: From Cognitive Neuroscience to the Clinic*. Presented at the Beckman Institute Tech Talk Series, University of Illinois, Urbana, IL.
5. **Schwarb, H.** (November, 2017). *Magnetic resonance elastography and relational memory: A new tool for cognitive neuroscience*. Presented at the Brain and Cognition Seminar, Urbana, IL.
6. **Schwarb, H.,** Johnson, C.L., McGarry, M. D. J., & Cohen, N.J. (February, 2016). Hippocampal viscoelasticity and relational memory performance: A magnetic resonance elastography study. Presented at the Postdoctoral Research Symposium, University of Illinois at Urbana-Champaign, Urbana, IL. **[Grand prize winner]**
7. **Schwarb, H.,** Johnson, C.L., McGarry, M. D. J., & Cohen, N.J (March, 2015). The relationship between hippocampal viscoelasticity and relational memory performance in healthy young adults: A magnetic resonance elastography study. Data-blitz presentation at the Cognitive Neuroscience Society annual meeting, San Francisco, CA.
8. **Schwarb, H.,** Campbell, C., Watson, P. D., & Cohen, N.J (October, 2013). *Competition among contextual and relational memory representations*. Presented at the Memory Disorders Research Society annual meeting, Toronto, ON.
9. **Schwarb, H.** (April, 2013). *Context guided relational memory: understanding medial temporal lobe and prefrontal cortex interactions using eye tracking*. Presented at the Brain and Cognition Seminar, Urbana, IL.
10. **Schwarb, H.** (September, 2011). *Project #3-3: Optimization of transcranial stimulation (e.g., TMS and tDCS) intervention parameters for attentional control training*. Presented at Air Force Center of Excellence on Bio-nano-enabled Inorganic/Organic Nanostructures and Improved Cognition, Atlanta, GA.
11. **Schwarb, H.** (August, 2011). *Understanding the limits of visual working memory capacity*. Presented to the Air Force Research Laboratory's Human Effectiveness Directorate, Wright Patterson Air Force Base, OH.

12. **Schwarb, H.** (September, 2010). *Project #3-1: Moderate amounts of attentional control and working memory training to increase war-fighter real-time reasoning and decision making.* Presented at Air Force Center of Excellence on Bio-nano-enabled Inorganic/Organic Nanostructures and Improved Cognition, Atlanta, GA.
13. **Schwarb, H.** (September, 2010). *Moderate amounts of attentional control training to improve real-time decision making skills.* Presented at Cognitive Science Seminar, Georgia Institute of Technology, Atlanta, GA.
14. Schumacher, E.H., Hazeltine, E., **Schwarb, H.**, Adeline, T., & Lightman, E. J. (September, 2010). *Investigating the modality specificity of cognitive control using a temporal flanker task.* Presented at Crossmodal Action Workshop, Aachen, Germany.
15. **Schwarb, H.** (April, 2010). *EMG and fMRI evidence for response conflict in the exclude-recognition task.* Presented at Cognitive Science Seminar, Georgia Institute of Technology, Atlanta, GA.
16. **Schwarb, H.** (September, 2009). *The role of stimulus-response rules in implicit sequence learning.* Presented at Cognitive Science Seminar, Georgia Institute of Technology, Atlanta, GA.
17. Hazeltine, E., Schumacher, E.H., & **Schwarb, H.** (2008). *Sequential effects in a temporal flanker task.* Presented at Neuroscience and Cognitive Control, Ghent, Belgium
18. Schumacher, E.H. & **Schwarb, H.** (November, 2008). *The effect of central processing interference on dual-task sequence learning.* Paper presented at the 49<sup>th</sup> annual meeting of the Psychonomic Society, Chicago, IL.
19. **Schwarb, H.** (November, 2008). *Investigating modality-specific control mechanisms with a temporal flanker task.* Presented at Cognitive Science Seminar, Georgia Institute of Technology, Atlanta, GA.
20. **Schwarb, H.** (March, 2008). *What does executive control control?* Presented at Cognitive Science Seminar, Georgia Institute of Technology, Atlanta, GA.
21. **Schwarb, H.** (February, 2007). *Dual-task processing overlap impairs sequence learning.* Presented at Cognitive Science Seminar, Georgia Institute of Technology, Atlanta, GA.
22. **Schwarb, H.** (February, 2006). *Implicit sequence learning: A cognitive processing perspective.* Presented at Cognitive Science Seminar, Georgia Institute of Technology, Atlanta, GA.

#### TEACHING EXPERIENCE

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Memory and Amnesia, Instructor	Spring, 2014-present
Introduction to Cognitive Psychology, Instructor	Spring, 2012
	Fall, 2011
Cognitive Psychology, Lab Instructor	Spring, 2008
Cognitive Psychology, Teaching Assistant	Spring, 2008
General Psychology, Student Instructor	Spring, 2008

#### MENTORING

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##### Research Assistants

Nathaniel Bouton	University of Illinois	2020-present
Rachel Gonzalez	University of Illinois	2013-2015
Nirav Patel	University of Illinois	2013-2015

Faizan Khawaja University of Illinois 2012-2015

### **Undergraduate Researchers**

Nethaniel Bouton (supervised thesis)	University of Illinois	2019-2020
Renya Hickey	University of Illinois	2019-2020
Erin Sahn	University of Illinois	2019-present
Raya Gandhi	University of Illinois	2017-2019
Davis Gerew	University of Illinois	2017
Fatima Eldes	University of Illinois	2017-2018
Varun Devakonda (supervised thesis)	University of Illinois	2017-2018
Connor Dyer	University of Illinois	2016-2017
Ezra Winter-Nelson	University of Illinois	2014-2018
Maha Anwar	University of Illinois	2013-2014
Brendan Vastlik	University of Illinois	2013-2014
Ricky Patel	University of Illinois	2013
Ryan Kahle (supervised thesis)	University of Illinois	2013-2016
Chris Shander	University of Illinois	2012-2013
Emily Young	Georgia Institute of Technology	2011-2012
Jayde Nail	Georgia Institute of Technology	2010-2012
Brittney Zimmerly	Georgia Institute of Technology	2009-2011
Carla Burrus (supervised thesis)	Georgia Institute of Technology	2006-2009
Nehal Patel (supervised thesis)	Georgia Institute of Technology	2005-2008
Lana Jones	Georgia Institute of Technology	2006

### **Qualifying Exam Committees**

Rebecca Golden University of Illinois 2021

### **HONORS AND AWARDS**

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University of Illinois at Champaign-Urbana

Postdoctoral Research Symposium Grand Prize Winner (2016)

American Psychological Association (APA)

Dissertation Research Award Grant (2011; \$1,000)

National Science Foundation (NSF)

Graduate Research Fellowship Honorable Mention (2006)

Georgia Institute of Technology

President's Fellowship (2005-2010)

Graduate Student Career Development Grant (2005 and 2006)

Graduate Student Research Symposium Grand Prize Winner (2009)

Outstanding Graduate Student Award (2010)

School of Psychology Graduate Research Award (2011)

University of Notre Dame

2005 Magna Cum Laude

2005 Honors in Psychology and French

2005 John F. Santos Award for Distinctive Achievement in Psychology

2004-2005 President of the Notre Dame Chapter of Psi Chi

2003-present Psi Chi Honor Society

2003-present Pi Delta Phi Honor Society

## SERVICE

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Vice-chair of the Biomedical Institutional Review Board at the University of Illinois (current)  
Ad hoc reviewer *Cerebral Cortex*  
Ad hoc reviewer *Hippocampus*  
Ad hoc reviewer *NeuroImage*  
Ad hoc reviewer *Quarterly Journal of Experimental Psychology*  
Ad hoc reviewer *Brain and Cognition*  
Ad hoc reviewer *Psychological Research*  
Ad hoc reviewer *Human Brain Mapping*  
Ad hoc reviewer *Experimental Psychology*  
Ad hoc reviewer *Human Brain Mapping*  
Ad hoc reviewer *Neurobiology of Aging*  
Ad hoc reviewer *Journal of Experimental Psychology: Human Perception and Performance*  
APA Division 3 Newsletter: Co-author, *Graduate Student Corner* (2009-2011)  
Coordinator of the Cognition and Brain Sciences weekly seminar (Fall 2011)  
Member of Center for Advanced Brain Science director Search Committee (2009, 2011)  
Cognitive and Brain Science graduate student representative (2008-2009, 2010-2011)

## PROFESSIONAL MEMBERSHIPS

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2005- Cognitive Neuroscience Society  
2005-2014 Center for Behavioral Neuroscience - Atlanta  
2006- Society for Neuroscience  
2011- American Psychological Association  
2011- Association for Psychological Science

## REFERENCES

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Newark, DE 19716

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Professor Bradley P. Sutton  
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