BIOGRAPHICAL SKETCH

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NAME	POSITION TITLE
Geoffrey Schoenbaum	Assistant Professor
eRA COMMONS USER NAME schoenbg	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
University of Georgia	BS	1989	Biology
University of North Carolina Graduate School	PhD	1994	Neurobiology
University of North Carolina School of Medicine	MD	1996	Medicine
Yale University	Resident	1996	Psychiatry
University of North Carolina Psychology Dept.	Post-doc	1995-1997	Psychology

A. Positions and Honors.

Positions:

1996 Resident Physician, Yale University, Department of Psychiatry, New Haven, CT
1995-97 Post-Doc, University of North Carolina, Department of Psychology, Chapel Hill, NC
1997-03 Associate Research Scientist, JHU, Department of Psychological and Brain Sci, Baltimore, MD
2003- Assistant Professor, University of Maryland, Departments of Anatomy & Neurobiology and Psychiatry, Baltimore, MD
Adjunct, Department of Psychology, University of Maryland Baltimore County, Baltimore, MD

Selected Honors:

1989 Graduated Summa Cum Laude from University of Georgia
1989 Full Scholarship, M.D./Ph.D. Program at the University of North Carolina
1996 Received MD with Honors, University of North Carolina School of Medicine
2007 Awarded **"Best Mentor"** by University of Maryland Program in Neuroscience graduate students
2007 Post-doctoral fellow received award from UMB as most **"Outstanding Postdoctoral Fellow"**

B. Peer-reviewed publications (in chronological order)

1) **Schoenbaum**, G.M., Martin, R.J., and D.S. Roane. (1989) Interactions between sustained sucrose-feeding and opioid tolerance and withdrawal. Pharmacology Biochemistry and Behavior. 34:911-914.
2) **Schoenbaum**, G.M., Martin, R.J., and D.S. Roane. (1990) Discontinuation of sustained sucrose-feeding aggravates morphine withdrawal. Brain Research Bulletin. 24:565-568.
3) Dykstra, L.A., **Schoenbaum**, G.M., Yarbrough, J., McNutt, R., and K-J. Chang. (1993) A novel delta opioid agonist, BW373U86, in squirrel monkeys responding under a schedule of shock titration. Journal of Pharmacology and Experimental Therapeutics. 267(2):875-882.
4) **Schoenbaum**, G., and H. Eichenbaum. (1995) Information coding in the rodent prefrontal cortex. I. Single-neuron activity in orbitofrontal cortex compared with that in pyriform cortex. Journal of Neurophysiology. 74(2):733-750.
5) **Schoenbaum**, G., and H. Eichenbaum. (1995) Information coding in the rodent prefrontal cortex. II. Ensemble activity in orbitofrontal cortex. Journal of Neurophysiology 74(2):751-762.
6) Eichenbaum, E., **Schoenbaum**, G., Young, B., and Bunsey, M. (1996) Functional organization of the hippocampal memory system. Proceedings of the National Academy Science. 93:13500-13507.
7) **Schoenbaum**, G., Chiba, A., and Gallagher, M. (1998) Orbitofrontal cortex and basolateral amygdala encode expected outcomes during learning. Nature Neuroscience. 1:155-159.
8) **Schoenbaum**, G., Chiba, A., and Gallagher, M. (1999) Neural encoding in orbitofrontal cortex and basolateral amygdala during olfactory discrimination learning. Journal of Neuroscience. 19:1876-1884.

9) Gallagher, M. and **Schoenbaum**, G. (1999) Functions of the amygdala and related forebrain areas in attention and cognition. Annals of the New York Academy of Sciences. 877:397-411.
10) Gallagher, M., McMahan, R.W., **Schoenbaum**, G. (1999) Orbitofrontal cortex and representation of incentive value in associative learning. Journal of Neuroscience. 19:6610-6614.
11) **Schoenbaum**, G., Chiba, A., and Gallagher, M. (2000) Changes in functional connectivity in orbitofrontal cortex and basolateral amygdala during learning and reversal training. Journal of Neuroscience. 20:5179-5189.
12) **Schoenbaum**, G., Garmon, J., and Setlow, B. (2001) A novel method for detecting licking behavior during recording of electrophysiological signals from the brain. Journal of Neuroscience Methods. 106:139-146.
13) **Schoenbaum**, G. and Setlow, B. (2001) Integrating orbitofrontal cortex into prefrontal theory: common processing themes across species and subdivision. Learning and Memory. 8:134-147.
14) **Schoenbaum**, G., Nugent, S., Saddoris, M.P., Gallagher, M. (2002) Teaching old rats new tricks: age-related impairments in olfactory reversal learning. Neurobiology of Aging. 23:555-564.
15) **Schoenbaum**, G., Nugent, S., Saddoris, M.P., Setlow, B. (2002) Orbitofrontal lesions in rats impair reversal but not acquisition of go, no-go discriminations. Neuroreport. 13:885-890.
16) **Schoenbaum**, G., Setlow, B., Nugent, S.L., Saddoris, M.P., and Gallagher M. (2003) Lesions of orbitofontal cortex and basolateral amygdala complex disrupt acquisition of odor-guided discriminations and reversals. Learning and Memory. 10: 129-140.
17) Setlow, B., **Schoenbaum**, G., and Gallagher, M. (2003) Neural encoding in nucleus accumbens during olfactory discrimination learning. Neuron. 38: 625-636.
18) **Schoenbaum**, G., Setlow, B., Saddoris, M.P., and Gallagher, M. (2003) Encoding predicted outcome and acquired value in orbitofrontal cortex during cue sampling depends upon input from basolateral amygdala Neuron. 39:855-867.
19) **Schoenbaum**, G. and Setlow, B. (2003) Lesions of nucleus accumbens disrupt learning about aversive outcomes. Journal of Neuroscience. 23:9833-9841.
20) Pickens, C., Setlow, B., Saddoris, M.P., Gallagher, M., Holland, P.C., and **Schoenbaum**, G. (2003) Different roles for orbitofrontal cortex and basolateral amygdala in a reinforcer devaluation task. Journal of Neuroscience. 23:9833-9841.
21) **Schoenbaum**, G., Setlow, B., and Ramus, S.J. (2003) A systems approach to orbitofrontal cortex function: recordings in rat orbitofrontal cortex reveal interactions with different learning systems. Behavioral Brain Research. 146:19-29.
22) **Schoenbaum**, G. (2004) Affect, action, and ambiguity and the amygdala-orbitofrontal circuit. Journal of Neurophysiology. 91:1938-1939.
23) **Schoenbaum**, G., Saddoris, M.P., Ramus, S.J., Yavin, S., and Setlow, B. (2004) Cocaine-experienced rats exhibit learning deficits in a task sensitive to orbitofrontal cortex lesions. European Journal of Neuroscience. 19:1997-2002.
24) **Schoenbaum**, G and Setlow, B. (2005) Cocaine makes actions insensitive to outcomes but not extinction: implications for altered orbitofrontal-amygdalar function. Cerebral Cortex. 15:1162-1169.
25) Saddoris, M. P., Gallagher, M., and **Schoenbaum**, G. (2005) Rapid associative encoding in basolateral amygdala depends on connections with orbitofrontal cortex. Neuron. 46:321-331.
26) **Schoenbaum**, G., and Roesch, M.R. (2005) Orbitofrontal cortex, associative learning, and expectancies. Neuron. 47:633-636.
27) **Schoenbaum**, G., and Stalnaker, T.A. (2005) Thanks for the memories… Learning and Memory. 12:547-548.
28) **Schoenbaum**, G., Roesch, M.R., and Stalnaker, T.A. (2006) Orbitofrontal cortex, decision-making, and drug addiction. Trends in Neurosciences. 29:116-124.
29) **Schoenbaum**, G., Setlow, B., Saddoris, M.P., and Gallagher, M. (2006) Encoding changes in orbitofrontal cortex in reversal-impaired aged rats. Journal of Neurophysiology. 95:1509-1517.
30) Burke, K.A., Franz, T.A., Gugsa, N., and **Schoenbaum**, G. (2006) Prior cocaine exposure disrupts extinction of fear conditioning. Learning and Memory. 13:416-421.
31) Roesch, M.R., Taylor, A.R., and **Schoenbaum**, G. (2006) Encoding of time-discounted rewards in orbitofrontal cortex is independent of value representation. Neuron. 51:509-520.
32) Roesch, M.R., Stalnaker, T.A., and **Schoenbaum**, G. (2007; EPUB 2006) Associative encoding in anterior piriform cortex versus orbitofrontal cortex during odor discrimination and reversal learning. Cerebral Cortex. 17:643-652.

33) Roesch, M. and **Schoenbaum**, G. (2006) From Associations to Expectancies: Orbitofrontal Cortex as Gateway Between the Limbic System and Representational Memory. pp. 199-236. In: The Orbitofrontal Cortex. Edited by D.H. Zald and S.L. Rauch.
34) Calu, D.J., Roesch, M.R., Stalnaker, T.A., and **Schoenbaum**, G. (2007, EPUB in 2006) Associative encoding in posterior piriform cortex during odor discrimination and reversal learning. Cerebral Cortex. 17:1342-1349.
35) **Schoenbaum**, G. and Takahashi, Y. (2006) Paying attention. Journal of Neurophysiology. 96:2844.
36) Stalnaker, T.A., Roesch, M.R., Franz, T.M., Burke, K.A., and **Schoenbaum**, G. (2006) Abnormal associative encoding in orbitofrontal neurons in cocaine-experienced rats during decision-making. European Journal of Neuroscience. 24:2643-2653.
37) Roesch, M.R., Takahashi, Y., Gugsa, N., Bissonette, G.B., and **Schoenbaum**, G. (2007) Previous cocaine exposure makes rats hypersensitive to both delay and reward magnitude. Journal of Neuroscience. 27:245-250.
38) Roesch, M. R., Calu, D.J., Burke, K.A., and **Schoenbaum**, G. (2007, Epub ahead of print) Should I stay or should I go? Transformation of time-discounted rewards in orbitofrontal cortex and associated brain circuits. Annals of the New York Academy of Sciences.
39) Stalnaker, T.A., Franz, T.M., Singh, T., and **Schoenbaum**, G. (2007) Basolateral amygdala lesions abolish orbitofrontal-dependent reversal impairments. Neuron. 54:51-58.
40) Calu, DJ, Stalnaker, TA, Franz, TM, Singh, T, Shaham, Y, and **Schoenbaum**, G. (2007) Withdrawal from cocaine self-administration produces long-lasting deficits in orbitofrontal-dependent reversal learning in rats. Learning and Memory. 14:325-328.
41) Stalnaker, T.A., Roesch, M.R., Franz, T.M., Calu, D.J. and **Schoenbaum**, G. (2007) Basolateral amygdala neurons in cocaine-experienced rats persistently encode appetitive associative representations after reversal. Nature Neuroscience. 10:949-951.
42) **Schoenbaum**, G., Stalnaker, T.A., and Shaham, Y. (2007) Role of BDNF in cocaine reward and relapse. Nature Neuroscience. 10:935-936.
43) **Schoenbaum**, G, Saddoris, MP, and Stalnaker, TA. (in press) Reconciling the roles of orbitofrontal cortex in reversal learning and the encoding of outcome expectancies. Annals of the New York Academy of Sciences.
44) Stalnaker, TA, Roesch, MR, Burke, KA, Calu, DJ, and **Schoenbaum**, G. (in press) Orbitofrontal-amygdalar interactions and decision-making deficits after cocaine exposure. Annals of the New York Academy of Sciences.
45) Burke, K.A., Miller, D.N., and **Schoenbaum**, G. (in press) Conditioned reinforcement and the specialized role of corticolimbic circuits in the pursuit of happiness and other more specific rewards. In: Pleasures of the Brain: The Neural Basis of Sensory Rewards. Edited by M.L. Kringelbach and K.C. Berridge.
46) **Schoenbaum**, G. and Shaham, Y. (in press) The role of orbitofrontal cortex in drug addiction: a review of preclinical studies. Biological Psychiatry.
47) Murray, E.A, O'Doherty, J, and **Schoenbaum**, G. (2007) What we know (and don't know) after 20 years of investigating orbitofrontal function across species. Journal of Neuroscience. 27:8166.
48) Burke, K.A., Franz, T.M., Miller, D.N., and **Schoenbaum**, G. (in press) Conditioned reinforcement can be mediated by either outcome-specific or general affective representations. Frontiers in Integrative Neuroscience.
49) Roesch, M.R., Calu, D.J., and **Schoenbaum**, G. (in press) Dopamine neurons encode the more valuable option in rats deciding between differently sized and delayed rewards. Nature Neuroscience.
50) Burke, K.A., Franz, T.M., Miller, D.N., and **Schoenbaum**, G. (in review) The role of orbitofrontal cortex in the pursuit of happiness and other more specific rewards.
51) Takahashi, Y., Roesch, M.R., Stalnaker, T.A., and **Schoenbaum**, G. (in review) Cocaine exposure reduces cue-evoked firing in ventral striatum.

C. Research Support.

CURRENT:

Lasting Effects of Cocaine Use on Corticolimbic Function

R01 DA015718, 9/1/03-5/31/08
Role: PI
The goal of this project is to test how long-lasting changes that occur as a result of cocaine exposure affect normal learning functions that depend on orbitofrontal cortex and related parts of amygdala and striatum.

Flexibility, prefrontal function, and normal aging
R01 AG027097, 9/1/07-08/31/12
Role: PI
The goal of this project is to identify neural correlates of aging-related declines in reversal-learning and set-shifting in orbitofrontal and medial prefrontal cortex and ask whether it might be possible to prevent or reverse these effects with practice that engages these areas. Note this project continues work started under K08 AG00882, shown below under "Completed".

COMPLETED:

Linking Affect to Action: Critical Contributions of the Orbitofrontal Cortex
1R13DA021499-01, 7/17/06-6/30/07
Role: PI
The goal of this grant was to support an international conference on orbitofrontal function. The meeting, which was organized by the New York Academy of Sciences, occurred in March of 2007. It brought together over 30 basic and clinical researchers from around the world and attracted several hundred additional participants. A special issue of the Annals of the New York Academy of Sciences was published from the proceedings.

Associative Functions of the Basolateral Amygdala
R01 MH60179 (PI: Michela Gallagher), 8/5/99-7/31/03
Role: Co-Investigator
The goal of this project was to dissociate functions of the basolateral amygdala and nucleus accumbens in supporting associative functions dependent on amygdala.

Neural Representations in Prefrontal Systems in Aged Rat
K08 AG00882, 8/30/98-8/31/03
Role: PI
The goal of this project was to develop a rat model for the study of normal function across of a system of structures centered on orbitofrontal cortex and then apply that model to investigate the effects of aging on prefrontal function.

OTHER PROJECTS INVOLVING NON-SALARIED ROLE:

The neurobiology of social attraction and preference
R01 MH072930, 2005-2009 (PI: A Petrulis)
Role: Consultant
The goal of this project is to characterize neural circuits involved in social attraction in rodents, using pharmacological and single unit recording techniques.

OFC-NA interactions, dopamine modulation, and impulsive choice
K01 DA021609, 2007-2012 (PI: M Roesch)
Role: Mentor
The goal of this project is to test the hypothesis that interactions between OFC and NA regulate impulsivity and that this balance is modulated by dopaminergic function.

Effects of aging on correlates of odor discrimination learning
HFSP Long-Term Fellowship, 2006-2009 (PI: Y Takahashi)

Role: Mentor
The goal of this project is to characterize aging-related changes in odor processing in piriform cortex.

The associative basis of conditioned reinforcement
F31 DA021989, 2007-2010 (PI: K Burke)
Role: Mentor
The goal of this project is to develop novel techniques to characterize the underlying associative basis of conditioned reinforcement.

Role of orbitofrontal signaling of expected outcomes in Pavlovian blocking
F31 MH080514, 2007-2010 (PI: D Calu)
Role: Mentor
The goal of this project is to use blocking to test the hypothesis that OFC signals outcome expectations.