

**Matthew M. Walsh**

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TiER1 Performance Solutions

216 Boulevard of the Allies

Pittsburgh, PA 15222

**EDUCATION:**

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**Carnegie Mellon University**, Pittsburgh, PA

Ph.D. in Cognitive Psychology

Degree conferred: August, 2012

**Center for the Neural Basis of Cognition**, Pittsburgh, PA

Certificate conferred: August, 2012

**The Pennsylvania State University**, University Park, PA

Bachelor of Science with High Distinction in Psychology

Minors in Statistics and in Information Systems and Statistical Analysis

Degree conferred: May, 2007

**AWARDS:**

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Elected as Fellow to Psychonomic Society, 2016

Joachim Herz Stiftung Fellowship to attend the Summer Institute on Bounded Rationality, 2014

Air Force Achievement Medal for meritorious service to the 112<sup>th</sup> Air Operations Squadron, 2012

NIMH Fellowship to attend Steve Luck's ERP Bootcamp, 2009

Honorable Mention, NSF Graduate Research Fellowship, 2008, 2009

President's Fund for Undergraduate Research, 2006

Paul Cornwell Memorial Fund in Psychology, 2006

Richard E. Thorn Memorial Scholarship, 2006

Mona Shibley Bird Memorial Scholarship in Psychology, 2005

Pennsylvania National Guard Fellowship, 2005

**EXTERNAL FUNDING:**

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FY16: (Co-PI) Real-time cognitive model-based fatigue monitoring. (AFRL Human Performance Wing Chief Scientist's Office, Dr. Rajesh Naik; \$100K)

FY16: (PI) Attentional trainer to improve control of unmanned systems (NAVAIR SBIR; \$150K)

FY15-FY16: (Co-PI) Design, reconfigure, and evaluate autonomous models in training (AF STTR; Phase I: \$150K; Phase II: \$750k)

FY13-FY14: (Co-PI) Computational approaches for understanding vigilance and mental fatigue (AFOSR; \$257K)

FY12-FY14: Simple heuristics that make us smart: Using verbal protocol analysis to study the selection and application of decision strategies (NRC; \$160K)

**PUBLICATIONS:**

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Walsh, M. M., Gunzelmann, G., & Anderson, J. R. (*in press*). Relationship of P3b single-trial latencies and response times in one, two, and three-stimulus oddball tasks. *Biological Psychology*

Zhang, Q., Walsh, M. M., & Anderson, J. R. (*in press*). The effects of probe similarity on retrieval and comparison processes in associative recognition. *Journal of Cognitive Neuroscience*.

- Anderson, J. R., Zhang, Q., Borst, J. P., & Walsh, M. M. (*in press*). The measurement of processing stages: Extension of Sternberg's method. *Psychological Review*.
- Walsh, M. M., Gunzelmann, G., & Van Dongen, H. P. A. (*accepted pending minor revisions*). Computational cognitive models of the temporal dynamics of fatigue from sleep loss. *Psychonomic Bulletin and Review*.
- Manelis, A., Popov, V., Paynter, C., Walsh, M., Vogt, K., & Reder, L. (*accepted pending minor revisions*). Cortical networks involved in memory for temporal order. *Journal of Cognitive Neuroscience*.
- Walsh, M. M., Gluck, K. A., Gunzelmann, G., Jastrzembski, T., & Krusmark, M. (*invited revision*). Evaluating the theoretical adequacy and applied potential of computational models of the spacing effect.
- Walsh, M. M., Gluck, K. A., Gunzelmann, G., Jastrzembski, T., Krusmark, M., Myung, J. I., Pitt, M. A., & Zhou, R. (*submitted*). The effects of spaced practice on retention and relearning.
- Rawson, K., Vaughn, K., Walsh, M., & Dunlosky, J. (*submitted*). Successive relearning: The next frontier for educationally relevant memory research.
- Warwick, W., Walsh, M., Rodgers, S., & Lebiere, C. (2017). Integrating heterogeneous modeling frameworks using the DREAMIT workspace. In *Advances in Applied Digital Human Modeling and Simulation* (pp. 267-278), Springer International Publishing.
- Blaha, L., Fisher, C., Gunzelmann, G., Walsh, M. M., & Veksler, B. (2016). Real-time fatigue monitoring with computational cognitive models. In *International Conference on Augmented Cognition* (pp. 299-310). Springer International Publishing.
- Walsh, M. M., Paynter, C. A., Zhang, Y., & Reder, L. M. (2016). Hitting the reset button: An ERP investigation of memory for temporal context. *Brain Research, 1642*, 524-531.
- Walsh, M. M., & Lovett, M. (2016). The cognitive science approach to learning and memory. In S. Chipman (Ed.), *The Oxford Handbook of Cognitive Science: Part 2, Cognitive Science Perspectives on Classic Problems in Psychology*.
- Walsh, M. M., & Gluck, K. A. (2016). Verbalization of decision strategies in multiple-cue probabilistic inference. *Journal of Behavioral Decision Making, 29*, 78-91.
- Walsh, M. M., & Gluck, K. A. (2015). Mechanisms for robust cognition. *Cognitive Science, 39*, 1131-1171.
- Gunzelmann, G., Veksler, B. Z., Walsh, M. M., & Gluck, K. A. (2015) Understanding and predicting the impact of sleep loss through simulation. *Translational Issues in Psychological Science, 1*, 106-115.
- Nie, A., Griffin, M., Keinath, A., Walsh, M. M., Dittmann, A., & Reder, L. (2014). ERP profiles for face and word recognition are based on their status in semantic memory and not their stimulus category. *Brain Research, 1557*, 66-73.
- Liu, X., Walsh, M. M., & Reder, L. M. (2014). An attentional adaptation account of spatial negative priming: Evidence from event-related potentials. *Cognitive, Affective, and Behavioral Neuroscience, 14*, 49-61.
- Walsh, M. M., & Anderson, J. R. (2014). Navigating complex decision spaces: Problems and paradigms in sequential choice. *Psychological Bulletin, 140*, 466-486.
- Borst, J. P.\*, Schneider, D. W.\*, Walsh, M. M.\*, & Anderson, J. R. (2013). Stages of processing in associative recognition: Evidence from behavior, electroencephalography, and classification. *Journal of Cognitive Neuroscience, 25*, 2151-2166.
- \*Contributed equally to this work, order is alphabetical
- Walsh, M. M., & Anderson, J. R. (2013). Electrophysiological responses to feedback during the application of abstract rules. *Journal of Cognitive Neuroscience, 25*, 1986-2002.
- Walsh, M. M., Einstein, E. H., & Gluck, K. A. (2013). A quantification of robustness. *Journal of Applied Research in Memory and Cognition, 2*, 137-148.

- Walsh, M. M., & Anderson, J. R. (2012). Learning from experience: Event-related potential correlates of reward processing, neural adaptation, and behavioral choice. *Neuroscience and Biobehavioral Reviews*, *36*, 1870-1884.
- Walsh, M. M., & Anderson, J. R. (2011). Modulation of the feedback-related negativity by instruction and experience. *Proceedings of the National Academy of Science*, *108*, 19048-19053.
- Walsh, M. M., & Anderson, J. R. (2011). Learning from delayed feedback: Neural responses in temporal credit assignment. *Cognitive, Affective, and Behavioral Neuroscience*, *11*, 131-143.
- Walsh, M. M., & Rosenbaum, D. A. (2009). Deciding how to act is not achieved by watching mental movies. *Journal of Experimental Psychology: Human Perception and Performance*, *35*, 1481-1489.
- Walsh, M. M., & Anderson, J. R. (2009). The strategic nature of changing your mind. *Cognitive Psychology*, *58*, 416-440.
- van der Wel, R., Eder, J. R., Mitchel, A. D., Walsh, M. M., & Rosenbaum, D. A. (2009). Trajectories emerging from discrete versus continuous processing models in a phonological competitor task: A commentary on Spivey, Grosjean, and Knoblich (2005). *Journal of Experimental Psychology: Human Perception and Performance*, *35*, 588-594.

### **CONFERENCE PRESENTATIONS:**

- Walsh, M., Blaha, L., Fisher, C., Gunzelmann, G., Setlur, V., & Veksler, B. (2017). The use of computational cognitive models to support real-time state assessment. Talk to be presented at 8<sup>th</sup> International Conference on Applied Human Factors and Ergonomics.
- Walsh, M. (2016). Successive re-learning: The next frontier in educationally relevant psychology research. Poster presented at the 2016 Carnegie Mellon University Teaching and Learning Summit.
- Collins, M., Gluck, K., Walsh, M., Krusmark, M., & Gunzelmann, G. (2016). Using prior data to inform model parameters in the Predictive Performance Equation. Poster presented at 38<sup>th</sup> Annual Conference of the Cognitive Science Society.
- Fisher, C. R., Walsh, M. M., Blaha, L. M., Gunzelmann, G., & Veksler, B. (2016). Efficient parameter estimation of cognitive models for real-time performance monitoring and adaptive interfaces. Talk presented at 14<sup>th</sup> International Conference on Cognitive Modeling.
- Rodgers, S., Walsh, M., & Oskorus, A. (2016). Revolutionizing personalized and optimized training. Talk presented at 2016 Training Officers Consortium Annual Institute.
- Walsh, M. M. (2015, July). Spacing effects across multiple re-learning sessions. Talk presented at 22<sup>nd</sup> Annual ACT-R Workshop.
- Walsh, M. M., Collins, M. A., & Gluck, K. A. (2015, July). Verbal reports reveal strategies in multiple-cue probabilistic inference. Talk presented at 37<sup>th</sup> Annual Conference of the Cognitive Science Society.
- Fisher, C. R., Walsh, M. M., Blaha, L. M., & Gunzelmann, G. (2015, July). ACT-R and LBA model mimicry reveals similarity across levels of analysis. Talk presented at 37<sup>th</sup> Annual Conference of the Cognitive Science Society.
- Myers, C. W., Harris, J., Gluck, K., Veksler, V., Mielke, T., Boyd, R., & Walsh, M. (2015). Robust decisions in aerospace environments with fast & frugal trees. Talk presented at 85<sup>th</sup> Annual Meeting of the Aerospace Medical Association.
- Gunzelmann, G., Veksler, B. Z., Walsh, M. M., & Gluck, K. A. (2015, May). Fatigue risk mitigation in aerospace medicine: Simulating the effects of fatigue on cognitive processing. Talk presented at the 85<sup>th</sup> Annual Meeting of the Aerospace Medical Association.
- Walsh, M. M., & Rodgers, S. (2015, May). Cognitive modeling for personalized training in military and medical domains. Talk presented at DoD Human Factors Engineering Technical Advisory Group (HFETAG) Meeting 69.

- Walsh, M. M., Gunzelmann, G., & Van Dongen, H. P. A. (2014, July). Comparing accounts of psychomotor vigilance impairment due to sleep loss. Talk presented at 36<sup>th</sup> Annual Conference of the Cognitive Science Society, Quebec City, Canada.
- Walsh, M. M., & Gluck, K. A. (2014, July). Using process measures to track strategy use in probabilistic inference. Poster presented at 36<sup>th</sup> Annual Conference of the Cognitive Science Society, Quebec City, Canada.
- Jastrzembski, T., Gluck, K., Gunzelmann, G., Krusmark, M., Tang, Y., & Walsh, M. (2014, July). Modeling nuances of the spacing effect. Talk presented at 47<sup>th</sup> Annual Meeting of the Society for Mathematical Psychology, Quebec City, Canada.
- Walsh, M. M., & Gluck, K. A. (2013, April). Quantifying and enhancing robustness of cognitive and behavioral systems. Poster presented at 23<sup>rd</sup> Annual Conference on Behavior Representation in Modeling and Simulation (BRiMS). Washington D.C.
- Walsh, M. M., & Gluck, K. A. (2013, November). Robustness for human-machine systems. Poster presented at AHEAD Autonomy Research Showcase. Dayton, OH.
- Walsh, M. M., & Gluck, K. A. (2013). Robustness: Quantification and application. Poster presented at 12th International Conference on Cognitive Modeling. Ottawa, Canada.
- Walsh, M. M. (2013). Robustness as a guiding principle for the design of cognitive and behavior systems. In K. A. Gluck (Chair), *Robustness in cognitive and behavioral systems. 22<sup>nd</sup> Annual Conference on Behavior Representation in Modeling and Simulation (BRiMS)*. Ottawa, Canada.
- Liu, X., Walsh, M. M., & Reder, L. (2011, April). An attentional adaptation account of spatial negative priming: Evidence from ERP. Poster presented at the Cognitive Neuroscience Society Eighteenth Annual Meeting. San Francisco, CA.
- Walsh, M. M., & Anderson, J. R. (2010, August). Neural correlates of temporal credit assignment. Talk presented at 10th International Conference on Cognitive Modeling. Philadelphia, PA. (*Honorable mention: Allen Newell Award for Best Student Paper*)
- Walsh, M. M. (2010, July). Problems and paradigms in temporal credit assignment. Talk presented at Seventeenth Annual ACT-R Summer School. Pittsburgh, PA.
- Anderson, J. R., & Walsh, M. M. (2009, July). Decision making in a cognitive architecture. Talk presented at Multi-modal Neuroimaging Training Program Symposium. Pittsburgh, PA.
- Walsh, M. M., & Anderson, J. R. (2009, July). Tracking the course of algebra learning. Poster presented at 31<sup>st</sup> Annual Meeting of the Cognitive Science Society. Amsterdam.
- Walsh, M. M., & Anderson, J. R. (2008, July). Strategy selection at the technological interface. Poster presented at 30<sup>th</sup> Annual Meeting of the Cognitive Science Society. Washington D.C..
- Walsh, M. M., & Anderson, J. R. (2008, July). Statistical learning and anticipatory start point selection. Talk presented at 16<sup>th</sup> Annual ACT-R Workshop. Pittsburgh, PA.
- Walsh, M. M., & Rosenbaum, D. A. (2007, June). Path planning. Talk presented at Third International Workshop on Posture-Based Motion Planning. University Park, PA.
- Von Der Heide, R. J., Wenger, M. J., Gilmore, R. O., Walsh, M. M., Sullivan, B. M., & Bittner, J. (2007, May). Developmental changes in the capacity to process faces. Poster presented at Vision Sciences Society 6<sup>th</sup> Annual Meeting. Sarasota, FL.
- Walsh, M. M., & Rosenbaum, D. A. (2007, April). Planning for an uncertain future. Poster presented at Psi Chi Research Conference. University Park, PA.
- Walsh, M. M., Schiller, C., van der Wel, R. & Rosenbaum, D. A. (2006, April). Control of manual positioning sequences at slow frequencies. Poster presented at Psi Chi Research Conference. University Park, PA.
- Walsh, M. M., Mason, S., & Crnic, K. (2006, March). The relationship between caregiver's locus of control and child's cognitive development at 36 and 60 months. Poster presented at 39<sup>th</sup> annual Gatlinburg Conference on Research and Theory in Intellectual and Developmental Disabilities. San Diego, CA.

Biddle, J., Cohen, R. G., Schiller, C., Walsh, M. M., Hopkins, L., Miller, M., & Rosenbaum, D. A. (2005, April). Issues in obstacle avoidance. Talk presented at Second International Workshop on Posture-Based Motion Planning. University Park, PA.

### **INVITED COLLOQUIA:**

- Gluck, K. A., & Walsh, M. W. (2015, July). Robustness: Definition, quantification, and mechanisms. 711 Human Performance Wing Commander's Luncheon Series.
- Walsh, M. M. & Gluck, K. A. (2014, March). Mechanisms for Robust Cognition. Air Force Institute of Technology. Dayton, OH.
- Walsh, M. M., & Gluck, K. A. (2013, December). Mechanisms for robust cognition. Computational Cognition and Robust Decision Making Program Review. Washington D.C.
- Gluck, K. A., & Walsh, M. M. (2013, September). Robustness as a selection criterion for human-machine systems. AFRL/AFIT Colloquium – Human Machine Systems.
- Walsh, M. M. (2012, January). Behavioral and neural adaptation in reward learning. Naval Research Laboratory. Washington D.C.
- Walsh, M. M. (2011, December). The error of our ways: Behavioral and neural correlates of reward learning. Air Force Research Laboratory. Dayton, OH.
- Walsh, M. M. (2010, June). Neural prediction error in temporal credit assignment. Center for the Neural Basis of Cognition, Carnegie Mellon University and University of Pittsburgh. Pittsburgh, PA.

### **RESEARCH EXPERIENCE:**

#### *TiERI Performance Solutions*

- 2015-Present Senior Solutions Consultant. Workgroup manager: Stu Rodgers
- 2014-2015 Senior Consultant.

#### *Air Force Research Laboratory*

- 2012-2014 PALM Lab. Advisor: Kevin Gluck

#### *Carnegie Mellon University*

- 2014-Present Consultant, ACT-R Research Group
- 2007-2012 ACT-R Research Group. Advisor: John Anderson
- 2008-2012 Memory Lab, Carnegie Mellon University. Advisor: Lynne Reder

#### *The Pennsylvania State University*

- 2004-2009 The Lab for Cognition and Action. Advisor: David Rosenbaum
- 2005-2007 Vision, Memory and Computational Neuroscience Lab. Advisor: Michael Wenger
- 2004-2006 The Collaborative Family Study. Advisor: Keith Crnic

#### *Drew University*

- 2004 Cognition Lab. Advisor: Patrick Dolan

### **TEACHING EXPERIENCE:**

#### *Carnegie Mellon University*

- 2011 Guest lecturer to Laurie Heller (Research Methods in Cognitive Psychology)
- 2010 Teaching Assistant to David Plaut (Introduction to Parallel Distributed Processing)
- 2010 Co-instructor with Lynne Reder (Introduction to Event Related Potentials)
- 2009 Teaching Assistant to John Anderson (Cognitive Modeling)
- 2009 Guest lecturer to Chante Cox-Boyd (Research Methods in Social Psychology)

#### *Private Instruction*

- 2005-2006 Volunteers in Public School, State College, PA (AP Calculus and Statistics)

**PROFESSIONAL SERVICE:**

Ad hoc reviewer for the following journals (34 reviews total):

*Biological Psychology • BMC Neuroscience • Brain and Cognition • Cognitive, Affective, & Behavioral Neuroscience • Cognitive Science • Computational Psychiatry • Journal of Applied Research in Memory and Cognition • Journal of Cognitive Neuroscience • Neuropsychologia • Neuroscience Letters • Neuroscience Research • PLOS Computational Biology • Psychiatry Research • Psychiatry Research: Neuroimaging • Psychological Bulletin • Psychological Review • Psychonomic Bulletin & Review • Psychophysiology • Scandinavian Journal of Psychology • Scientific Reports*

Ad hoc reviewer for the following conferences (23 reviews total):

*Annual Cognitive Science Conference • Conference on Behavior Representation in Modeling and Simulation • EuroAsianPacific Joint Conference on Cognitive Science • International Conference on Cognitive Modeling • Human Factors and Ergonomics Society • Midwest Cognitive Science Conference*

Ad hoc reviewer for the following organization (2 reviews total):

*Air Force Office of Scientific Research (AFOSR)*

Tutorial Committee: 2016 International Conference on Cognitive Modeling

Career Mentor, Association for Psychological Science, 2016-Present

**PROFESSIONAL AFFILIATIONS:**

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Fellow, Psychonomic Society; 2016-Present

Member, Association for Psychological Science, 2016-Present

Member, Society for Judgment and Decision Making, 2014-Present

Member, Cognitive Science Society, 2007-Present

Member, Psi Chi, 2004-Present

Elected to Phi Beta Kappa, 2008