

# Benjamin T. Saunders, PhD

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## CURRENT POSITION

Postdoctoral Fellow, 2015-  
Johns Hopkins University  
Supervisor: Patricia H. Janak, PhD

## EDUCATION AND TRAINING

University of California, San Francisco (UCSF)  
Ernest Gallo Clinic and Research Center  
Postdoctoral Fellow, 2013-2014  
Supervisor: Patricia H. Janak, PhD

University of Michigan, Ann Arbor, MI  
PhD in psychology/biopsychology: 2012  
MS in psychology/biopsychology: 2009  
Supervisor: Terry E. Robinson, PhD

West Virginia University, Morgantown, WV  
BS in biology, BS in psychology: 2007  
*Summa cum laude*, University Honors Scholar

## RESEARCH SUPPORT AND FELLOWSHIPS

- *Pending*: K99 DA042895 “Midbrain cellular and circuit dynamics of cocaine seeking”
- NARSAD Young Investigator Award: 2016-2018
- NIDA National Research Service Award Postdoctoral Fellowship (F32 DA036996): 2014-2017
- NIDA National Research Service Award Predoctoral Fellowship (F31 DA030801): 2011-2013
- Rackham Graduate School Research Grant, University of Michigan: 2011-2012
- NIDA Predoctoral Training Grant (T31 DA007281): 2007-2008

## PUBLICATIONS

18. **Saunders BT**, Richard JM, & Janak PH. (2015). Contemporary approaches to neural circuit manipulation and mapping: focus on reward and addiction. *Proc Roy Soc Phil Trans B*. doi: 10.1098/rstb.2014.0210. PMID: PMC4528822 [Available on 2016-09-19]
17. **Saunders BT**, O'Donnell EG, Aurbach EL, & Robinson TE. (2014). A cocaine context renews drug seeking preferentially in a subset of individuals. *Neuropsychopharmacology*, 39, 2816-2823. PMID: PMC4200491 [Available on 2015/11/01]
16. Morrow JD, **Saunders BT**, Maren S, & Robinson TE. (2014). Sign-tracking to an appetitive cue predicts incubation of conditioned fear in rats. *Behavioural Brain Research*, 276, 59-66. PMID: PMC4201891 [Available on 2016/01/01]
15. Steinberg EE, Boivin JR, **Saunders BT**, Witten IB, Deisseroth K, & Janak PH. (2014). Positive reinforcement mediated by midbrain dopamine neurons requires D1 and D2 receptor activation in the nucleus accumbens. *PLOS One*. 9(4): e94771. PMID: PMC3986242

14. **Saunders BT** & Janak PH. (2014). Nucleus accumbens plasticity underlies multifaceted behavioral changes associated with addiction. *Biological Psychiatry*, 75, 92-93. Commentary on Saddoris and Carelli, 2014
13. Robinson TE, Yager LM, Cogan ES, & **Saunders BT**. (2014). On the incentive motivational properties of food and drug cues. *Neuropharmacology*, 76, 450-499. PMID: PMC3796005 [Available on 2014/12/7]
12. Fitzpatrick CJ, Gopalakrishnan S, Cogan ES, Yager LM, Meyer PJ, Lovic V, **Saunders BT**, Parker CC, Gonzales NM, Aryee E, Flagel SB, Palmer AA, Robinson TE, & Morrow JD. (2013). Variation in the form of Pavlovian conditioned approach behavior among outbred male Sprague Dawley rats from different vendors and colonies: Sign-tracking vs. goal-tracking. *PLOS One*. 8(10): e75042. PMID: PMC3787975
11. **Saunders BT**, Yager LM, & Robinson TE. (2013). Cue-evoked cocaine "craving": role of dopamine in the accumbens core. *Journal of Neuroscience*, 33, 13989-14000. PMID: PMC3756749
10. **Saunders BT** & Robinson TE. (2013). Individual variation in resisting temptation: Implications for addiction. *Neuroscience and Biobehavioral Reviews*, 37, 1955-1975. PMID: PMC3732519 [Available on 2014/11/1]
9. **Saunders BT**, Yager LM, & Robinson TE. (2013). Preclinical studies shed light on individual variation in addiction vulnerability. *Neuropsychopharmacology*, 38, 249-250. Hot Topics commentary. PMID: PMC3521973
8. Badrinarayan A, Wescott SA, Vander Weele CM, **Saunders BT**, Couturier BE, Maren S, & Aragona BJ. (2012). Aversive stimuli differentially modulate real-time dopamine transmission dynamics within the nucleus accumbens core and shell. *Journal of Neuroscience*, 32, 15779-15790. PMID: PMC3752139
7. **Saunders BT** & Robinson TE. (2012). The role of dopamine in the accumbens core in the performance of Pavlovian-conditioned responses. *European Journal of Neuroscience*, 36, 2521-2532. PMID: PMC3424374
6. Meyer PJ, Lovic V, **Saunders BT**, Yager LM, Flagel SB, Morrow JD, & Robinson TE. (2012). Quantifying individual variation in the propensity to attribute incentive salience to reward cues. *PLOS One*, 7(6): e38987. PMID: PMC3382216
5. **Saunders BT** & Richard JM. (2011). Shedding light on the role of ventral tegmental area dopamine in reward. *Journal of Neuroscience*, 31, 18195-18197. Journal Club review of Adamantidis et al. 2011. PMID: PMC3263377
4. Lovic V, **Saunders BT**, Yager LM, & Robinson TE. (2011). Rats prone to attribute incentive salience to reward cues are also prone to impulsive action. *Behavioural Brain Research*, 223, 255-261. PMID: PMC3119757
3. **Saunders BT** & Robinson TE. (2011). Individual variation in the motivational properties of cocaine. *Neuropsychopharmacology*, 36, 1668-1676. PMID: PMC3138662
2. **Saunders BT** & Robinson TE. (2010). A cocaine cue acts as an incentive stimulus in some but not others: Implications for addiction. *Biological Psychiatry*, 67, 730-736. PMID: PMC2849872
1. Diller JW, **Saunders BT**, & Anderson KG. (2008). Effects of acute and repeated administration of caffeine on temporal discounting in rats. *Pharmacology, Biochemistry, & Behavior*, 89, 546-555

## MANUSCRIPTS IN PREPARATION

**Saunders BT**, Richard JM, Margolis EB, & Janak PH. Instantiation of attraction and invigoration by distinct midbrain dopamine neurons.

Vitale KR, **Saunders BT**, Ambroggi F, Frank LM, & Janak PH. Orbitofrontal cortex mediates inhibition within the basolateral amygdala to promote conditioned reward seeking. *Under revision*

## AWARDS AND HONORS

- American College of Neuropsychopharmacology Travel Award: 2015
- Winter Conference on Brain Research Travel Award: 2014
- Wyvell Award for Outstanding Dissertation in Biopsychology, University of Michigan: 2013
- Pat Gurin Distinguished Lecturer Award, University of Michigan: 2010
- Rackham Graduate School Travel Grant, University of Michigan: 2009-2012
- NIDA Early Career Investigators Travel Award: 2009
- NSF Graduate Research Predoctoral Fellowship *Honorable Mention*: 2008
- Phi Beta Kappa: 2007

## TALKS/SEMINARS

- National Institute on Drug Abuse, Baltimore, MD, 2015
- Professional Development Workshop, Society for Neuroscience, Chicago, IL, 2015
- *Symposium speaker*, Catecholamines Gordon Research Seminar, Newry, ME, 2015
- *Symposium speaker/Organizer*, Winter Conference on Brain Research, Big Sky, MO, 2015
- Professional Development Workshop, Society for Neuroscience, Washington, DC, 2014
- *Symposium speaker*, Winter Conference on Brain Research, Steamboat Springs, CO, 2014
- University of Michigan, Ann Arbor, MI, 2012
- Ernest Gallo Clinic and Research Center at UCSF, 2011

## TEACHING EXPERIENCE

### Johns Hopkins University:

Laboratory mentor for 5 undergraduate research assistants

### UCSF:

Lecturer, "Introduction to Neuroscience. Essential Concepts & Methods": 2013

### University of Michigan:

Graduate student instructor: "Animal Behavior": 2008, 2009

- Responsible for teaching 3 weekly 1-hour discussion sections (~90 total students), leading review sessions, grading, and private tutoring

Graduate student instructor: "Drugs of Abuse, Brain, & Behavior": 2010

- Guest lecturer; responsible for exam preparation, leading review sessions, grading, and private tutoring

Graduate student instructor: "Introduction to Biopsychology": 2010

- Responsible for teaching 3 weekly 1-hour discussion sections (~90 total students), leading laboratory demonstrations, review sessions, grading, and private tutoring

Laboratory mentor to 16 undergraduate research assistants, including 1 senior honors thesis student

## PEER REVIEW SERVICE (JOURNALS)

Ad hoc

With supervisors

Behavioural Brain Research  
Behavioral Neuroscience  
Frontiers in Decision Neuroscience  
Neuropharmacology  
PLOS One

Biological Psychiatry  
Journal of Neuroscience  
Neuron  
Neuropsychopharmacology

## PROFESSIONAL MEMBERSHIPS

Association for Psychological Science: 2014  
New York Academy of Sciences: 2016  
Society for Neuroscience: 2006-present

## OTHER SERVICE & OUTREACH

- Contributor and editing team member, Interstellate Magazine, Vol. 1: 2016
- Society for Neuroscience meeting professional development workshop panels: 2014, 2015
- Organizing committee for the Gordon Research Seminar on Catecholamines: 2013
- University of Michigan:
  - BrainsRule! volunteer: 2012
  - Biopsychology area Department of Psychology PhD admissions committee: 2009-2010
  - Faculty-elected Departmental Associate, Department of Psychology: 2009-2010
  - Michigan Mentorship Program: 2008

## Conference Abstracts

25. Richard JM, **Saunders BT** & Janak PH. (2016). Ventral pallidum roles in cue-elicited reward seeking and reinforcement. American College of Neuropsychopharmacology Meeting, Hollywood, FL.
24. **Saunders BT** & Janak PH. (2016). Exploring midbrain circuit dynamics of conditioned motivation. Society for Neuroscience meeting, San Diego, CA
23. **Saunders BT** & Janak PH. (2016). Projection-specific control of conditioned motivation and action invigoration among midbrain neurons. Action selection across the animal Kingdom. Janelia Research Campus Conference, Ashburn, VA.
22. **Saunders BT** & Janak PH. (2016). Functional heterogeneity among midbrain dopamine neurons. Dopamine 2016, Vienna, Austria.
21. **Saunders BT**, Margolis EB, & Janak PH. (2015). Exploring functional heterogeneity among midbrain neurons in motivation. American College of Neuropsychopharmacology Meeting, Hollywood, FL.
20. **Saunders BT**, Vitale KR, & Janak PH. (2015). Orbitofrontal cortex mediates inhibition within the basolateral amygdala to promote appetitive Pavlovian conditioning. Society for Neuroscience meeting, Chicago, IL
19. **Saunders BT** & Janak PH. (2014). Distinct midbrain dopamine neuron subpopulations contribute to cue attraction, psychomotor activation, and reinforcement. Winter Conference on Brain Research, Big Sky, MT
18. **Saunders BT** & Janak PH. (2014). Distinct midbrain dopamine neuron subpopulations contribute to cue attraction, psychomotor activation, and reinforcement. Society for Neuroscience meeting, Washington, DC
17. **Saunders BT** & Janak PH. (2013). Optogenetic manipulation of dopamine neurons reveals dual

roles for dopamine in reinforcement and conditioned motivation. Society for Neuroscience meeting, San Diego, CA

16. O'Donnell EG, **Saunders BT**, & Robinson TE. (2013). Dorsomedial striatal control of cue-directed versus goal-directed Pavlovian approach behavior. Society for Neuroscience meeting, San Diego, CA
15. **Saunders BT** & Janak PH. (2013). Dopamine neurons both directly reinforce actions and instantiate neutral cues with reinforcing value. Society for Neuroscience meeting, San Diego, CA. Gordon Research Seminar and Gordon Research Conference on Catecholamines, Mount Snow Resort, West Dover, VT
14. O'Donnell EG, **Saunders BT**, & Robinson TE. (2013). Dorsomedial striatal control of cue-directed versus goal-directed Pavlovian approach behavior. Michigan Society for Neuroscience meeting, Detroit, MI
13. **Saunders BT**, Aurbach EL, & Robinson TE. (2012). Individual variation in the influence of a cocaine-associated context on behavior. Society for Neuroscience meeting, New Orleans, LA
12. Couturier BE, Vander Weele CM, **Saunders BT**, & Aragona BJ. (2012). In vitro identification of carbon-fiber micro-electrodes with sensitivity sufficient for voltammetric detection of dopamine transients in vivo. Society for Neuroscience meeting, New Orleans, LA
11. Badrinarayan A, Wescott SA, Vander Weele CM, **Saunders BT**, Couturier BE, Maren S, & Aragona BJ. (2012) Aversive stimuli differentially modulate real-time dopamine transmission dynamics within the nucleus accumbens core and shell. Molecular and Cellular Cognition Society meeting, New Orleans, LA
10. **Saunders BT** & Robinson TE. (2012). Individual variation in the influence of a cocaine-associated context on behavior. Michigan Society for Neuroscience meeting, Ann Arbor, MI
9. **Saunders BT** & Robinson TE. (2011). A cue evokes relapse in the face of adverse consequences preferentially in rats prone to attribute incentive salience to reward cues: Role of nucleus accumbens dopamine. Society for Neuroscience meeting, Washington, D.C
8. **Saunders BT** & Robinson TE. (2011). Nucleus accumbens dopamine receptor blockade selectively disrupts the expression of approach to an incentive stimulus. Society for Neuroscience meeting, Washington, D.C
7. **Saunders BT** & Robinson TE. (2011). A cue evokes relapse in the face of adverse consequences preferentially in rats prone to attribute incentive salience to reward cues. University of Michigan Substance Abuse Research Center Symposium, Ann Arbor, MI
6. **Saunders BT** & Robinson TE. (2011). Nucleus accumbens dopamine blockade selectively disrupts the expression of approach to an incentive stimulus. Gordon Research Seminar and Gordon Research Conference on Catecholamines, Bates College, Lewiston, ME
5. **Saunders BT** & Robinson TE. (2010). Variation in attributing incentive salience to a food-related cue predicts motivation for cocaine and cocaine-induced drug seeking. Society for Neuroscience meeting, San Diego, CA
4. Lovic V, **Saunders BT**, Yager LM, Czuj AK, & Robinson TE. (2010). Variation in attributing incentive salience to a food cue is associated with action impulsivity. Society for Neuroscience meeting, San Diego, CA
3. **Saunders BT** & Robinson TE. (2009). Individual differences in attributing incentive salience to a food-related cue predict the ability of a cocaine-associated cue to maintain and reinstate self-administration. Society for Neuroscience meeting, Chicago, IL **\*\*Selected by the Society as a**

**“Hot Topic” for media attention**

2. **Saunders BT** & Robinson TE. (2009). Individual differences in responsivity to a cocaine-associated cue: Implications for vulnerability to addiction. American Psychological Association/National Institute on Drug Abuse Early Career Investigators, Toronto, ON, Canada
1. Diller JW, **Saunders BT**, & Anderson KG. (2007). The effects of acute and repeated caffeine administration on delay discounting in rats. Association for Behavior Analysis meeting, Atlanta, GA