

**BIOGRAPHICAL SKETCH**

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NAME: Duff, Melissa Collins

eRA COMMONS USER NAME (credential, e.g., agency login): MCDUFF

POSITION TITLE: Associate Professor of Hearing & Speech Sciences, Vanderbilt University Medical Center

EDUCATION/TRAINING (*Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.*)

INSTITUTION AND LOCATION	DEGREE (if applicable)	Completion Date MM/YYYY	FIELD OF STUDY
Southern Illinois University, Carbondale, IL	B.A.	1996	Linguistics
Southern Illinois University, Carbondale, IL	B.S.	1997	Communication Disorders and Sciences
University of North Carolina, Chapel Hill, NC	M.S.	1999	Speech and Hearing Sciences
University of Illinois, Urbana-Champaign, IL	Ph.D.	2005	Speech and Hearing Science
University of Iowa, Iowa City, IA	Postdoctoral Fellow	2005-2009	Cognitive Neuroscience

**a. Personal Statement**

I am the director of the Communication and Memory Laboratory at Vanderbilt University Medical Center. The research in my lab focuses on the role of memory in language and social interaction, paying special attention to the role of the hippocampus in language use and processing and in flexible cognition more broadly. Methodologically, the lab combines neuropsychological, neuroimaging, and eye-tracking methods together with behavioral methods to address questions about the contribution of distinct forms of memory to various aspects of language use and processing, and the dynamic network of neural and cognitive systems that support memory and language in the everyday communicative settings and tasks. My lab also conducts research in the area of acquired brain injury and the factors that influence long-term outcome. I am the founder and director of the Brain Injury Patient Registry, a repository of demographic information, and state of the art neuropsychological and neuroanatomical data from individuals with focal lesions and traumatic brain injury, which serves as a unique resource for conducting large-scale basic and translational research in the area of acquired brain injury.

- a. Hannula, D. & Duff, M.C. (Eds.). (2017). *The hippocampus from cells to systems: Structure, connectivity, and functional contributions to memory and flexible cognition*. New York, NY: Springer Nature.
- b. Duff, M.C., & Brown-Schmidt, S. (2012). The hippocampus and the flexible use and processing of language. *Frontiers in Human Neuroscience*, 6. doi: 10.3389/fnhum.2012.00069. PMID: PMC3319917.

**B. Positions and Honors**

Positions and Employment

- 1999 – 2000 Speech-Language Pathologist, SunDance Rehabilitation, Merrillville, Indiana
- 2000 – 2003 Speech-Language Pathologist, Carle Hospital, Champaign, Illinois
- 2000 – 2004 Clinical Supervisor, Dept. Speech and Hearing Science Clinic, University of Illinois

2005 – 2009	Postdoctoral Fellow, Department of Neurology, Division of Cognitive Neuroscience, University of Iowa, Iowa City, Iowa
2009 – 2015	Assistant Professor, Departments of Communication Sciences and Disorders and Neurology, University of Iowa
2015 – 2016	Associate Professor, Departments of Communication Sciences and Disorders and Neurology, University of Iowa
2011 – 2016	Founder and Director, Iowa Traumatic Brain Injury Registry, University of Iowa
2016 – present	Associate Professor, Department of Hearing and Speech Sciences, Vanderbilt University Medical Center
2016 – present	Founder and Director, Brain Injury Patient Registry, Vanderbilt University Medical Center

#### Selected Honors and Awards

1996	Outstanding Linguistic Student Award, Southern Illinois University at Carbondale
1998	Medical Alumni Loyalty Fund Scholarship, Medical School, University of North Carolina
2006-2011	NIH Clinical Research Loan Repayment Program Recipient
2010	American Speech Language Hearing Association Award for Early Career Contributions in Research
2015-2016	Dean's Scholar, College of Liberal Arts and Sciences, University of Iowa

### **C. Contribution to Science**

#### **1. Hippocampal contributions to language processing and use**

We have proposed that the hippocampus is a key contributor to language use and processing. Specifically, my proposal is that many of the processes by which we produce and understand language also place high demands on and receive contributions from the hippocampal declarative memory system. This proposal has its roots in my observations that while individuals with amnesia are within normal limits on standardized tests of language, their *language use* differs in striking ways from healthy comparison participants. This proposal goes against the historical view that amnesia is a pure deficit in memory leaving other cognitive domains, like language, intact. Combining a neuropsychological approach with situated discourse analysis and eyetracking, **my work has provided extensive evidence that hippocampus contributes to language use and processing and argues that the network of neural substrates and cognitive process that support language use and processing be extended to include the hippocampal declarative memory system.** We have shown that hippocampus supports a range of discursive functions including reference, online- processing, and semantic processing.

- Kurczek, J., Brown-Schmidt, S., & **Duff, M.C.** (2013). Hippocampal contributions to language: Evidence of referential processing deficits in amnesia. *Journal of Experimental Psychology: General*, 142 (4), 1346-1354. PMID: PMC3974972.
- Klooster, N. & **Duff, M.C.** (2015). Remote semantic memory is impoverished in hippocampal amnesia. *Neuropsychologia*, 79(Part A), 42-52. PMID: PMC4679630
- Hilliard, C., Cook, S.W., & **Duff, M.C.** (2016). Hippocampal declarative memory supports gesture production: Evidence from amnesia. *Cortex*, 85, 25-36.
- Duff, M.C.**, & Brown-Schmidt, S. (2017). Hippocampal contributions to language use and processing. In Hannula, D. & Duff, M.C. (Eds.). *The hippocampus from cells to systems: Structure, connectivity, and functional contributions to memory and flexible cognition*, pp. 503-536. New York, NY: Springer Nature.

**2. Hippocampal contributions to flexible cognition and social behavior.** In addition to hippocampal contributions to language use and processing, my work has also specified how the hallmark processing features of the hippocampus, including its capacity for relational binding, online processing, and representational flexibility are called on in service of flexible cognition and social behaviors that were considered exclusively the domain of other neural structures (e.g., frontal lobes). **My lab has demonstrated hippocampal contributions to decision-making, creativity, empathy, and other domains of social cognition. This work, along with my work on hippocampal contributions to language use and processing, has impacted subsequent refinements and expansions of relational memory theory** (Rubin & Cohen, 2017).

- a. Warren, D., Kurczek, J., & **Duff, M.C.** (2016). What relates newspaper, definite, and clothing? An article describing deficits in convergent problem solving and creativity following hippocampal damage. *Hippocampus*, 26: 835–840.
- b. **Duff, M.C.**, Kurczek, J., Rubin, R., Cohen, N.J., & Tranel, D. (2013). Hippocampal amnesia impairs creative thinking. *Hippocampus*, 23 (12), 1143-1149. PMID: PMC4010315.
- c. Beadle, J., Tranel, D., Cohen, N.J., & **Duff, M.C.** (2013). Empathy in hippocampal amnesia. *Frontiers in Psychology*, 4 (69). doi: 10.3389/fpsyg.2013.00069. PMID: PMC3605505.
- d. Rubin, R., Watson, P., **Duff, M.C.**, & Cohen, N.J. (2014). The role of the hippocampus in flexible cognition and social behavior. *Frontiers in Human Neuroscience*, 8, DOI: 10.3389/fnhum.2014.00742. PMID: PMC4179699.

### 3. Social perception and social communication following traumatic brain injury

Impairments in social behavior are a hallmark of moderate-to-severe traumatic brain injury in adults. While TBI can result in a range of cognitive and behavioral disorders, the most common complaint, and perhaps the greatest obstacle to community re-integration and employment, is that persons with TBI have “odd” social behaviors, such as making inappropriate or irrelevant comments, monopolizing conversations, and generally appearing to be insensitive to the social needs of others. These are *social communication problems*. To date, however, there is little evidence that treatment of these problems generalizes beyond the therapy room to everyday social interaction. **We propose that treatments may fail because clinicians are targeting the wrong problem, as current therapies focus on re-teaching “appropriate” behaviors (e.g., training eye contact or turn-taking), without considering the underlying causes of these behaviors. Our work has aimed to identify the underlying mechanisms of impairment in social perception and communication in individuals with traumatic brain injury.**

- a. Rigon, A., Turkstra, L., Mutlu, B., & **Duff, M.C.** (in press). Facial affect recognition deficit as a predictor of social communication impairment following traumatic brain injury. *Neuropsychology*.
- b. Turkstra, L., Politis, A., **Duff, M.C.**, & Mutlu, B. (in press). Detection of text-based social cues in adults with traumatic brain injury. *Neuropsychological Rehabilitation*.
- c. Rigon, A., Voss, M., Turkstra, L., Mutlu, B., & **Duff, M.C.** (2017). Relationship between individual differences in functional connectivity and facial-emotion recognition abilities following traumatic brain injury. *NeuroImage: Clinical*, 13, 370-377.
- d. Rigon, A., Turkstra, L., Mutlu, B., & **Duff, M.C.** (2016). The female advantage: Sex as a possible protective factor against emotion recognition impairment following traumatic brain injury. *Cognitive, Affective, and Behavioral Neuroscience*, 16(5), 866-875.

### 4. Development of novel and ecologically valid approaches to the empirical study of social communication following brain injury

A significant challenge in the study of social behavior and communication is that such deficits can be elusive and difficult to capture in laboratory settings while maintaining needed experimental control. **We have been active in developing methods and analyses that support the empirical study of complex social behavior and that promote understanding of interactions among communication partners within the environments and contexts of everyday language use.**

- a. Gupta Gordon, R., & **Duff, M.C.** (2016). Incorporating principles of the collaborative contextualized intervention approach with the empirical study of learning and communication in traumatic brain injury. *Aphasiology*, 30(12), 1461-1482.
- b. **Duff, M.C.**, Mutlu, B., Byom, L., & Turkstra, L. (2015). Communication as distributed cognition: Novel theoretical and methodological approaches to disruptions in social communication following acquired brain injury. In R. Bahr & E. Silliman (Eds.) *Handbook of Communication Disorders*. Routledge.
- c. **Duff, M.C.**, Mutlu, B., Byom, L., & Turkstra, L. (2012). Beyond utterances: Distributed cognition as a framework for studying discourse in adults with acquired brain injury. *Seminars in Speech and Language*, 33 (1), 44-54.

## 5. Neural systems and large scale neural networks that support complex behavior

Taking advantage of recent methodological and theoretical advances in visualizing and conceptualizing the functional connectivity of neural systems and the disrupted nature of complex behavior in the brain, we have been exploring the neural systems and large scale neural networks that supports complex behavior. Studying healthy and neurologically impaired participants allows us to contribute to a new (emerging) set of principles for the organization of the brain and the instantiation of complex cognitive behavior in brain. **This work has allowed us to relate behavioral impairment to disruptions in underlying neural networks and promises to advance our ability to characterize and track recovery (deterioration) trajectories in clinical populations and develop personalized interventions.**

- a. Rigon, A., **Duff, M.C.**, McAuley, E., Kramer, A., & Voss, M. (2016). Is traumatic brain injury associated with reduced inter-hemispheric functional connectivity? A study of large-scale resting state networks following traumatic brain injury. *Journal of Neurotrauma*, 33(11), 977-989.
- b. Rigon, A., Voss, M., Turkstra, L., Mutlu, B., & **Duff, M.C.** (2016). Fronto-temporal structural connectivity is associated with communication impairment following traumatic brain injury. *Journal of the International Neuropsychological Society*, 22(7) 705-716.
- c. Philippi, C., Tranel, D., **Duff, M.C.**, & Rudrauf, D. (2015). Damage to the default mode network disrupts autobiographical memory retrieval. *Social Cognitive and Affective Neuroscience*, 10(3), 318-26. PMID: PMC4350487.

**Link to publications:** <http://www.ncbi.nlm.nih.gov/pubmed/?term=melissa+duff>

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## D. Research Support

### Ongoing Research Support

R01 DC011755-01 (NIH-NIDCD) Language processing and hippocampal declarative memory

Project Period: 2/12 – 3/18

Role on Project: Co-PI (with Sarah Brown-Schmidt)

The purpose of this project is to investigate the role of hippocampal declarative memory to the flexible use and on-line processing of language.

R01 HD071089 (NIH-NIHCD) Social Perception and Social Communication in Adults with Traumatic Brain Injury

Project Period: 11/1/12 – 10/1/2018

Role on Project: Co-Investigator (with Lyn Turkstra)

The goal of this work is to link differences in social perception across parametrically varied social cues in face to face interaction in individuals with TBI with communication ability and outcome.

### Completed Research Support

F32 DC008825 (NIH-NIDCD) Acquisition and use of common ground in communication

Project Period: 9/1/06-8/31/09

Role on Project: PI

The goal of this work was to characterize the cognitive processes and neural substrates supporting the acquisition and use of common ground in communication.

American Speech-Language-Hearing Foundation (ASHFoundation) Effects of an impaired somatic marker system on the use of involvement strategies in communication following bilateral ventromedial prefrontal cortex damage

Project Period: 1/1/2008-12/31/2009

Role on Project: PI

The goal of this work was to investigate language use in the social communication of individuals with acquired frontal lobe pathology.