

Jason Fitzgerald Smith, Ph.D.

Brain Imaging and Modeling Section
National Institute on Deafness and Other Communication Disorders
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Neuroscientist with expertise in experimental design and statistical analysis of neuroimaging data with an emphasis on human studies of long-term memory and audio-visual association. Strong experience in developing and applying novel statistical methods to multivariate data to answer specific theoretically derived questions. Effective at integrating ideas from multiple scientific and engineering domains to solve problems. Focused team member capable of performing in multiple roles from team leader to consultant. Dynamic speaker invited to present at international venues. Clear and concise writer able to distill complex statistical and mathematical ideas and present them effectively to diverse audiences. Demonstrated ability to bring projects from initial concepts through to deliverables.

Professional Experience:

2011-Present

Research Fellow, Brain Imaging and Modeling Section, NIDCD

Major duties include development of statistical methods for analysis of functional magnetic resonance imaging (fMRI) data; designing, conducting, and analyzing fMRI and behavioral experiments to probe the relation between audio-visual memory and language; programming in multiple languages to implement statistical methods.

Methods Development: Focused on understanding the brain-behavior relationship by studying how multiple, partially specialized, brain regions interact and integrate information during task performance. Utilized ideas from diverse fields such as chemometrics, control systems, econometrics, climate science, computer science, and cybernetics.

Experimental Neuropsychology: Involved in all aspects of experimental cycle from initial design to publication. Team leader for experiments testing predictions of current theories of long-term memory consolidation, arbitrary audio-visual memory in humans, and on the relation between animal models of audio-visual memory and language. Team member on experiments studying disease such as tinnitus and frontotemporal dementia, individual differences such as mono- and bilingualism, aging, human motor systems, and auditory cortex.

Computer Programming: Extensive programming in the Matlab environment and C to efficiently perform fMRI image analysis and graphical presentation of statistical results. Supervised research assistant developing graphical user interface for fMRI connectivity analysis.

2008-2011:

Post Doctoral Research Fellow, Brain Imaging and Modeling Section, NIDCD.

Duties: Investigation of the basis of long-term memory formation and memory consolidation in relation to object naming. Development of dynamic subspace methods for network analysis of fMRI and simultaneous fMRI-EEG data.

2005-2008:

Research Assistant, Brain Imaging and Modeling Section, NIDCD

Duties: Simulation of large-scale neurobiologically realistic neural networks of working memory and attention, fMRI data collection and statistical analysis, development of novel statistical methods for multivariate analysis of fMRI data.

2001-2005:

Research Assistant, Neuroimaging Analysis Laboratory, Department of Psychology, Arizona State University and Arizona Alzheimer's Research Center

Duties: Developing novel statistical methods for multivariate analysis of fMRI data; developing fMRI experiments and experimental presentations; assisting with fMRI data collection; programming user interfaces, computational routines, and batch modes for existing imaging software packages/formats; basic systems administration (Linux).

1997-2001:

Research Assistant, Center for Cognitive Neuroscience, Department of Neurology, Temple University School of Medicine

Duties: Experimental design and analysis for behavioral testing and fMRI imaging; programming (C/C++) and database mining/programming (dBase); patient testing and transcription; and systems administration (Apple OS).

1996-1997:

Research Assistant, Department of Psychology, University of North Carolina at Charlotte

Duties: Scoring of aphasic patient transcripts.

Professional Service:

Associate Editor for *Neuroscience and Biomedical Engineering*

Review Editor for *Frontiers in Brain Imaging Methods*

Ad-hoc Reviewer for *NeuroImage*, *Human Brain Mapping*, *Neurocomputation* and others

Conference Reviewer for Organization for Human Brain Mapping

Co-Leader NIH summer intern journal club

Education:

Ph.D. (Psychology, Cognitive and Behavioral Systems)

Arizona State University, May 2008.

Dissertation: *Imaging spatiotemporal transformations in the functional neuroanatomy of lexical memory*

Advisor: Gene E. Alexander

Dissertation research conducted at NIDCD/NIH

M.A. (Psychology, Cognitive and Behavioral Systems)

Arizona State University, November 2004.

Thesis: *Applying Principle and Principal Based Approaches to Model Evaluation and Experimental Design in Written Word Perception*

B.A. Cum Laude (Dual Major: Cognitive Psychology / Philosophy)

University of North Carolina at Charlotte, 1997.

GPA: 3.67 (4.0 psychology / 3.8 philosophy)

Awards and Scholarships:

National Science Foundation Graduate Fellowship, Honorable Mention: 2002.

University Graduate Scholar Award: Department of Psychology, Arizona State University, 2001-2004.

National Science Foundation Graduate Fellowship, Honorable Mention: 2001.

Chick-fil-A of Southpark Scholarship: Department of Philosophy, University of North Carolina at Charlotte, 1996.

Departmental Service:

Graduate Studies Committee Student Member, Arizona State University: 2003-2005.

Professional Society Membership:

Member of Organization for Human Brain Mapping

Member Society for Neuroscience

Original Research Articles:

Coderre, EL, **Smith, JF**, van Heuven, W., & Horwitz, B (submitted). The neural locus of the bilingual cognitive advantage.

Smith, JF, Braun, AR, Alexander, GE, Chen, K, & Horwitz, B (2013). Separating lexical access from other mnemonic processes in picture-name verification. *Frontiers in Psychology: Language Sciences*. 4: 706. doi: 10.3389/fpsyg.2013.00706

Smith, JF, Chen, K, Pillai, AS, Horwitz, B (2013). Identifying effective connectivity parameters in simulated fMRI: a direct comparison of switching linear dynamic system, stochastic dynamic causal, and multivariate autoregressive models. *Frontiers in Brain Imaging Methods*. 7:70. doi: 10.3389/fnins.2013.00070

Banerjee, A, Pillai, AS, Sperling, JR, **Smith, JF**, & Horwitz B (2012). Temporal microstructure of cortical networks underlying task related differences. *NeuroImage*. 62(3): 1643-57

Smith, JF, Pillai, A, Chen, K, & Horwitz B (2012). Effective connectivity Analysis for fMRI: Six issues and possible solutions using linear dynamic systems. *Frontiers in Systems Neuroscience* 5:104. doi: 10.3389/fnsys.2011.00104

Husain, FT, Pajor, NM, **Smith, JF**, Kim, HJ, Rudy, S, Zallewski, C, Brewer, C, & Horwitz, B (2011). Discrimination task reveals differences in neural bases of tinnitus and hearing impairment. *PloS ONE* 6(10): e26639.

Smith, JF, Pillai, A, Chen, K, & Horwitz, B (2010) Identification and validation of effective connectivity networks in functional magnetic resonance imaging using switching linear dynamic systems. *NeuroImage* 52: 1027-1040.

Smith, JF, Alexander, GE, Chen, K, Husain, FT, Kim, J, Pajor, N, & Horwitz B (2010). Imaging systems level consolidation of novel semantic-like memories: A longitudinal neuroimaging study. *NeuroImage* 50(2): 826-836.

Xu, J, Gannon, PJ, Emmorey, K, **Smith, JF**, & Braun, AR (2009). Symbolic gestures and spoken language are processed by a common neural system. *Proceedings of the National Academy of Sciences USA*. Doi: 10.1073/pnas.0909197106.

Smith, JF, Chen, K, Johnson, S, Morrone-Strupinsky, J, Johnson, SC, Reiman, EM, Nelson, A, Moeller, JR, & Alexander, GE (2006). Network analysis of single-subject fMRI during a finger opposition task. *NeuroImage* 32(1): 325 -332.

Invited Reviews:

Horwitz, B & **Smith, JF** (2008). A link between neuroscience and informatics: Large-scale modeling of memory processes. *Methods* **44**(4): 338-347

Conference Presentations, Posters, and Abstracts:

Coderre E, **Smith JF**, van Heuven W, Horwitz B (2013). The Neural Locus of the Bilingual Cognitive Advantage, Cognitive Neuroscience Annual Meeting, San Francisco, CA. Poster

Pillai AS, **Smith JF**, Gilbert JR, Holroyd T, Bennet Y, Horwitz B (2010). MEG Power Difference in Human Auditory Cortex During a Crossmodal, Long-term Memory Task Organization for Human Brain Mapping 16th Annual Meeting, Barcelona, Poster.

Banerjee A, Pillai AS, **Smith JF**, Horwitz B (2010). A method to compare timing of task related differences in MEG/EEG network dynamics. Organization for Human Brain Mapping 16th Annual Meeting, Barcelona, Poster

Smith JF, Horovitz S, Pillai A, Horwitz B (2009). Identifying quasi-neural level task related connectivity in simultaneous EEG/fMRI using a single non-stationary dynamic system. Workshop on Connectivity Inference in Neuroimaging, Neural Information Processing Systems Conference. Whistler BC. Presentation.

Smith JF, Pillai A, Chen K, Horwitz B (2009). Identification and validation of nonlinear forward models of effective connectivity networks using switching dynamic systems. Society for Neuroscience, 39th Annual Meeting, Chicago, IL. Poster

Smith JF, Chen K, Horwitz B, Alexander GE (2009). Temporal evolution of performance related regional networks for visual-to-auditory memory. Organization for Human Brain Mapping 15th Annual Meeting, San Francisco, CA. Poster

Smith JF, Alexander GE, Chen K, Braun AR, Horwitz B (2008). Assessing the functional organization of visual-semantic memory: An fMRI study of linguistic and non-linguistic visual-to-auditory associations. Society for Neuroscience, 38th Annual Meeting, Washington, DC. Poster.

Smith JF, Husain TH, Pajor NM, Goldinger S, Chen K, Alexander GE, Horwitz B. (2007). Functional Neuroimaging of Immediate, Remote, and Linguistic Visual-to-Auditory Paired Associates Memory. Society for Neuroscience, 37th Annual Meeting, San Diego, CA. Presentation.

Husain FT, Pajor NM, **Smith JF**, Zalewski Z, Rudy S, Braun AR, Kim HJ, Brewer C, Horwitz B (2007). Auditory processing in persons with hearing loss and tinnitus: an fMRI study.

Society for Neuroscience, 37th Annual Meeting, San Diego, CA. Poster.

Thai-Van H, **Smith JF**, Kim J, Husain F, Kemeny S, Braun AR, Horwitz B (2006). Focused and divided attention and short-term memory to concurrent auditory and visual information.

Society for Neuroscience, 36th Annual Meeting, Atlanta, GA. Poster.

Smith JF, Thai-Van H, Chen K, Johnson S, Reiman EM, Moeller JR, Horwitz B, Alexander GE (2006). Multivariate Analysis of Functional Networks and Sub-Networks in Single Subject fMRI. Organization for Human Brain Mapping 12th Annual Meeting, Florence Italy. Poster.

Alexander GE, Gupta A, Chen K, Pipe JG, Santerre-Lemmon LE, **Smith JF**, Reiman EM, Baxter LC (2005). Effect of age on regional white matter integrity assessed by diffusion tensor imaging. Annual Meeting of the Arizona Alzheimer's Research Center, Phoenix, AZ. Poster.

Smith JF, Chen K, Morrone-Strupinsky JV, Reiman EM, Nelson A, Moeller JR, Alexander GE (2003) Regional Network Analysis of Single Subject fMRI During the Performance of a Finger Tapping Task. Society for Neuroscience 33rd Annual Meeting, New Orleans, LA. Presentation.

Smith JF, Stone GO (2002). Dynamic Allocation of Levels of Processing in Written Word Perception. 3rd Pre-Psychonomics Lexical Processing Workshop, Tuscon, AZ, November 20-21. Presentation.

Smith JF, Chen K, Moeller JR, Reiman EM, Pietrini P, Rice HJ, Lewis DJ, Davis DA, Krasuski JS, Teipel SJ, Hampel H, Rapoport SI, Schapiro MB, Grafman J, Alexander GE (2002). Regional network analysis of gray matter atrophy in frontotemporal dementia using voxel-based MRI morphometry and a principal component analysis. Annual Meeting of the Arizona Alzheimer's Research Center, Scottsdale, AZ. Poster.

Invited Presentations:

Smith, JF (2013). Effective connectivity revisited. Invited presentation, Center for the Advanced Study of Language, College Park Maryland.

Smith, JF. (2012). Temporal and spatial non-stationarity in effective connectivity. Invited presentation at Symposium "From Static to Dynamic Descriptions: Non-Stationarity in Functional and Effective Brain Connectivity", Organization for Human Brain Mapping 17th Annual Meeting, Beijing China.

- Smith, JF. (2012). On the role of noise in effective connectivity analysis. Invited presentation at 11th Annual Brain Connectivity Workshop, Chengdu China.
- Smith, JF. (2012). Caveats for the analysis of resting state fMRI data. Invited presentation for Division of Neuroscience, National Institute on Aging, Bethesda Maryland.
- Smith, JF. (2011). Effective connectivity modeling for fMRI. Invited presentation for Principle Investigator Seminar Series, National Institutes of Health, Bethesda Maryland.
- Smith, JF. (2010). Effective connectivity Analysis for fMRI: Six issues and possible solutions using linear dynamic systems. Invited presentation for the “Networks in the Human Brain” workshop, Max Plank Institute for Human Cognitive and Brain Sciences Leipzig Germany.
- Smith, JF (2009). Identification and validation of generative models of effective connectivity networks in fMRI and combined fMRI/EEG. Invited presentation for the Applied Neuroscience Seminar, Center for the Advanced Study of Language, College Park Maryland.
- Smith, JF (2009). Systems level consolidation of semantic memory: neuroimaging analysis and steps toward a generative model. Invited presentation for the Neurocognitive Aging Section, National Institute on Aging, Baltimore Maryland.