

NORBOU BUCHLER

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Lines of Research

I. Memory & Aging

My main interests concern the psychological and biological aspects of memory and aging. Currently, my research uses functional magnetic resonance imaging (fMRI) to investigate age-related differences in the neural mechanisms of both anticipatory recruitment and memory retrieval processes associated with general item recognition (*what?*) as well as recognizing more source-specific information (*who? where? when?*).

II. Computational Modeling of Age-related Memory Decline

My recent post-doctoral research was focused on developing computational models of memory, and specifically, to explain the typically observed pattern of impaired (episodic) and intact (semantic) memory performance with advancing age. I used computational modeling to explore a number of age-related parameters to account for this pattern. A 2-parameter solution based on lifelong experience successfully fit the pattern of results in 5 published studies. Lifelong experience increases the strength of our memories but also saturates it with an increasing number of episodic associations to each concept. More episodic associations to each concept means that activation spreads more diffusely, making retrieval of any newly established memory trace less likely; however, greater memory strength makes general recognition (familiarity) more likely.

As a general theme, I am interested in understanding the role of experience on memory and cognition both in the short-term (cognitive skill-acquisition, learning, repetition) and across the lifespan (cognitive aging).

III. Executive Control Processes

Currently, my research uses fMRI to investigate incidental and intentional uses of memory. That is, what are the neural correlates of exerting cognitive control over mnemonic processes? And, to what degree are memories elicited automatically?

My doctoral work used various behavioral methods, including analyzing response distributions and formal quantitative modeling, to examine multi-tasking performance (switching between up to four tasks) in both young and older adults. Amazingly, extended training (5 days) eliminated age-related differences in task-switch costs, even when having to manage the execution of up to four tasks. This positive outcome supports the use of training interventions for the aged multi-tasker.

More recent work examined the difficulty of coordinating a sequence of well-learned, simple mental operations. For well-practiced sequences, increasing the length from two-steps to three-steps resulted in a four-fold jump in the 'coordinative cost', which I was able to isolate using task decomposition methods.

Positions and Professional Experience

- 2007- Post-doctoral Research Scientist, *Duke University*, Durham, NC
Supervised by both Prof. Roberto Cabeza & Prof. Ian Dobbins: using behavioral and neuroimaging (fMRI) to investigate the neural correlates of memory function, executive control, and memory recruitment in young and older adults.
- 2004-2006 Post-doctoral Research Fellow, *Carnegie Mellon University*, Pittsburgh, PA
Supervised by Prof. Lynne Reder: using behavioral and computational modeling techniques to investigate age-related (lifelong experience) change to memory function. Ongoing collaboration with Prof. Leah Light (*Pitzer College*)
- 2002-2003 Eric F. Gardner Research Fellow, Cognitive Aging Lab, Syracuse University
- 1999-2002 Instructor, Syracuse University, Syracuse, NY
- 1997-1999 Teaching Assistant, Syracuse University, Syracuse, NY
- 1994-1996 Undergraduate Research Assistant, Optical Diagnostics and Applications Lab, University of North Carolina at Chapel Hill

Education

- 1997-2003 *Department of Experimental Psychology (Cognitive Aging), Syracuse University*
Ph.D., supervised by Dr. William Hoyer (primary advisor) and Dr. John Cerella (secondary advisor). Dissertation (currently under review) investigated the control of multiple task sets in task switching for younger and older adults using behavioral measures, analyses of response distributions, and formal quantitative models.
- 1996-1997 *Computer Information Science and Engineering (CISE), University of Florida*
Post-baccalaureate coursework
- 1993-1996 *Department of Psychology, University of North Carolina at Chapel Hill*
BS in Psychology
- 1989-1993 *Eastside High School, Gainesville, FL*
International Baccalaureate (IB) diploma

Awards and Fellowships

- 2005 Fellow, 6th Schloessmann Seminar of Cognitive Neuroscience of Human Ontogeny (Doelln, Germany: Max Planck Society)
- 2004-2006 National Institutes of Mental Health Training Grant (Combined Computational and Behavioral Approaches to the Study of Cognition) [Carnegie Mellon University]
- 2003 Certificate in University Teaching, Future Professoriate Program, Syracuse University, Syracuse, NY

- 2003 Fellow, Computational Modeling ACT-R Summer School and Workshop (Pittsburgh, PA: Carnegie Mellon University)
- 2002 -2003 Eric F. Gardner Memorial Research Fellowship
- 1999 Syracuse University Competitive Research Grant Award (\$1500)

Publications

1. **Buchler, N.E.G.**, & Reder, L. M. (2007). Modeling age-related memory deficits: A two-parameter solution. *Psychology and Aging, 22(1)*, 104-121.
2. Hoyer, W.J., Semene, S., **Buchler, N.E.G.** (2007). Acute alcohol impairs controlled search across the visual field. *Journal of Studies of Alcohol and Drugs, 68(5)*, 748-758.
3. Verhaeghen, P., Palfai, T., Cerella, J., **Buchler, N.E.**, et al. (2000). Age-related dissociations in time accuracy functions for recognition memory: Utilizing semantic support versus building new presentations. *Aging, Neuropsychology and Cognition, 7(4)*, 260-272.
4. **Buchler, N.E.G.**, Hoyer, W.J., & Cerella, J. (under review). Rules and more rules: The Effects of multiple tasks, extensive training, and aging on task-switching performance. *Memory & Cognition*.
5. **Buchler, N.E.G.**, Reder, L.M., & Light, L.L. (under review). Memory for items and associations: Distinct units and processes in associative recognition. *Journal of Memory and Language*.
6. **Buchler, N.E.G.** (submitted). The cost of coordinative a sequence of mental operations. *Journal of Experimental Psychology: Learning, Memory, & Cognition*

Manuscripts in Preparation

7. **Buchler, N.E.G.**, Light, L.L., Gottfredson, N., & Reder, L.M. (in preparation). Young and older adult recognition for items and associations. Pittsburgh, PA: Carnegie Mellon University, 2007, unpublished manuscript.
8. Hoyer, W.J., Cerella, J., & **Buchler, N.E.G.** (in preparation). Age-related differences in visual search: Modeling controlled search and eccentricity effects. Syracuse, NY: Syracuse University, 2007, unpublished manuscript.

Published Abstracts

Buchler, N.E., & Reder, L.M. (2006, April). Modeling age-related memory deficits: A two-parameter solution. *Ninth Cognitive Aging Conference* (Atlanta, GA).

Buchler, N.E., Hoyer, W.J., & Cerella, J. (2004, April). Rules and more rules: The accessibility of productions in highly trained younger and older adults. *Eighth Cognitive Aging Conference* (Atlanta, GA).

Begeny, J., **Buchler, N.E.**, Kleinmann, A., Leader, T., Lee, S., Neal, D., Onyper, S., Rosenblatt, M., Stawski, R., & Wasylshyn, C. (2003, December). Does music have charms to soothe the demented breast? A meta-analytic integration of music therapy for dementia. *56th Meeting of the Gerontological Society of America* (San Diego, CA).

Hoyer, W.J., Cerella, J., & **Buchler, N.E.** (2003, November). Cluster size and eccentricity in visual search. *44th meeting of the Psychonomic Society* (Orlando, FL).

Buchler, N.E., Semenec, S., Hoyer, W.J., & Cerella, J. (2002, April). Age-related constriction of the functional field in visual search. *Seventh Cognitive Aging Conference* (Atlanta, GA).

Buchler, N.E., & Hoyer, W. J. (2000, April). Adult age differences in learning and transfer of speeded choice responses: Response competition effects. *Sixth Cognitive Aging Conference* (Atlanta, GA).

Teaching Experience

1999-2002 **Instructor**, Syracuse University
Cognitive Psychology (35 students)
Cognitive Psychology Lab (25 students)
Psychology of Adult Development (70 students)

1997-1999 **Teaching Assistant**, Syracuse University
General Psychology (120 students)
Experimental Methodology (50 students)
Brain and Behavior Lab (30 students)
Sensation and Perception (50 students)

Invited Symposia

Buchler, N. E. (2005, June). Modeling age-related memory deficits: A two-parameter solution. Talk given at the *6th Schloessmann Seminar on Cognitive Neuroscience of Human Ontogeny*. Doelln, Germany.

Buchler, N. E. (2003, October). Ex-Gaussian analysis: The tau of response distributions. Talk given at the *41st Eric F. Gardner Conference on Psychological Measurement*. Auburn, NY.

Buchler, N. E. (2002, October). Effects of adult age on the item learning and rule learning components of cognitive skill acquisition. Talk given at the *40th Eric F. Gardner Conference on Psychological Measurement*. Auburn, NY.

Professional Experience and Memberships

1998-2007 Member, American Psychological Association (Division 20, Psychology & Aging).

2005-2007 Journal Reviewer (ad hoc)
Journal of Memory and Language
Journal of General Psychology
American Journal of Psychology

Languages: Bilingual: English, French.

Nationality: USA

Professional References

Professor William Hoyer, Ph.D. advisor

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Professor John Cerella, Ph.D. secondary advisor

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Professor Lynne Reder, Post-doctoral advisor

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Professor Leah Light, ongoing research collaboration

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Professor Ian G. Dobbins, Post-doctoral advisor

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