BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. **DO NOT EXCEED FIVE PAGES**.

NAME: Peter Edward Wais

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

POSITION TITLE: Assistant Professor in Residence

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
University of California, Berkeley	B.A.	03/1976	Journalism
Harvard Business School	Executive Program	06/1992	Competitive Strategy
Stanford University	Psychology	06/2004	
University of California, San Diego	M.A.	06/2006	Psychology
University of California, San Diego	Ph.D.	06/2008	Psychology
University of California, San Francisco	Postdoctoral Fellow	01/2013	Neurology
University of California, San Francisco	Assistant Adjunct Professor	12/2015	Neurology

A. Personal Statement

My current research focus involves a translational neuroscience approach in development of a cognitive training intervention that targets sustained improvement in capabilities for long-term memory (LTM) and cognitive control. My hypothesis is that immersion in a game to navigate errands through unfamiliar, visually complex neighborhoods (i.e., wayfinding) will effectively induce enriching learning and memory retrieval that depends upon healthy hippocampal function. The significance of this novel direction is in therapeutic applications for older adults with impairments in cognitive health.

Building onto my expertise from prior cognitive neuroscience research involving functional MRI, repetitive transcranial magnetic stimulation and studies with healthy and cognitively impaired older adults, I have most recently developed cognitive interventions using video games with new VR technologies. My research plans aim to conduct RCT-designed studies to examine cognitive training-induced changes in the hippocampal memory system, which will bring beneficial gains in high-fidelity LTM capability to healthy and mildly impaired older adults.

Background: After a successful career in industry, which culminated as chief executive for companies producing basic sheet steel and pure chocolate, I redirected my energy and curiosity toward basic research in the cognitive neuroscience of long-term memory. I made the transition from leadership of an industrial organization with several hundred employees to graduate school at UCSD, where I developed my thesis about the roles of the hippocampus in recognition memory.

I completed my doctoral degree in four years, and then began a postdoctoral fellowship at UCSF. I developed research with Dr. Adam Gazzaley that examined the interaction of the prefrontal cortex, the MTL and the visual association cortex in functional networks that support memory retrieval during external distraction. The experiments gave me opportunities to learn additional neuroimaging methods, advanced

techniques for analysis of structural and long-range functional networks and how to conduct research with older adult participants.

The National Institutes on Aging granted a Pathway to Indpenedence Award (K99/R00) in support of my continued training and original research plan. During the K99 phase, I accepted a position as Assistant Professor of Neurology in Residence at UCSF and completed training related to research with cognitively impaired patients.

B. Positions and Honors

Positions and Employment

2016-present Assistant Professor in Residence, Department of Neurology, University of California, San Francisco

Other Experience and Professional Memberships

2004-present Society for Neuroscience
2008-present Cognitive Neuroscience Society
2010-present Association for Psychological Science
2013-2013 grant referee, German-Israeli Foundation for Scientific Research and Development

Honors

2007 Kavli Institute for Brain & Mind Innovative Research Award ($27,000)
2013 UCSF RAP Junior Investigator Pilot Award ($25,000)
2013 K99R00 Pathway to Independence Award from the National Institutes on Aging (NIH) Grant KAG043557

C. Contribution to Science

1. Hippocampal functions in recognition memory. My earliest contribution came from a comparison of memory performance between healthy controls and hippocampal patients that supported a new interpretation of hippocampal function in recognition. Related projects with healthy younger adults elucidated neural correlates associated with psychological models of recognition processes.
   a. Wais, P., Wixted, J., Hopkins, R. & Squire, L. (2006). The hippocampus supports both the recollection and the familiarity components of recognition memory. Neuron, 49. 459-466. PMCID: PMC1457095
   b. Wais, P., Mickes, L., & Wixted, J. (2008). Remember/Know judgments probe degrees of recollection. The Journal of Cognitive Neuroscience, 20. 400-405. PMID: 18004949
   c. Wais, P., Squire, L. & Wixted, J. (2010). In search of recollection and familiarity signals in the hippocampus. The Journal of Cognitive Neuroscience, 22. 109-123. PMCID: PMC2888779
   d. Wais, P. (2011). Hippocampal signals for strong memory when associative memory is available and when it is not. Hippocampus, 21. 9-21. PMID: 20014387
2. Effects of distraction on LTM retrieval. A series of studies revealed that the influence of irrelevant external stimuli causes interference with the fidelity of details retrieved from long-term memory (LTM). Convergent results from experiments with younger and older adults showed a domain-general, negative impact of distraction on retrieval of details from memory. Related studies with younger adults, fMRI and rTMS studies identified modulation of functional cortico-hippocampal networks associated with distracted and non-distracted LTM performance.
   a. Wais, P., Rubens, M., Boccanfuso, J. & Gazzaley, A. (2010). Neural mechanisms underlying the impact of visual distraction on retrieval of long-term memory. Journal of Neuroscience, 30. 8541-8550. PMCID: PMC2919837
   b. Wais, P., Kim, O. & Gazzaley, A. (2012). Distractibility during episodic retrieval is exacerbated by perturbation of left ventrolateral prefrontal cortex. Cerebral Cortex, 22. 717-724. PMCID: PMC3278320
   c. Wais, P., Martin, G. & Gazzaley, A. (2012). The impact of visual distraction on retrieval of long-term memory in older adults. Brain Research, 1430. 78-85. PMCID: PMC3242871
   d. Wais, P. & Gazzaley, A. (2011). The impact of auditory distraction on retrieval of visual memories. Psychonomic Bulletin & Review, 18. 1090-1097. PMID:21938641
3. High-fidelity memory retrieval arises from MTL-cortical networks. My recent research is published or in peer review. Results from studies using structural and functional MRI, and rTMS, show that retrieval of

contextually rich memory (i.e., pattern separation underlying discrimination) depends on functional and related structural networks involving the medial temporal lobe (MTL), prefrontal cortex, and lateral parietal regions. Changes in cognitive aging are such that healthy older adults who retain capability for high-fidelity retrieval (i.e., high performers) employ compensatory networks, whereas healthy older adults who are impaired in remembering details from memory (i.e., low performers) do not evidence prefrontal-MTL interactions during high-fidelity retrieval.

a. Wais, P., Jahanikia, S., Steiner, D., Stark, C. & Gazzaley, A. (2017). Retrieval of high-fidelity memory arises from distributed cortical networks. NeuroImage 149, 178-189. PMCID: PMC5367976

b. Wais, P., Montgomery, O., Stark, C.E.L. & Gazzaley, A. (2018). Evidence of a causal role for mid-ventrolateral prefrontal cortex based functional networks in retrieving high-fidelity memory. Scientific Reports, Oct 05; 8(1):14877. PMCID:PMC6173692

4. Cognitive training with a spatial wayfinding game generalizes to high-fidelity LTM improvement in healthy older adults. Results showed a post-treatment gain in mnemonic discrimination for the Labyrinth-VR arm, relative to placebo, which reached the levels attained by younger adults in another experiment. This novel finding demonstrates generalization of benefits from the VR wayfinding game to important, and untrained, LTM capabilities.

a. Wais, P., Arioli, M., Anguera-Singla R., Gazzaley A. (2021). Virtual reality video game improves high-fidelity memory in older adults. Scientific Reports, Jan 28; PubMed PMID: 33510315; PubMed Central PMCID: PMC7844043.

Complete List of Published Work in My Bibliography:

A complete listing of my publications can be viewed at:
https://www.ncbi.nlm.nih.gov/myncbi/1b1VBiiuqxckt/bibliography/public/

D. Research Support

Completed Research Support

K99/ R00 AG043557 07/01/2013-05/31/2019
National Institutes on Aging (NIH)
Neural Correlates of Discrimination and Generalization in Recognition Memory
Project goal(s): Use multiple neuroimaging methodologies to examine the roles of distributed cortical networks in retrieval of high fidelity memory. Comparisons between younger and older adults will reveal network changes associated with diminished memory, age-related alterations and compensatory shifts. Behavioral testing with mildly impaired patients will identify deficits associated with pathology.
Role: PI

07-29 07/01/2007-06/30/2008
Kavli Institute for Brain and Mind at UCSD
A Neuroimaging Investigation of the Component Processes of Recognition Memory
Role: co PI

35488 / 556945 02/01/2013-01/31/2014
UCSF Academic Senate
Examining Discrimination and Generalization in Recognition Memory: Neural Substrates, and Changes Associated with Normal and Pathological Aging
Role: PI