

Franklin P. Tamborello, II, Ph.D.

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Education

- Ph.D. (2009) in Human-Computer Interaction with emphasis in computational cognitive modeling, Rice University, Houston, TX. Dissertation title: *A Computational Model of Routine Procedural Memory* Advisor: Dr. Michael D. Byrne.
- M.A. (2006) in Human-Computer Interaction with emphasis in computational cognitive modeling, Rice University, Houston, TX. Thesis title: *Visual Displays: The Continuing Investigations of the Highlighting Paradox*. Advisor: Dr. Michael D. Byrne.
- B.A. in Psychology, double minor in History and Media Studies, Trinity University, San Antonio, TX (2001). Undergraduate thesis title: *Memory and Emotional Fluency*. Thesis advisor: Dr. Paula Hertel.

Research Interests and Experience

Error in Routine Procedural Behavior

This, the topic of my dissertation project, examines human systematic procedural error in routine tasks. In other words, why do we still err in tasks that are very familiar to us? This project seeks to understand perceptual-motor and cognitive constraints that have implications for error commission and how the structure of the task environment can influence human error. Additionally, important related behaviors such as error recovery and adaptation of old task knowledge to new contexts seem to be enabled by the particular configuration of procedural and declarative memories people employ to perform routine procedures.

I managed this project from conception to delivery, including design and execution of empirical and computational modeling studies, supervision of research assistants during data collection, inferential statistical analysis, write-up and presentation as my dissertation. Delivered products were my dissertation and data presented to the project's funding agency, the Office of Naval Research.

Efficient Strategy Selection

This research program is concerned with determining how people learn to select efficient work strategies, with keyboard shortcuts as a test case of the larger issue of efficient software interaction methods. Exploratory work determined that people may be learning keyboard shortcuts from coworkers and that estimates of cost/benefit ratios figure prominently in user behavior change. Learning from coworkers may play a special role in adjusting cost/benefit estimates because the methods are demonstrated during circumstances of maximum salience to the user's current goal while the benefits of the new procedure are demonstrated first-hand. This social interaction acts to lower the cost of behavior change while making the benefits apparent.

This project began upon the initiative of myself and a few of my graduate student cohort. As we graduated and moved to new institutions the project grew into an inter-institutional collaboration, co-

managed by myself and Dr. S. Camille Peres, University of Houston Clear Lake. Again, I have been directly involved in all phases of project management and execution. Delivered products include four refereed and archived conference papers and their oral presentations at those conferences, and a journal article in revision.

Visuospatial Representation in Working Memory

This project focuses on how we form and update spatial relationships between objects or people. The basis of the theory is that people often represent spatial locations in multiple frames of reference simultaneously. Doing so enables a special kind of representational blending that allows us to, for example, imagine another person's perspective. The project looks at how we form these representations in working memory and use them to support spatial reasoning.

My role in this project was its management from conception to delivery, including design and execution of empirical and computational modeling studies, inferential statistical analysis, and presentation of the results and new insights gleaned in oral and written forms. The project's deliverables were these oral and written communications as well as the software package encapsulating the theory. Furthermore, as a W. M. Keck Postdoctoral fellow I participated in the Gulf Coast Consortia for Quantitative Biomedical Sciences' lectures and conferences. Here I networked with biomedical informatics professionals, finding common ground in biomedical procedures and information tools.

Additional Research Experience

Co-Op (Summer, 2005), Lockheed-Martin, NASA Johnson Space Center. Supervisor: Jurine Adolf. I reviewed NASA's human factors design requirements documentation for the Constellation project. I documented prototype equipment trials for in-spacesuit Heads-Up Displays, hand tools, and a Lunar/Martian personnel vehicle. I co-planned, executed, and presented a usability study of food package labels.

Lab Manager (May 2001 – August 2003) Brain and Language Laboratory, Department of Psychology, Rice University. Supervisor: Dr. Randi C. Martin. I assisted in design, construction, data collection and analysis of psycholinguistic experiments with the participation of undergraduate, brain injury patient, and age-matched control subject populations. I maintained lab equipment, supplies, and subject payment funds. I also managed research assistants' data collection.

Research Assistant (June 1998 – May 2001) Brain and Language Laboratory, Department of Psychology, Rice University. Supervisor: Dr. Randi C. Martin. I assisted with the implementation and execution of data collection projects, including traveling cross-country to test special patient populations.

Publications

Journal Articles

Tamborello, F. P. II, Sun, Y., & Wang, H. (in press) Spatial Reasoning with Multiple Intrinsic Frames of Reference. *Experimental Psychology*.

Martin, R. C., Crowther, J. E., Knight, M., **Tamborello, F. P., II**, & Yang, C. L. (2010). Planning in sentence production: Evidence for the phrase as a default planning scope. *Cognition*, *116*, 177–192.

Tamborello, F. P., II, & Byrne, M. D. (2007). Adaptive but Non-Optimal Visual Search Behavior in Highlighted Displays. *Journal of Cognitive Systems Research*, 8(3), 182 – 191.

Refereed Conference Proceedings

Tamborello, F. P., II, Sun, Y., & Wang, H. (2010). Spatial representations with conflicting intrinsic frames of reference. Proceedings of the Thirty-Second Annual Conference of the Cognitive Science Society.

Tamborello, F. P., II, Chung, P. H., & Byrne, M. D. (2008). *Where no interface has gone before: What can the phaser tell us about label usage in HCI?* CHI 2008 Extended Abstracts.

Black, D., Peres, S. C., **Tamborello, F. P., II**, & Amos, A. (2008). Computer Based Training with a Twist: Leveraging Peer to Peer Learning to Improve Training Effectiveness. Proceedings of the Human Factors and Ergonomics Society 52st Annual Meeting, New York, USA.

Tamborello, F. P., II, & Byrne, M. D. (2007). Fast Learning in a Simple Probabilistic Visual Environment: A Comparison of ACT-R's Old PG-C and New Reinforcement Learning Algorithms. Proceedings of the Eighth International Conference on Cognitive Modeling.

Tamborello, F. P., II, & Byrne, M. D. (2006). Adaptive but Non-Optimal Visual Search Behavior in Highlighted Displays. Proceedings of the Seventh International Conference on Cognitive Modeling.

Tamborello, F. P., II, Peres, S. C., & Fleetwood, M. D. (2006). A peer-mediated leap to efficiency: A theory of cost-benefit analysis in the selection of efficient strategies. Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting (pp. 349 – 353). Santa Monica, CA: Human Factors and Ergonomics Society.

Peres, S. C., Fleetwood, M. D., **Tamborello, F. P., II**, & Yang, M. & Paige-Smith, D. L. (2005). The pros and cons of efficiency: Predicting the use of the keyboard to issue commands. *Proceedings of the Human Factors and Ergonomics Society 49th Annual Meeting*. (pp. 637 – 641). Santa Monica, CA: Human Factors and Ergonomics Society.

Tamborello, F. P., II, & Byrne, M. D. (2005). Information search: The intersection of visual and semantic space. *CHI 2005 Extended Abstracts*, (pp. 1821-1824). New York, NY: Association for Computing Machinery.

Peres, S. C., **Tamborello, F. P., II**, Fleetwood, M. D., Chung, P., & Paige-Smith, D.L. (2004). Keyboard shortcut usage: The roles of social factors and computer experience. *Proceedings of the Human Factors and Ergonomics Society 48th Annual Meeting*. (pp. 803 – 807). Santa Monica, CA: Human Factors and Ergonomics Society.

Manuscripts in Preparation

Tamborello, F. P. II, Peres, S.C., Fleetwood, M.D., & Nguyen, V. (in revision) Observing Efficient Behavior Leads to the Adoption of Efficient Behavior: An Investigation of the Influence of Peer Observation on the Adoption of Efficient Software Techniques.

Tamborello, F. P. II, & Byrne, Michael D. (in revision) Routine Procedural Memory, Error, Error Recovery, and Adaptation to Changing Task Environment: Interacting Components of a Complete Description of Human Performance in a Difficult Task.

Presentations

Talks

How an emergent, componential approach to modeling complex cognition can help us understand human error in routine procedures. Invited talk given April 26, 2011, Naval Research Laboratory, Washington, DC.

Spatial representations with conflicting intrinsic frames of reference. Given August 14, 2010, Thirty-Second Annual Conference of the Cognitive Science Society, Portland, OR.

Peer-mediated leap to efficiency: Cost-benefit analysis in the selection of efficient strategies. Given October 18, 2006, 50th Meeting of the Human Factors and Ergonomics Society, San Francisco, CA.

Adaptive but Non-Optimal Visual Search Behavior in Highlighted Displays. Given April 7, 2006. International Conference on Cognitive Modeling, Trieste, Italy.

Cost/benefit analysis and efficient work strategy selection: Using keyboard shortcuts to issue commands. March 6, 2006. Rice University Human-Computer Interaction/Human Factors Seminar, Rice University, Houston, TX.

Visual displays: The continuing investigations of the highlighting paradox. November 23, 2005. Master's degree defense and Cognitive Tea, Rice University, Houston, TX combined.

Pros, cons, and changing behavior: An application in the use of the keyboard to issue commands. (slides authored by S. Camille Peres). September 27, 2005. Human Factors and Ergonomics 49th Annual Meeting, Orlando, FL.

Information Search: The Intersection of Visual and Semantic Space. April 5, 2005. CHI 2005, Portland, OR.

Highlighting: A Presentation in Two Acts. March 30, 2005. Cognitive Tea, Rice University, Houston, TX.

Information Search: The Intersection of Visual and Semantic Space. March 10, 2004. Cognitive Tea, Rice University, Houston, TX.

Poster

Where no interface has gone before: What can the phaser tell us about label usage in HCI? CHI 2008. Florence, Italy. April, 2008.

Fast Learning in a Simple Probabilistic Visual Environment: A Comparison of ACT-R's Old PG-C and New Reinforcement Learning Algorithms. The Eighth International Conference on Cognitive Modeling. Ann Arbor, MI. July, 2007.

Visual Displays: The (Modeled) Highlighting Paradox. Human Factors and Ergonomics Society, Houston Chapter 2nd Conference, Houston, TX. May, 2005.

Grants and Awards: \$114,855.88 in total

W. M. Keck Postdoctoral Fellowship, jointly administered by the W. M. Keck Foundation, The Gulf Coast Consortia, and The National Library of Medicine. October, 2009 – June, 2011. \$95,000

Research Awards

Gertrude Maurin Fund research award: \$350 for subject money for research leading to the publication and presentation of Peres, Fleetwood, Yang, & Paige-Smith (2005).

Travel Awards, Total: \$7,005.88

Psychology Department: \$255.38 to attend CHI 2008 and present Tamborello, Chung, & Byrne (2008). Florence, Italy; April, 2008.

Gertrude Maurin Fund: \$400 to attend CHI 2008 and present Tamborello, Chung, & Byrne (2008). Florence, Italy; April, 2008.

Rice University Academic & Research Support Fund: \$440 to attend CHI 2008 and present Tamborello, Chung, & Byrne (2008). Florence, Italy; April, 2008.

Psychology Department: \$400 to attend the Eighth International Conference on Cognitive Modeling and present Tamborello and Byrne (2007). Ann Arbor, MI; July, 2007.

Gertrude Maurin Fund: \$350 to attend the Eighth International Conference on Cognitive Modeling and present Tamborello and Byrne (2007). Ann Arbor, MI; July, 2007.

Rice University Academic & Research Support Fund: \$400 to attend the Eighth International Conference on Cognitive Modeling and present Tamborello and Byrne (2007). Ann Arbor, MI; July, 2007.

Psychology Department: \$400 to attend Human Factors and Ergonomics Society 50th Annual Meeting and present Tamborello, Peres, and Fleetwood (2006). San Francisco, CA, USA; October, 2006.

Gertrude Maurin Fund: \$500 to attend Human Factors and Ergonomics Society 50th Annual Meeting and present Tamborello, Peres, and Fleetwood (2006). San Francisco, CA, USA; October, 2006.

Rice University Academic & Research Support Fund: \$675 to attend the Seventh International Conference on Cognitive Modeling and present Tamborello and Byrne (2006). Trieste, Italy; March, 2006.

Psychology Department: \$400 to attend the Seventh International Conference on Cognitive Modeling (and present Tamborello and Byrne (2006). Trieste, Italy; March, 2006.

Gertrude Maurin Fund: ICCM: \$500 to attend International Conference on Cognitive Modeling and present Tamborello and Byrne (2006). Trieste, Italy; March, 2006.

Psychology Department: \$400 to attend Human Factors and Ergonomics Society 49th Annual Meeting and present Peres et al. (2005). Orlando, FL, USA; September, 2005.

Gertrude Maurin Fund: HFES 2005: \$291 to attend Human Factors and Ergonomics Society 49th Annual Meeting and present Peres et al. (2005). Orlando, FL, USA; September, 2005.

Psychology Department: \$400 to attend CHI 2005 and present Tamborello and Byrne (2005). Portland, OR, USA; April, 2005.

Gertrude Maurin Fund: \$300 to attend CHI 2005 and present Tamborello and Byrne (2005). Portland, OR, USA; April, 2005.

Rice University Academic Research Support Fund: \$494.50 to attend CHI 2005 and present Tamborello and Byrne (2005). Portland, OR, USA; April, 2005.

Psychology Department: \$400 to attend Human Factors and Ergonomics Society 48th Annual Meeting. New Orleans, LA, USA; September, 2004.

Scholarships

Princeton Review GRE Course Scholarship, \$500. September, 2002.

Trinity University President's Scholarship, \$3,000 per year. Fall 1997 – Spring 2001.

Teaching Experience

Teaching Interests

Human-Computer Interaction/Human Factors; Cognition & Cognitive Modeling; Statistics

Instructor

- Readings in Introductory Psychology (Fall 2006)

Teaching Assistant & Recitation Leader

- Statistical Methods for Psychology (Spring 2008)

Teaching Assistant

- Research Methods (Spring 2006 and Fall 2004)
- Introduction to Psychology (Fall 2003)

Guest Lectures

- Human-Computer Interaction & Cognitive Modeling (Introduction to Psychology, Summer 2008)
- Cognitive Modeling & Cognitive Engineering (Introduction to Cognition, Fall 2007)
- Ethics (Research Methods, Spring 2006)
- Data Analysis with SPSS (Research Methods, Fall 2004)

Honors and Affiliations

- Keck NLM Postdoctoral Fellowship
- Member, Cognitive Science Society (2010 – present)
- Member, Human Factors and Ergonomics Society (2009 – present)
- Member, Human Factors and Ergonomics Society, Houston Chapter (2009 – present)
- Student Affiliate, Human Factors and Ergonomics Society (2004 – 2009)
- Student Member, Human Factors and Ergonomics Society, Houston Chapter (2004 – 2009)

Service

- Reviewer, *Human Factors and Ergonomics Society*, January 2011, January 2008, February 2007
- Reviewer, *CHI 2008*, January 2011, October 2007
- Reviewer, *Journal of Cognitive Systems Research*, December 2006

- Reviewer, *Clinical Toxicology*, June 2006
- Conference Planning Committee, Human Factors and Ergonomics Society, Houston Chapter
- Webmaster, Human Factors and Ergonomics Society, Houston Chapter
- Department of Psychology Prospective Student Weekend Planning Committee