

PSY 346: No Train, No Gain: Using Brain Training to Prevent Cognitive Decline
Spring 2017, Fridays, 10:10 a.m. – 12:30 p.m. Olin 309

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Office hours: Tuesday noon – 1:00 p.m., Friday 1:30 p.m. – 2:30 p.m., or by appointment

COURSE DESCRIPTION

The finding that the brain changes as a function of experience and that this neuroplasticity extends beyond critical periods in development raises the possibility that behavioral interventions might be able to improve cognitive processes such as attention and memory. In this course we will critically evaluate the evidence in favor of so-called “brain training”, with an emphasis on behavioral interventions designed to delay or prevent cognitive declines associated with dementia and healthy aging. Readings for this course will primarily be empirical research, theoretical papers, and review articles. Assignments will include the submission of weekly discussion questions, presentation of empirical articles, and a final paper proposing a novel behavioral intervention. This course is open to all moderated psychology students or with permission of the instructor.

COURSE POLICIES

Weekly Expectations

This class will be conducted as a seminar and is intended to provide a forum where you can express your thoughts and analyses on the material. The only way this can happen effectively is if you complete the reading thoroughly. Generally, you will not be able to read and reflect on all the material if you wait until the last minute. I encourage you to look at the assignments ahead of time and plan accordingly.

Participation and Attendance

Attendance is mandatory. As a seminar, this class is founded on discussion among students, and you cannot contribute if you do not show up for class. Consequently, your participation grade will be lowered for each absence.

Academic Integrity.

All students are assumed to have read the Bard College Handbook and to be familiar with the school’s policies regarding Plagiarism and Academic Dishonesty. Violations of these policies are taken extremely seriously and will result in a failing grade for the course and a referral to the Dean of Students for further action.

REQUIRED READING MATERIAL

+++All reading assignments are available through the course's Moodle site(access code: Train

ASSIGNMENTS

Class Participation (100 points). Because this is a seminar, participation from everyone is crucial. If you tend to feel uncomfortable speaking up in classes, please talk to me early in the semester to discuss ways to help you

Weekly discussion questions/comments (80 points). You must submit **one** question or comment about the week's readings to me via email (thutcheo@bard.eud) by 9:30 am on the assigned days. These questions/comments are intended to help you think more deeply about the articles and to help organize our in class discussion. Questions will be graded as 0, 5, or 10 points. There will be a total of 8 questions/comments due throughout the semester.

Article Presentation (50 points each). On the first day of class, you will be randomly assigned to present during two class periods. For these presentations you will summarize one of the assigned articles. You are welcome to use whatever visual/auditory/printed aides you would like to help us understand your article. You should be prepared to serve as the class expert on that paper (note: this might entail some outside reading. At the end of the class period you present, you will meet with me to discuss your performance and to receive your grade.

Brain Training Proposal (260 points).

In this assignment you will propose a novel behavioral brain training intervention relevant to the topics covered in this course. This project will be broken down into four parts

- 1) An initial 1-page proposal in which you generally describe the intervention and a summary of one relevant article (that we have not read as a part of class reseach (25 points)
- 2) An initial submission of your full proposal (approximately 8-12 pages) (100 points)
- 3) A detailed review of your classmates' initial submissions (35 points)
- 4) A revise and resubmission of your proposal in which you explicitly respond to the comments of the reviewers (50 points).
- 5) Presentation to group on last day of class (50 points).

Additional information about the Experimental Proposal will be provided over the course of the semester

GRADING

Grading is on a 490 point scale. Grades will be assigned based on total points earned within the following ranges – pluses and minuses will be assigned at the top and bottom of each range.

- A range 440 points and higher
- B range 390-439 points
- C range 340-389 points
- D range 290-349 points
- F less than 290 points

SUMMARY OF DUE DATES

Weekly Questions	See weekly schedule
Article Presentations	Will be assigned during first class meeting
One page training proposal	March 17
Initial Proposal Submission	April 21
Review of Classmate's Proposal	April 28
In class Presentations and Final Paper	May 19

COURSE SCHEDULE**February 3rd: Welcome to Brain Train!**

No readings or assignments

February 10th: Introduction to The Brain Training Controversy

“A consensus on the brain training industry from the scientific community.” (2014). Retrieved from <http://longevity3.stanford.edu/blog/2014/10/15/the-consensus-on-the-brain-training-industry-from-the-scientific-community-2/>

“Cognitive training data response letter.” (2014). Retrieved from <http://www.cognitivetrainingdata.org/the-controversy-does-brain-training-work/response-letter/>

Ericsson, K. A., Chase, W. G., & Faloon, S. (1980). Acquisition of a memory skill. *Science*, *208*, 1181-1182.

February 17th: Early Evidence that Cognition Can be Trained I

Green, C. S. & Bavelier, D. (2003). Action video game modifies visual selective attention. *Nature*, *423*, 534-537.

Holmes, J., Gathercole, S., & Dunning, D. L. (2009). Adaptive training leads to sustained enhancement of poor working memory in children. *Developmental Science*, *12*, F9 F15.

Jaeggi, S. M., Buschkuhl, M., Jonides, J., & Perrig, W. J. (2008). Improving fluid intelligence with training on working memory. *Proceedings of the National Academy of Sciences*, *105*, 6829-6833

Assignments

Question/Comment #1 Due

February 24th: Evidence that Cognition Can Be Trained II

- Rosen, A. C., Sugiura, L., Kramer, J. H., Whitfield-Gabrieli, S., & Gabrieli, J. D. (2011). Cognitive training changes hippocampal function in mild cognitive impairment: A pilot study. *Journal of Alzheimer's Disease*, *26*, 349-357.
- Pressler, S. J., Therrrien, B., Riley, P.L., Chou, C. C., Ronis, D. L., Koelling, T. M.,...Giordani, B. (2011). Nurse-enhanced memory intervention in heart failure: The MEMOIR study. *Journal of Cardiac Failure*, *17*, 832-843.
- Anguera, J. A., Boccanfuso, J., Rintoul, J. L., Al-Hashimi, O., Faraji, F., Janowich, J.,...Gazzaley, A. (2013). Video game training enhances cognitive control in older adults. *Nature*, *501*, 97-101.

Assignments

Question/Comment #2 Due

March 3rd: Plausible Neural Mechanisms Underlying Brain Training

- Olesen, P. J., Westerberg, H., & Klingberg, T. (2004). Increased prefrontal and parietal activity after training of working memory. *Nature Neuroscience*, *7*, 75 – 79.
- Cole, M. W., Yarkoni, T., Repovš, G., Anticevic, A., & Braver, T. S. (2012). Global connectivity of prefrontal cortex predicts cognitive control and intelligence. *Journal of Neuroscience*, *27*, 8988 – 8999.
- Burke, S. N., & Barnes, C. A. (2006). Neural plasticity in the ageing brain. *Nature Reviews Neuroscience*, *7*, 30-40.

Assignments

Question/Comment #3 Due

March 10th: Methodological Considerations for Training Studies

Selected parts of:

Simons, Boot, W. R., Charness, N., Gathercole, S. E., Chabris, C. F., Hambrick, D. Z., & Stine-Morrow, E. (2016). Do “Brain-training” programs work? *Psychological Science in the Public Interest*, *17*, 103-186.

Owen, A. M., Hampshire, A., Grahn, J. A., Stenton, R., Dajani, S., Burns, S. A.,...& Ballard, C. G. (2010). Putting brain training to the test. *Nature*, *465*, 775-778.

McCabe, J. A., Redick, T. S., & Engle, R. W. (2016). Brain-training pessimism, but applied memory optimism. *Psychological Science in the Public Interest*, *17*, 187-191.

Assignments

Question/Comment #4 Due

March 17th: Training Studies with Older Adults

Ackerman, P. L., Kanfer, R., & Calderwood, C. (2010). Use it or lose it? Wii brain exercise practice and reading for domain knowledge. *Psychology and Aging*, *25*, 753-766.

Stine-Morrow, E. A. L., Payne, B. R., Roberts, B. R., Kramer, A. F., Morrow, D. G., Payne, L.,...Janke, M. C (2014). Training versus engagement as paths to cognitive enrichment in Aging. *Psychology and Aging*, *29*, 891-906.

Sternberg, D. A., Ballard, K., Hardy, J. L., Katz, B., Doraiswamy, P. M., & Scanlon, M. (2013). The largest human cognitive performance dataset reveals insights into the effects of lifestyle factors and aging. *Frontiers in Human Neuroscience*, *7*.

Assignments

One Page Training Proposal Due

March 31st: The Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) Trial

Willis, S. L., Tennstedt, S. L., Marsiske, M., Ball, K., Elias, J., Koepeke, K. M., ... Wright, E. (2006). Long-term effects of cognitive training on everyday functional outcomes in Older Adults.

Ball, K., Edwards, J. D., Ross, L. A., & McGwin, G., Jr. (2010). Cognitive training decreases motor vehicle collision involvement in older drivers. *Journal of the American Geriatric Society, 58*, 2107-2113.

Rebok, G. W., Ball, K., Guey, L. T., Jones, R. N., Kim, H.-Y., King, J. W.,...Willis, S. J. (2014). Ten year effects of the advanced cognitive training for independent and vital elderly cognitive training trial on cognition and everyday functioning in older adults. *Journal of the American Geriatric Society, 62*, 16-24.

Assignments

Question/Comment #5 Due

April 7th: Strategy Use in Older Adults

Spieler, D. H., Mayr, U., & La Grone, S. (2006). Outsourcing of cognitive control to the environment: Adult age differences in the use of task cues. *Psychonomic Bulletin & Review, 13*, 787-793.

Lindenberger, U., Mayr, U. (2014). Cognitive aging: is there a dark side to environmental support? *Trends in Cognitive Sciences, 18*, 7-15.

Mayr, U., Spieler, D. H., & Hutcheon, T. G (2015). When and why do older adults outsource control to the environment? *Psychology and Aging, 30*, 624-633.

Assignments

Question/Comment #6 Due

April 14th Exercise and Cognition

Colcombe, S. J., Erickson, K. I., Scalf, P.E., Kim, J. S., Prakash, R., McAuley, E.,..., Kramer, A. F. (2006). Aerobic exercise training increases brain volume in aging humans. *Journal of Gerontology: Medical Science*, *61*, 1166-1170.

Erickson, K. I., Voss, M. W., Prakash, R. S., Basak, C., Szabo, A., Chaddock, L.,..., Kramer, A. F. (2011). Exercise training increases the size of hippocampus and improves memory. *Proceedings of National Academy of Sciences*,

Tan, Z. S., Spartano, N. L., Beiser, A. S., DeCarli, C., Auerbach, S. H., Ramachandran, S. V., Seshadri, S. (2016). Physical Activity, Brain Volume, and Dementia Risk: The Framingham Study. *Journals of Gerontology: Medical Sciences*, *00*, 1-7.

Assignments

Question/Comment #7 Due

April 21st The Effects of Training on the Aging Brain

<https://www.ftc.gov/news-events/press-releases/2016/01/lumosity-pay-2-million-settle-ftc-deceptive-advertising-charges>

O'Brien, J. L., Edwards, J. D., Maxfield, N. D., Peronto, C. L., Williams, V. A., & Lister, J. J. (2013). Cognitive training and selective attention in the aging brain: An electrophysiological study. *Clinical Neuropsychology*, *124*, 2198-2208.

Lin, F., Heffner, K. L., Ren, P., Tivarus, M. E., Brasch, J., Chen, D.-G., ..., Tadin, D. (2016). Cognitive and neural effects of vision-based speed-of-processing training in older adults with amnesic mild cognitive impairment: A pilot study. *Journal of the American Geriatrics Society*, *64*, 1293-1298.

Assignments

Initial Proposal Submission Due

April 28th Review Day**Assignments**

Review of Classmates Proposal Due

May 5th: Recent Advances

Kesler, S., Hadi Hoseni, S. M., Hecker, C., Janelins, M., Palesh, O., Mustain, K., Morrow, G. (2013). Cognitive training for improving executive function in chemotherapy treated breast cancer survivors. *Clinical Breast Cancer, 13*, 299-306.

Roberts, G., Quach, J., Spencer-Smith, M., Anderson, P., Gathercole, S., Gold, L., . . . Wake M.(2016). Academic outcomes 2 years after working memory training for children with low working memory: A randomized clinical trial. *JAMA Pediatrics, 170*, e154568

Oh, S. J., Seo, S. Lee, J. H., Song, M. J., & Shin, M.-S. (2017). Effects of smartphone-based memory training for older adults with subjective memory complaints: A randomized controlled trial. *Aging & Mental Health*.

Assignments

Question/Comment #8 Due

May 19th: Presentations***Assignments***

In Class Presentation and Final Paper Due