

# Alexander J. Shackman

Affective and Translational Neuroscience Laboratory | Maryland Neuroimaging Center  
Department of Psychology and Neuroscience & Cognitive Science Program, University of Maryland  
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## Academic Appointments

- 8/2013 – Assistant Professor (Clinical and CNS area groups)  
Department of Psychology, University of Maryland, College Park
- 8/2013 – Core Faculty  
Maryland Neuroimaging Center, University of Maryland, College Park
- 6/2013 – Faculty Member  
Neuroscience and Cognitive Science (NACS) Program, University of Maryland, College Park
- 6/2013 – 8/2013 Visiting Assistant Professor  
Department of Psychology, University of Maryland, College Park
- 8/2011 – 7/2013 Postdoctoral Scientist  
Department of Psychiatry, University of Wisconsin—Madison  
Supervisor: Ned H. Kalin, MD
- 1/2010 – 8/2011 Postdoctoral Scientist  
Departments of Psychology and Psychiatry, University of Wisconsin—Madison  
Supervisor: Bradley R. Postle, Ph.D.
- 9/2008 – 12/2009 Postdoctoral Scientist  
Department of Psychology, University of Wisconsin—Madison  
Supervisor: Richard J. Davidson, Ph.D.

## Education

- 2008 Ph.D., Biological Psychology (Distributed Minor in Neuroscience)  
University of Wisconsin—Madison
- 1997 Bachelor of Arts, *cum laude*, Psychology (Honors)  
University of Wisconsin—Madison

## Research Sketch

### *Major Research Interests*

Affective/translational neuroscience; fear, anxiety, and their application to neuropsychiatric disorders; individual differences in temperament/personality; cognition × emotion interactions with a focus on cognitive control and working memory; developmental psychopathology; neuropsychopharmacology; extended amygdala; cingulate; prefrontal cortex.

### *Major Methods*

Multimodal neuroimaging (MRI, PET); peripheral physiology (cortisol, facial EMG, fear-potentiated startle); Experience sampling/ecological momentary assessment (EMA) methods.

## Honors, Awards, and Fellowships

2014	Career Development Leadership Program Fellowship, Anxiety & Depression Association of America
2013	NIH-Sponsored Summer Institute in Cognitive Neuroscience Fellowship ( <i>declined</i> )
2012	NIH-Sponsored Conference on the <i>Determinants of Executive Function &amp; Dysfunction</i> Poster Award, University of Colorado
2012	NIH-Sponsored Conference on the <i>Determinants of Executive Function &amp; Dysfunction</i> Travel Award, University of Colorado
2011	NIH-Sponsored Summer Institute in Cognitive Neuroscience Fellowship
2006	Graduate Student Mentoring Award, Graduate School, University of Wisconsin
2001 – 2003	NIH Predoctoral Fellowship, Training Program in Emotion Research (T32- MH018931)
1998 – 2001	NSF Graduate Research Fellowship
1997 – 1998	Distinguished Graduate Fellowship, Graduate School, University of Wisconsin
1996 – 1997	Hilldale Senior Thesis Research Fellowship, College of Letters & Sciences, University of Wisconsin
1996	Phi Beta Kappa

## Grant Support

### Current

July 2015—June 2017	<b>A. J. Shackman</b> , Co-PI. The role of anxiety-related brain circuits in tobacco dependence and withdrawal. Dean's Research Initiative Level II Seed Grant. College of Behavioral and Social Sciences, University of Maryland. \$20,000 in direct costs.
July 2016—June 2018	<b>A. J. Shackman</b> , PI. The role of anxiety-related brain circuits in tobacco dependence and withdrawal. NIDA R21 DA040717. \$418,000 in total costs.
April 2016—March 2021	<b>A. J. Shackman</b> , PI. Prospective determination of neurobehavioral risk for the development of emotion disorders. NIMH R01 MH107444. \$3,384,218 in total costs.

### Prior

June 2014—July 2015	<b>A. J. Shackman</b> (PI), D. Seminowicz (co-I), and L. Pessoa (co-I). Dissecting the functional organization and significance of the neural circuitry of pain. Dean's Research Initiative Level II Seed Grant. College of Behavioral and Social Sciences, University of Maryland. \$19,500 in direct costs.
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## Publications (*h*-index = 27 | citations = 3,626 | total publications = 57)

\* indicates equal contribution      † indicates mentored trainee

### Peer-Reviewed Articles

- [37] Nusslock, R., **Shackman, A. J.**, McMenemy, B. W., Greischar, L. L., Davidson, R. J., & Kovacs, M. (*in press*). Comorbid anxiety moderates the relationship between depression history and prefrontal EEG asymmetry. *Psychophysiology*. []
- [36] **Shackman, A. J.**, Weinstein †, J., Hudja †, S.N., Bloomer, C. †, Barstead, M. G. †, Fox, A. S. & Lemay, E. P., Jr. (*in press*). Dispositional negativity in the wild: Social context governs momentary emotional experience. ***Emotion***. [NIHMS874284]

- [35] Gorka, A. X., Torrisi, S., **Shackman, A. J.**, Grillon, C. & Ernst, M. (*in press*). Intrinsic functional connectivity of the central nucleus of the amygdala and bed nucleus of the stria terminalis. *Neuroimage*. [NIHMS868633]
- [34] **Shackman, A. J.**, Fox, A. S., Oler, J. A., Shelton, S. E., Oakes, T. R., Davidson, R. J. & Kalin, N. H. (2017). Heightened extended amygdala metabolism following threat characterizes the early phenotypic risk to develop anxiety-related psychopathology, *Molecular Psychiatry*, 22, 724-32. **Impact Factor 14.897 #1 journal in Psychiatry** [NIHMS799606]
- [33] **Shackman, A. J.**, Kaplan, C. M. †, Stockbridge, M. D. †, Tillman, R. M. †, Tromp, D. P. M., Fox, A. S., & Gamer, M. (2016). The neurobiology of dispositional negativity and attentional biases to threat: Implications for understanding anxiety disorders in adults and youth. *Journal of Experimental Psychopathology*, 7, 311-42 [Special issue focused on “Risk and resilience in anxiety: Exploring the roles of attentional bias and attentional control in development” (J. A. Hadwin, L. Visu-Petra, C. MacLeod, N. Derakshan & P. Muris, Editors). [NIHMS799616]
- [32] **Shackman, A. J.**, Tromp, D. P. M., Stockbridge, M. D. †, Kaplan, C. M. †, Tillman, R. M. †, & Fox, A. S. (2016). Dispositional negativity: An integrative psychological and neurobiological perspective. *Psychological Bulletin*, 142, 1275-1314. [NIHMS804781]
- [31] **Shackman, A. J.** & Fox, A. S. Contributions of the central extended amygdala to fear and anxiety. (2016). *Journal of Neuroscience*, 36, 8050-63. [NIHMS799620]
- [30] Bradford, D. E., Starr, M. J., **Shackman, A. J.** & Curtin, J. J. (2015) Empirically based comparisons of the reliability and validity of common quantification approaches for eyeblink startle potentiation in humans. *Psychophysiology*, 52, 1669-81. [PMC4715694]
- [29] Fox, A. S., Oler, J. A., **Shackman, A. J.**, Shelton, S. E., Alexander, A. L., Davidson, R. J., Blangero, J., Rogers, J. & Kalin, N. H. (2015). Intergenerational neural mediators of early-life anxious temperament. *Proceedings of the National Academy of Sciences USA*, 112, 9118-22. [PMC4517228]
- [28] Cavanagh, J. F.\* & **Shackman, A. J.** \*(2015). Frontal midline theta reflects anxiety and cognitive control: Meta-analytic evidence. *Journal of Physiology Paris*, 109, 3-15. Special issue focused on “Neural circuits for the adaptive control of behaviour,” edited by Jerome Sallet, Sebastien Bouret, Mark Laubach, and Dan Shulz. [PMC4213310] **cited >75x**
- [27] Stout, D. M., **Shackman, A. J.**, Johnson, J. S. & Larson, C. L. (2015). Worry is associated with impaired gating of threat from working memory. *Emotion*, 15, 6-11. [PMC4324005]
- [26] Okon-Singer, H. \*, Hendler, T., Pessoa, L. & **Shackman, A. J.** \* (2015). The neurobiology of emotion-cognition interactions: Fundamental questions and strategies for future research. *Frontiers in Human Neuroscience*, 9, 58. [PMC4344113]
- [25] Roseboom, P. H., Nanda, S. A., Fox, A. S., Oler, J. A., **Shackman, A. J.**, Shelton, S. E., Davidson, R. J. & Kalin, N. H. (2014). Neuropeptide Y receptor gene expression in the primate amygdala predicts anxious temperament and brain metabolism. *Biological Psychiatry*, 76, 850-857. [PMC4022724] **\*\* This report was selected by the journal for an accompanying commentary: Dumont, Y. & Quirion, R. (2014). Neuropeptide Y pathways in anxiety-related disorders. Biological Psychiatry.** [PMC4022724]

- [24] Birn, R. M. \*, **Shackman, A. J.\***, Oler, J. A., Williams, L. E., McFarlin, D. R., Rogers, G. M., Shelton, S. M., Alexander, A. L., Pine, D. S., Slattery, M. J., Davidson, R. J., Fox, A. S. & Kalin, N. H. (2014). Evolutionarily conserved prefrontal-amygdalar dysfunction in early-life anxiety. *Molecular Psychiatry*, 19, 915-922. **Impact Factor 14.897 #1 journal in Psychiatry** [PMC4111803] \*\* cited >50x
- [23] Birn, R. M. \*, **Shackman, A. J. \***, Oler, J. A., Williams, L. E., McFarlin, D. R., Rogers, G. M., Shelton, S. M., Alexander, A. L., Pine, D. S., Slattery, M. J., Davidson, R. J., Fox, A. S. & Kalin, N. H. (2014). Extreme early-life anxiety is associated with an evolutionarily conserved reduction in the strength of intrinsic functional connectivity between the dorsolateral prefrontal cortex and the central nucleus of the amygdala. *Molecular Psychiatry*, 19, 853. \* **equal authorship; Impact Factor 14.897, #1 journal in Psychiatry** [PMC4657549]
- [22] Weng, H. Y., Fox, A. S., **Shackman, A. J.**, Stodola, D. E., Caldwell, J. Z. K., Olson, M. C., Rogers, G. M. & Davidson, R. J. (2013). Compassion training alters altruism and the neural responses to suffering. *Psychological Science*, 24, 1171-80. [PMC3713090] \*\* cited >175x
- [21] **Shackman, A. J.**, Fox, A. S., Oler, J. A., Shelton, S. E., Davidson, R. J., & Kalin, N. H. (2013). Neural mechanisms underlying heterogeneity in the presentation of anxious temperament. *Proceedings of the National Academy of Sciences USA*, 110, 6145-50. [PMC3713090] \*\* cited >40x
- [20] Stout, D. M., **Shackman, A. J.**, & Larson, C. L. (2013). Failure to filter: Anxious individuals show inefficient gating of threat from working memory. *Frontiers in Human Neuroscience*, 7: 58. [PMC3586709] \*\* cited >40x
- [19] Guller, Y., Ferrarelli, F., **Shackman, A. J.**, Sarasso, S., Peterson, M. J., Langheim, F. J., Meyerand, M. E., Tononi, G. & Postle, B. R. (2012). Probing thalamic integrity in schizophrenia using concurrent transcranial magnetic stimulation and functional magnetic resonance imaging. *Archives of General Psychiatry*, 69, 662-671. [PMC3411883]
- [18] Nusslock, R., **Shackman, A. J.**, Coan, J. A., Harmon-Jones, E., Alloy, L. B. & Abramson, L. Y. (2011). Cognitive vulnerability and frontal brain asymmetry: Common predictors of first prospective depressive episode. *Journal of Abnormal Psychology*, 120, 497-503. [PMC3130533] \*\* cited >50x
- [17] **Shackman, A. J.**, Salomons, T. V., Slagter, H. A., Fox, A. S., Winter, J. J. & Davidson, R. J. (2011). The integration of negative affect, pain and cognitive control in the cingulate cortex. *Nature Reviews Neuroscience*, 12, 154-167. [PMC3044650] \*\* cited >900x
- [16] **Shackman, A. J.**, Maxwell, J. S., McMenamin, B. W., Greischar, L. L. & Davidson, R. J. (2011). Stress potentiates early and attenuates late stages of visual processing. *Journal of Neuroscience*, 31, 1156-1161. [PMC3037336] \*\* cited >80x
- [15] McMenamin, B. W.\*, **Shackman, A. J.\***, Greischar, L. L. & Davidson, R. J. (2011). Electromyogenic artifacts and electroencephalographic inferences revisited, *Neuroimage*, 54, 4-9. [PMC2962711]
- [14] **Shackman, A. J.**, McMenamin, B. W., Maxwell, J. S., Greischar, L. L. & Davidson, R. J. (2010). Identifying robust and sensitive frequency bands for interrogating neural oscillations. *Neuroimage*, 51, 1319-1333. [PMC2871966] \*\* cited >50x

- [13] McMenamin, B. W. \*, **Shackman**\*, **A. J.** \*, Maxwell, J. S., Bachhuber, D. R. W., Koppenhaver, A. M., Greischar, L.L. & Davidson, R. J. (2010). Validation of ICA-based myogenic artifact correction for scalp and source-localized EEG. *Neuroimage*, 49, 2416-2432. [PMC2818255] \*\* cited >100x
- [12] Heller, A. S., Johnstone, T., **Shackman**, **A. J.**, Light, S., Peterson, M. J., Kolden, G. G., Kalin, N. H. & Davidson, R. J. (2009). Reduced capacity to sustain positive emotion in major depression reflects diminished maintenance of fronto-striatal brain activation. *Proceedings of the National Academy of Sciences USA*, 106, 22445-22450. [PMC2796908] \*\* cited >250x
- [11] **Shackman**, **A. J.**, McMenamin, B. W., Maxwell, J. S., Greischar, L. L. & Davidson, R. J. (2009). Right dorsolateral prefrontal cortical activity and behavioral inhibition. *Psychological Science*, 20, 1500-1506. [PMC2858783] \*\* cited >125x
- [10] **Shackman**, **A. J.**, McMenamin, B. W., Slagter, H. A., Maxwell, J. S., Greischar, L. L. & Davidson, R. J. (2009). Electromyogenic artifacts and electroencephalographic inferences. *Brain Topography*, 22, 7-12. [PMC2712576] \*\* cited >75x
- [9] Lee, H., **Shackman**, **A. J.**, Jackson, D. C. & Davidson, R. J. (2009). Test-retest reliability of voluntary emotion regulation. *Psychophysiology*, 46, 874-879. [PMC2706917]
- [8] McMenamin, B. W., **Shackman**, **A. J.**, Maxwell, J. S., Greischar, L. L. & Davidson, R. J. (2009). Validation of regression-based myogenic correction techniques for scalp and source-localized EEG. *Psychophysiology*, 46, 578-592. [PMC2677703]
- [7] Peterson, C. K., **Shackman**, **A. J.** & Harmon-Jones, E. (2008). The role of asymmetrical frontal cortical activity in aggression. *Psychophysiology*, 45, 86-92. \*\* cited >100x
- [6] Shackman, J. E., **Shackman**, **A. J.** & Pollak, S. D. (2007). Physical abuse amplifies attention to threat and increases anxiety in children. *Emotion*, 7, 838-852. \*\* cited >150x
- [5] Salomons, T. V., Johnstone, T., Backonja, M. M., **Shackman**, **A. J.** & Davidson, R. J. (2007). Individual differences in the effects of perceived controllability on pain perception: Critical role of the prefrontal cortex. *Journal of Cognitive Neuroscience*, 19, 993-1003. \*\* cited >150x
- [4] **Shackman**, **A. J.**, Sarinopoulos, I., Maxwell, J. S., Pizzagalli, D. A., Lavric, A., & Davidson, R. J. (2006). Anxiety selectively disrupts visuospatial working memory. *Emotion*, 6, 40-61. \*\* cited >250x
- [3] Maxwell, J. S., **Shackman**, **A. J.** & Davidson, R. J. (2005). Unattended facial expressions asymmetrically bias the concurrent processing of non-emotional information. *Journal of Cognitive Neuroscience*, 17, 1386-1395.
- [2] Davidson, R. J., **Shackman**, **A. J.** & Maxwell, J. S. (2004). Asymmetries in face and brain related to emotion. *Trends in Cognitive Sciences*, 8, 389-391. \*\* cited >75x
- [1] Davidson, R. J., Maxwell, J. S. & **Shackman**, **A. J.** (2004). The privileged status of emotion in the brain. *Proceedings of the National Academy of Sciences USA*, 101, 11915-11916. \*\* cited >40x

### **Book Chapters**

- [15] Lapate, R. C. & **Shackman, A. J.** (*in press*). Afterword: What develops in emotional development? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [14] Fox, A. S. & **Shackman, A. J.** (*in press*). Afterword: How are emotions physically embodied? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [13] Fox, A. S. & **Shackman, A. J.** (*in press*). Afterword: How are emotions embodied in the social world? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [12] **Shackman, A. J.** & Lapate, R. C. (*in press*). Afterword: How do emotion and cognition interact? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [11] **Shackman, A. J.** & Lapate, R. C. (*in press*). Afterword: How are emotions regulated by context and cognition? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [10] **Shackman, A. J.** & Fox, A. S. (*in press*). Afterword: How are emotions organized in the brain? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [9] **Shackman, A. J.** & Lapate, R. C. (*in press*). Afterword: What is the added value of studying the brain for understanding emotion? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [8] **Shackman, A. J.** & Fox, A. S. (*in press*). Afterword: What are the dimensions and bases for lasting individual differences in emotion? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [7] **Shackman, A. J.**, Lapate, R. C., & Fox, A. S. (*in press*). Afterword: How are emotions, mood, and temperament related? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> ed.). New York: Oxford University Press.
- [6] Lapate, R. C. & **Shackman, A. J.** (*in press*). Afterword: What is an emotion? In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion: Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.
- [5] Okon-Singer, H. \*, Stout, D. M., Stockbridge, M. D. †, Gamer, M., Fox, A. S. & **Shackman, A. J.** \* (*in press*). The interplay of emotion and cognition. In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.), *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press. \* equal authorship
- [4] **Shackman, A. J.**, Stockbridge, M. D. †, Lemay, E. P., & Fox, A.S. (*in press*). The psychological and neurobiological bases of dispositional negativity. In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.), *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.

- [3] Oler, J. A., Fox, A. S., **Shackman, A. J.** & Kalin, N. H. (2016). The central nucleus of the amygdala is a critical substrate for individual differences in anxiety. In D. G. Amaral & R. Adolphs (Eds.), *Living without an amygdala*. New York: Guilford Press.
- [2] Pizzagalli, D., **Shackman, A. J.**, & Davidson, R. J. (2003). The functional neuroimaging of human emotion: Asymmetric contributions of cortical and subcortical circuitry. In K. Hugdahl and R.J. Davidson (Eds.), *Brain Asymmetry* (2<sup>nd</sup> edition) (pp. 511-532). Cambridge, MA: MIT Press. **\*\* cited >75x**
- [1] **Shackman, A. J.** (2000). Anterior cerebral asymmetry, affect, and psychopathology: Commentary on the withdrawal-approach model. In R. J. Davidson (Ed.), *Anxiety, depression, and emotion* (pp. 109-132). New York: Oxford University Press.

### ***Letters, Commentaries, and Editorials***

- [5] **Shackman, A. J.** & Fox, A. S. (2016). Response from Dual Perspective Companion Authors [Commentary on Gungor & Paré]. *Journal of Neuroscience*, 26, 8045.
- [4] Wager, T. D., Atlas, L. Y., Botvinick, M., Chang, L., Coghill, R. C., Davis, K. D., Ianetti, G. D., Poldrack, R. A., **Shackman, A. J.**, & Yarkoni, T. (2016). Pain in the ACC? *Proceedings of the National Academy of Sciences USA*, 113, E2474-75. [PMC4983860]
- [3] **Shackman, A. J.**, Fox, A. S. & Seminowicz, D. A. (2015). The cognitive-emotional brain: Opportunities and challenges for understanding neuropsychiatric disorders. *Behavioral and Brain Sciences*, 38, e86.
- [2] Okon-Singer, H. \*, Hendler, T., Pessoa, L. & **Shackman, A. J.** \* (2015). Introduction to the special research topic on the neurobiology of emotion-cognition interactions. *Frontiers in Human Neuroscience*, 8, 1051.
- [1] **Shackman, A. J.** (2010). The potentially deleterious impact of muscle activity on gamma band inferences. *Neuropsychopharmacology*, 35, 847.

### ***Manuscripts Under Review***

- [2] Fox, A. S. \* & **Shackman, A. J.** \* The central extended amygdala in fear and anxiety: Closing the gap between mechanistic and neuroimaging research. *Neuroscience Letters*. Special issue focused on “Functional imaging of the emotional brain,” edited by T. D. Wager and **A. J. Shackman**. \*equal authorship
- [1] Stout, D. M. \*, **Shackman, A. J.** \*, Pedersen, W. S., Miskovich, T. A., & Larson, C. L. Neural circuitry governing anxious individuals’ mis-allocation of working memory storage to threat. Invited revision under review at *Scientific Reports*.

### ***Manuscripts in Preparation***

- [4] Kaplan, C. M. †, Tillman, R. M. †, Stockbridge, M. D. †, Gamer, M., & **Shackman, A. J.** Dispositional negativity and attentional biases to threat: Implications for understanding anxiety disorders. In T. Aue & H. Okon-Singer (Eds.), *The physiological basis of cognitive biases in health and disease*.
- [3] Kulick, S., Kalin, N. H. & **Shackman, A. J.** TBA invited chapter. In Perez-Edgar, K. E. & Fox, N. A. (Eds.), *Behavioral*  
24 May 2017

*Inhibition: Integrating theory, research, and clinical perspectives*. New York: Springer.

[2] Richter, T., Okon-Singer, H., Aue, T., & **Shackman, A. J.** \*. The neurobiology of emotion-cognition interactions. In Baune, B. & Harmer, C. (Eds.). *Cognitive dimensions of Major Depressive Disorder: Cognitive, emotional and social cognitive processes*. New York: Oxford University Press.

[1] Fox, A. S. \*, Lapate, R. C., Davidson, R. J. & **Shackman, A. J.** \*. Epilogue—The nature of emotion: A research agenda for the 21<sup>st</sup> century. In Fox, A. S., Lapate, R. C., Shackman, A. J. & Davidson, R. J. (Eds.). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press.

### ***Edited Books in Preparation***

Fox, A. S., Lapate, R. C., **Shackman, A. J.** & Davidson, R. J. (2017). *The nature of emotion. Fundamental questions* (2<sup>nd</sup> edition). New York: Oxford University Press. **This edited, multi-disciplinary volume is comprised of more than 90 short essays addressing 14 fundamental questions about the nature of emotion. More than 100 leading investigators from around the world have contributed. The Editors have contributed integrative summaries for each of the questions, as well as an epilogue organized around a roadmap to the future of research in the affective sciences.**

## **Editorial Duties and Reviewing**

### ***Guest Editor***

[2] Co-Editor of a Special Issue of *Neuroscience Letters*, “Functional imaging of the emotional brain,” Tor Wager (Boulder) and **Alexander J. Shackman**. The special issue will appear in 2017 and include 8 mini-reviews from leading authorities in affective neuroscience.

[1] Co-Editor of a Special Issue of *Frontiers in Human Neuroscience*, “The neurobiology of emotion-cognition interactions,” Talma Hendler (Tel Aviv University), Hadas Okon-Singer (University of Haifa and the Max Planck Institute for Human Cognitive and Brain Sciences), Luiz Pessoa (University of Maryland) & **Alexander J. Shackman**. **The special issue includes 35 empirical reports and reviews from 135 leading North American, Israeli, and European investigators. Collectively, the papers have been viewed ~150,000x and downloaded >25,000x.**

### ***Associate Journal Editor***

**3 Journals:** *Cognition and Emotion* (2013 – present); *Frontiers in Human Neuroscience* (2013 – 2015); *Frontiers in Psychology* (Section on *Emotion Science*) (2014 – present)

### ***Editorial Board/Consulting Journal Editor***

**5 Journals:** *Emotion* (2014 – present; American Psychological Association); *Frontiers in Integrative Neuroscience* (2012 - present); *Cognitive, Affective & Behavioral Neuroscience* (2013 – present; Psychonomic Society); *Frontiers in Neuropsychiatric Imaging and Stimulation* (2013 – present); *Frontiers in Human Neuroscience* (2015 – present); *Personality Neuroscience* (2017 – present; Cambridge University Press).

### ***Ad Hoc Reviewer***



**66 Journals:** *Acta Psychologica*; *Basic and Applied Social Psychology*; *Behavioral Neuroscience*; *Biological Psychiatry*; *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*; *Biological Psychology*; *BMC Psychiatry*; *Brain Research Bulletin*; *Brain Topography*; *Canadian Journal of Experimental Psychology/Revue canadienne de psychologie expérimentale*; *Cerebral Cortex*; *Cognitive, Affective, and Behavioral Neuroscience (CABN)*; *Cognition and Emotion*; *Computational Psychiatry*; *Computers in Biology and Medicine*; *Cortex*; *Current Biology*; *Depression and Anxiety*; *Emotion*; *Developmental Cognitive Neuroscience*; *Developmental Science*; *Development and Psychopathology*; *European Neurology*; *Frontiers in Human Neuroscience*; *Frontiers in Integrative Neuroscience*; *Harvard Review of Psychiatry*; *Human Brain Mapping*; *International Journal of Psychophysiology*; *JAMA Psychiatry*; *Journal of Abnormal Psychology*; *Journal of Affective Disorders*; *Journal of Applied Developmental Psychology*; *Journal of Clinical Child and Adolescent Psychology*; *Journal of Cognitive Neuroscience*; *Journal of Cognitive Psychology*; *Journal of Neuroscience*; *Journal of Neuroscience Methods*; *Journal of Pharmaceutical Technology & Drug Research*; *Journal of Physiology (Paris)*; *Journal of Visualized Experiments (JoVE)*; *Laterality*; *Neural Computing and Applications*; *Neurocase*; *Neuroimage*; *Neuroimage: Clinical*; *Neuroinformatics*; *Neuropsychologia*; *Neuropsychology*; *Neuropsychopharmacology*; *Neuroscience & Biobehavioral Reviews*; *Neuroscience Letters*; *Personality Disorders: Theory, Research, and Treatment*; *Physiology & Behavior*; *Plos Biology*; *Plos ONE*; *PNAS USA*; *Progress in Neurobiology*; *Psychological Medicine*; *Psychological Review*; *Psychological Science*; *Psychoneuroendocrinology*; *Psychonomic Bulletin & Review*; *Psychophysiology*; *Quarterly Journal of Experimental Psychology*; *Scientific Reports (NPG)*; *Social Cognitive and Affective Neuroscience (SCAN)*; *Social Neuroscience*; *Trends in Cognitive Sciences (TiCS)*.

**11 Funding Agencies/Awards:** *National Institutes of Health (NIH): Mechanisms of Emotion, Stress and Health Study Section (MESH) Study Section (ad hoc) and Special Emphasis Panel on the Development of Psychosocial Therapeutic and Preventive Interventions for Mental Disorders (ZMH1 ERB-D) (ad hoc)*; *National Science Foundation (NSF), including Graduate Research Fellowship*; *Arizona Institute for Mental Health Research*; *Biotechnology and Biological Sciences Research Council (Medical Research Council, UK)*; *Center for Translational and Basic Research, Hunter College, City University of New York*; *Commonwealth of Kentucky Science and Engineering Foundation*; *Dean's MRI Research Initiative, College of Behavioral and Social Sciences, University of Maryland*; *Mpower Seed Grant Program, University of Maryland*; *Neurological Foundation of New Zealand*; *San Antonio Life Sciences Institute*; *Undergraduate Researcher of the Year Award, University of Maryland*; *U.S. Army Research Office*

**3 Scientific Societies:** *Anxiety and Depression Association of America Annual Meeting*; *Organization for Human Brain Mapping Annual Meeting*; *Society of Biological Psychiatry annual meeting*.

**1 Publisher:** *Sinauer Associates Publishers*.

## **Invited Lectures and Colloquia**

[20] **Shackman, A. J.** (November 2017). The neurobiology of dispositional anxiety. *Department of Psychology Neuroscience Seminar Series, Yale University*.

[20] **Shackman, A. J.** (October 2017). The neurobiology of dispositional anxiety. *Department of Psychological and Brain Sciences, University of Iowa*.

[19] **Shackman, A. J.** (April 14, 2016). Anxiety, pain, and cognition are integrated in the brain. Fifth annual Maryland Neuroimaging Retreat (*Pain Neuroimaging—Advances & Controversies*), *University of Maryland, Baltimore*.

- [18] **Shackman, A. J.** (November 30, 2016). The neurobiological bases of dispositional negativity—*Implications for psychopathology*. *Counseling Center Research and Development Seminar Series, University of Maryland, College Park.*
- [17] **Shackman, A. J.** (June 15, 2016). The neurobiology of dispositional anxiety. *McLean Hospital/Harvard Medical School.*
- [16] **Shackman, A. J.** (March 18, 2016). The neurobiology of dispositional anxiety. *Department of Psychology, University of Virginia.*
- [15] **Shackman, A. J.** (February 23, 2016). The neurobiology of early-life anxiety. *Department of Psychiatry and Behavioral Sciences, Johns Hopkins University.*
- [14] **Shackman, A. J.** (December 4, 2015). The neurobiology of dispositional anxiety. *Department of Psychology, North Dakota State University.*
- [13] **Shackman, A. J.** (September 8, 2015). The role of the extended amygdala in early-life anxiety. *National Institute of Mental Health.*
- [12] **Shackman, A. J.** (August 8, 2014). Understanding the neurobiology of dispositional anxiety. NIDA-sponsored symposium, *At the intersection of neuroscience and addictions: Treatment development, University of Maryland, College Park.*
- [11] **Shackman, A. J.** (February 24, 2014). Understanding the neurobiology of dispositional anxiety. *Center for Addictions, Personality, and Emotion Research; Department of Psychology, University of Maryland, College Park.*
- [10] **Shackman, A. J.** (February 5, 2014). Understanding the neurobiology of dispositional anxiety. *Center for Children, Relationships, and Culture and NICHD Training Program in Social Development, Department of Human Development, University of Maryland, College Park.*
- [9] **Shackman, A. J.** (December 6, 2013). Anxiety and the brain. *Department of Psychology, University of Virginia.*
- [8] **Shackman, A. J.** (November 26, 2013). Dissecting the neurobiology of dispositional anxiety. *Department of Neural Pain Sciences, School of Dentistry, University of Maryland, Baltimore.*
- [7] **Shackman, A. J.** (November 20, 2013). Dissecting the neurobiology of dispositional anxiety. *Developmental Area Group, Department of Psychology, University of Maryland, College Park.*
- [6] **Shackman, A. J.** (October 13, 2013). Dissecting the neurobiology of dispositional anxiety. Invited speaker at the third annual DFG Symposium on *Fear, Anxiety & Anxiety Disorders* (sponsored by the German National Research Foundation [DFG] and organized by Christian Buechel and Hans-Christian Pape), *Institute for Systems Neuroscience & Center for Experimental Medicine, University of Hamburg, Germany.*
- [5] **Shackman, A. J.** (October 4, 2013). Dissecting the neurobiology of dispositional anxiety, *Neuroscience and Cognitive Science Program Annual Retreat, University of Maryland, College Park.*

- [4] **Shackman, A. J.** (December 6, 2012). Dissecting the neurobiology of dispositional anxiety, *Department of Psychology, University of Maryland, College Park*.
- [3] **Shackman, A. J.** (November 13, 2012). The neurobiology of individual differences in anxious temperament, *Department of Medicine, University of Wisconsin School of Medicine and Public Health*.
- [2] **Shackman, A. J.** (March 28, 2012). Individual differences reveal the deep structure of anxiety and its neurobiology, *Department of Psychology, University of Alabama at Birmingham*.
- [1] **Shackman, A. J.** (November 21, 2011). The interaction and integration of anxiety and cognition. *Department of Human Development, Cornell University*.

## Conference Presentations

### *Chaired Conference Symposia and Panels*

- [5] **Shackman, A. J.** & Etkin, A. (2016). New frontiers in adaptive control: From basic mechanisms to novel therapeutics. Panelists: **Alexander Shackman**, Amit Etkin, Robert Reinhart, and Tor Wager. Symposium chaired at the annual meeting of the *Society of Biological Psychiatry*, Atlanta, GA.
- [4] **Shackman, A. J.** (2015). Adaptive control: Neuro-computational substrates and implications for understanding neuropsychiatric disorders. Panelists: James Cavanagh, Clay Holroyd, Greg Hajcak, and Amitai Shenhav. Symposium chaired at the annual meeting of the *Society for Psychophysiological Research*, Seattle, WA.
- [3] Fox, A.S., **Shackman, A. J.**, & Koob, G. F. (2015). Extended amygdala circuits in anxiety and addiction: cross-species molecular, anatomical, and functional insights. Panelists: Andrew Fox, **Alexander Shackman**, Julie Fudge, Thomas Kash, and George Koob (Discussant). Symposium chaired at the annual meeting of the *Society of Biological Psychiatry*, Toronto, Canada.
- [2] **Shackman, A. J.** & Kalin, N.H. (2014). The neurobiology of pervasive anxiety: The role of circuits centered on the extended amygdala. Panelists: Talma Hendler, Ned Kalin, Luiz Pessoa, **Alexander Shackman** & Leah Somerville. Symposium chaired at the annual meeting of the *Society of Biological Psychiatry*, NY, NY.
- [1] **Shackman, A. J.** & Fox, A. S. (2014). The neurobiology of early-life anxiety. Panelists: Jennifer Blackford, Andrew Fox, Ned Kalin & Daniel Pine, **Alexander Shackman**, and Nim Tottenham. Symposium chaired at the annual meeting of the *Anxiety and Depression Association of America*, Chicago, IL.

### *Society Invited Talks*

- [3] **Shackman, A. J.** (2015). The integration of emotion and cognition in the brain. Annual meeting of the *Society for Psychophysiological Research*, Seattle, WA.
- [2] **Shackman, A. J.** (2015). The integration of emotion and cognition in the brain. Annual meeting of the *Social & Affective Neuroscience Society*, Boston, MA.
- [1] **Shackman, A. J.** (2015). The integration of emotion and cognition in the brain. Annual meeting of the *Society for Affective Science*, San Francisco, CA.

## Talks

- [13] **Shackman, A. J.** (2017). Brain bases of individual differences in dispositional negativity. Talk presented at the annual meeting of the Association for Research in Personality (Symposium on *TBD* chaired by R. Lutzman and C. DeYoung), Sacramento, CA.
- [12] **Shackman, A. J.** (2017). TBA. Talk presented at the annual meeting of the Association for Psychological Science (Symposium on New Directions on the *Affective consequences of interpersonal relationships: mechanisms, individual differences, and relationship characteristics*, chaired by E. P. Lemay & R. Venaglia), Boston, MA.
- [11] **Shackman, A. J.** (2016). Neurobiological bases and markers of early-life anxiety. Talk presented at the annual meeting of the **Society of Psychophysiological Research** (Symposium on *Biomarkers for anxiety*, chaired by A. Kaczkurkin & J.J.B. Allen), Minneapolis, MN.
- [10] **Shackman, A. J.** (2016). The neural bases and translational relevance of adaptive control. Talk presented at the annual meeting of the **Society of Biological Psychiatry** (Symposium on *New frontiers in adaptive control: From basic mechanisms to novel therapeutics*, chaired by **A.J. Shackman** & A. Etkin), Atlanta, GA.
- [9] **Shackman, A. J.** (2015). Neural mechanisms underlying similarities and differences in the presentation of early-life anxiety. Talk presented at the annual meeting of the **Society for Psychophysiological Research** (Symposium on *Using biobehavioral profiles to decrease heterogeneity, improve specificity and prediction of risk*, chaired by K. Buss), Seattle, WA.
- [8] **Shackman, A. J.**, Fox, A. S., Oler, J. A., Weinstein, J. S., Martinez-Cancino, R., Oakes, T. R., Shelton, S. E., Smith, J. F., Pessoa, L., Gamer, M., Davidson, R. J. & Kalin, N. H. (2015). The extended amygdala is a key substrate for sustained anxiety. Talk presented at the annual meeting of the **Society of Biological Psychiatry** (Symposium on *Extended amygdala circuits in anxiety and addiction: cross-species molecular, anatomical, and functional insights*, chaired by A. S. Fox, **A. J. Shackman** & G. F. Koob), Toronto, Canada.
- [7] **Shackman, A. J.** (2015). The central extended amygdala is a key substrate for early-life anxiety. Talk presented at the annual meeting of the **Anxiety and Depression Association of America** (Symposium on *Imaging the anxious brain at rest*, chaired by A. Roy), Miami, FL.
- [6] **Shackman, A. J.** (2014). The integration of emotion, pain, and cognition in the brain. Talk presented at the annual meeting of the **Society for Neuroscience** (Mini-symposium on *Characterizing the roles of fronto-cingulo-subcortical circuits in pain, emotion, and cognition*, chaired by D. Seminowicz), Washington, DC.
- [5] **Shackman, A. J.**, Fox, A. S., Oler, J. A., Birn, R. M., Williams, L. E., Oakes, T. R., Shelton, S. E., Davidson, R. J. & Kalin, N. H. (2014). The extended amygdala is a key substrate for extreme anxiety early in life. Talk presented at the annual meeting of the **Society of Biological Psychiatry** (Symposium on *The neurobiology of pervasive anxiety: The role of circuits centered on the extended amygdala*, chaired by **A. J. Shackman** & N. H. Kalin), NY, NY.
- [4] **Shackman, A. J.**, Fox, A. S., Oler, J. A., Birn, R. M., Williams, L. E., Oakes, T. R., Shelton, S. E., Davidson, R. J. & Kalin, N.

H. (2014). The extended amygdala is a key substrate for extreme anxiety early in life. Talk presented at the annual meeting of the **Anxiety and Depression Association of America** (Symposium on *The neurobiology of early-life anxiety*, chaired by **A. J. Shackman** & A. S. Fox), Chicago, IL.

[3] **Shackman, A. J.**, Fox, A. S., Oler, J. A., Shelton, S. E., Davidson, R. J. & Kalin, N. H. (2012). A common neural phenotype underlies diversity in the expression of anxiety. Talk presented at the annual meeting of the **Society for Neuroscience** (Nanosymposium on *Neural mechanisms underlying pain perception and anxiety*, chaired by I. Strigo), New Orleans, LA.

[2] **Shackman, A. J.**, Maxwell, J. S., McMenamin, B. W., Fox, A. S., Greischar, L. L. & Davidson, R. J. (2011). Neural circuitry mediating the impact of anxiety on cognition. **Psychophysiology**, 48, S8. (Symposium on the *Interaction between anxiety and cognition: Behavioral, psychophysiological, and neural perspectives*, chaired by C. Grillion).

[1] **Shackman, A. J.**, Maxwell, J. S., Skolnick, A. J., Schaefer, H. S. & Davidson, R. J. (2003). Exploiting individual differences in the prefrontal asymmetry of approach-related affect: Hemodynamic, electroencephalographic, and psychophysiological evidence. Program No. 444.6. Abstract Viewer/Itinerary Planner. Washington, DC: **Society for Neuroscience**.

### **Posters and Co-Authored Talks**

† indicates mentored student project

[62] Stockbridge, M. D. †, Furman, A. J., Keaser, M. L., Sosa, J. S. P., Padmala, S., Fox, A. S., Pessoa, A. S., Smith, J. F., Seminowicz, D. A. & **Shackman, A. J.** (*submitted*). Negative affect, pain, and cognition are integrated in the cingulate cortex. Poster presented at the annual meeting of the **Society for Neuroscience**, Washington, DC.

[61] Doorley, J. D., Kashdan, T. B., Weinstein, J. S. † & **Shackman, A. J.** (*submitted*). Dissecting the lives of people with social anxiety disorder: Assessing the best and worst of every hour using ecological momentary assessment. Talk presented at the annual meeting of the **Association for Behavioral and Cognitive Therapies**, San Diego, CA.

[60] Anderson, A. S. †, Barstead, M. G. †, DeYoung, K. D. & **Shackman, A. J.** (*submitted*). Ecological momentary assessment provides new insights into the interaction of neuroticism and daily events. Poster presented at the annual meeting of the **Association for Behavioral and Cognitive Therapies**, San Diego, CA.

[59] Kovner, R., Souaiaia, T., Lu, J., Dong, Y., Fathi, A., Tao, Y., French, D., Roseboom, P., **Shackman, A. J.**, Oler, J. A., Fudge, J., Bhattacharyya, A., Zhang, S.-C., Knowles, J., Kalin, N. H. (2017). Neuroplasticity in the primate central amygdala: regional distribution and physiological effects of neurotrophic kinase receptor, type 3. Poster presented at the annual **Wisconsin Alumni Research Foundation Discovery Challenge** meeting, Madison, WI.

[58] Tillman, R. M. †, Stockbridge, M. D. †, Nacewicz, B. M., Smith, J. F. & **Shackman, A. J.** (2017). Functional architecture of central extended amygdala networks. **Biological Psychiatry**, 81, S52. [NIHMS876194]

[57] Fox, A. S., Oler, J. A., **Shackman, A. J.**, Birn, R. M., Alexnader, A. L., Davidson, R. J. & Kalin, N. H. (2017). The neural substrates of anxious temperament in young rhesus monkeys. Talk presented at the biennial meeting of the Society for Research in Child Development (Symposium on *rarly risk factors for the development of*

*internalizing and externalizing symptomatology*, chaired by K. Roelofs & H. Niermann), Austin, TX.

- [56] Kaplan, C. M. †, Brinkman, M. †, Pessoa, L., Smith, J. F. & **Shackman, A. J.** (2016). The neurobiology of fear and anxiety: Circuits engaged by certain and uncertain threat. Poster presented at the annual meeting of the ***Society for Neuroscience***, San Diego, CA.
- [55] Kaplan, C. M. †, Brinkman, M. †, Pessoa, L., Smith, J. F. & **Shackman, A. J.** (2016). Understanding the neurobiology of fear and anxiety. Poster presented at the annual meeting of the ***Society of Research in Psychopathology***, Baltimore, MD. **\*\* selected for a poster/travel Award**
- [54] Fox, A. S., Birn, R. M., **Shackman, A. J.**, Oler, J. A., Raveendran, M., Alexander, A. L., Davidson, R. J., Rogers, J. & Kalin, N.H. (2016). Heritability of functional connectivity between components of the extended amygdala in young non-human primates. Poster presented at the annual meeting of the ***Society of Biological Psychiatry***, Atlanta, GA.
- [53] Fox, A. S., Birn, R. M., **Shackman, A. J.**, Oler, J. A., Raveendran, M., Alexander, A. L., Davidson, R. J., Rogers, J. & Kalin, N. H. (2015). Heritability of functional connectivity between components of the extended amygdala in young non-human primates. Poster presented at the ***Cold Spring Harbor Laboratory meeting on Behavior & Neurogenetics of Nonhuman Primates***, Cold Spring Harbor, NY.
- [52] Fox, A. S., **Shackman, A. J.**, Oler, J. A., Birn, R. M., Alexander, A. A., Shelton, S. E., Davidson, R.J. & Kalin, N. H. (2015). The neural substrates of anxious temperament in young rhesus monkeys. Talk presented at the annual meeting of the Society for Neuroscience, Chicago, IL.
- [51] Stout, D. M., **Shackman, A. J.**, Johnson, J. S., Miskovich, T. A. & Larson, C. L. (2014). Deficits gating threat from working memory in anxiety. Poster presented at the annual meeting of the ***Society for Research in Psychopathology***, Evanston, IL.
- [50] **Shackman, A.J.** & Cavanagh, J. F. (2014). The role of rostral cingulate cortex in anxiety and the adaptive control of action. Poster presented at the annual meeting of the ***Society for Affective Science***, Washington DC.
- [49] Stout, D. M., **Shackman, A. J.**, Miskovich, T. & Larson, C. L. (2014). Unnecessary storage of threat in working memory: A proximal mechanism underlying anxiety and worry. Poster presented at the annual meeting of the ***Society for Affective Science***, Washington DC .
- [48] **Shackman, A.J.** & Cavanagh, J. F. (2013). The role of rostral cingulate cortex in anxiety and the adaptive control of action. Poster presented at the ***Heidelberg University meeting on Neural Circuits Underlying Nociception and Pain and Their Plasticity*** (organized by Herta Flor and Rohini Kuner), Heidelberg, Germany.
- [47] Fox, A. S., Tromp, D. P. M., Oler, J. A., **Shackman, A. J.**, Shelton, S. E., McKay, D. R., Davidson, R. J., Oakes, T. R., Blangero, J., Rogers, J. & Kalin, N. H. (2013). The structural and functional neural systems underlying increased genetic risk for anxiety in a large sample of nonhuman primates. ***Behavior & Neurogenetics of Nonhuman Primates Meeting*** (organized by Jeff Rogers & Nelson Freimer), Cold Spring Harbor, NY.
- [46] Fox, A. S., **Shackman, A. J.**, Tromp, D. P. M., Birn, R. M., Oler, J. A., Adluru, N., Nanda, S. A., Shelton, S. E.,

- Alexander, A. L., Davidson, R. J. & Kalin, N. H. (2013). Amygdala-prefrontal connectivity predicts anxious temperament and gene expression in the primate dorsal amygdala. Poster presented at the annual meeting of the *Society of Biological Psychiatry*, San Francisco, CA.
- [44] Williams, L. E., Tromp, D. P. M., McFarlin, D. R., Birn, R. M., **Shackman, A. J.**, Rogers, G. M., Taft, W. M., Jesson, M. A. L., Slattery, M. J., Davidson, R. J., Oler, J. A. & Kalin, N. H. (2013). Amygdala-prefrontal connectivity is altered in childhood anxiety. *Poster presented at the annual Wisconsin Symposium on Emotion, Madison, WI.*
- [44] Kovner, R., Oler, J. A., **Shackman, A. J.**, French, D. A., Nanda, S. A., Fox, A. S., Roseboom, P. H. & Kalin, N. H. (2013). Distribution of NTRK3 and IRS2 within the primate amygdala: Implications for novel anxiety treatments. *Poster presented at the annual Wisconsin Symposium on Emotion, Madison, WI.*
- [43] Pedersen, W. S., **Shackman, A. J.**, Blaisdell, J. A., Belleau, E. L., Stout, D. M. & Larson, C. L. (2013). Posterior parietal cortex activation predicts working memory capacity for faces. Poster presented at the annual meeting of the *Cognitive Neuroscience Society*, San Francisco, CA.
- [42] Bocinova, A., Stout, D. M., **Shackman, A. J.**, Larson, C. L. & Johnson, J. S. (2013). Do anxious individuals have difficulty gating threat-related information from working memory? *Poster presented at the annual Red River Psychology Conference, Fargo, ND.*
- [41] Fox, A. S., Oler, J. A., **Shackman, A. J.**, Shelton, S. E., Davidson, R. J. & Kalin, N. H. (2012). The neural substrates of anxious temperament in 592 young rhesus monkeys. Talk presented at the annual meeting of the *Society for Neuroscience* (Nanosymposium on *Neural mechanisms underlying pain perception and anxiety*), New Orleans, LA.
- [40] Tromp, D., Oler, J. A., Fox, A. S., **Shackman, A. J.**, Davidson, R. J., Birn, R. M., Alexander, A. L. & Kalin, N. H. (2012). Structural and functional connectivity of the extended amygdala in newborn monkeys. Talk presented at the annual meeting of the *Society for Neuroscience* (Nanosymposium on *Neural mechanisms underlying pain perception and anxiety*), New Orleans, LA.
- [39] Roseboom, P. H., Oler, J. A., Nanda, S. A., Fox, A. S., Oler, J. A., **Shackman, A. J.**, Shelton, S. E. & Kalin, N. H. (2012). Serotonin 2c receptor gene expression in the rhesus amygdala predicts anxious temperament. Poster presented at the annual meeting of the *Society for Neuroscience*, New Orleans, LA.
- [38] Stout, D. M., **Shackman, A. J.**, Wamboldt, M. M. & Larson, C. L. (2012). Neural measures indicate that threat's privileged access to working memory reflects reduced attentional filtering. Poster presented at the annual meeting of the *Society for Psychophysiological Research*, New Orleans, LA.
- [37] Fox, A. S., Oler, J. A., Tromp, D. P. M., **Shackman, A. J.**, Alexander, A. L., Davidson, R. J. & Kalin, N. H. (2012). Cortisol predicts decreased cerebral cortical volume in 592 young non-human primates. Poster presented at the annual meeting of the *International Society of Psychoneuroendocrinology*, New York, NY.
- [36] Roseboom, P. H., Nanda, S. A., Fox, A. S., Oler, J. A., **Shackman, A. J.**, Shelton, S. E. & Kalin, N. H. (2012). Neuropeptide Y system gene expression in the the nonhuman primate amygdala is associated with anxious temperament. *Biological Psychiatry*, 71, 104S.

- [35] Oler, J. A., Tromp, D., Fox, A. S., **Shackman, A. J.**, Davidson, R. J., Alexander, A. L., Birn, R. M. & Kalin, N. H. (2012). Connectivity of the extended amygdala in newborn rhesus monkeys. Poster presented at the annual **Wisconsin Symposium on Emotion**, Madison, WI.
- [34] **Shackman, A. J.**, Fox, A. S., Oler, J. A., Van Valkenberg, H. C., Shelton, S. E., Davidson, R. J., & Kalin, N. H. (2012). A common neural phenotype underlies diversity in the presentation of anxiety. Poster presented at the annual **Wisconsin Symposium on Emotion**, Madison, WI.
- [33] **Shackman, A. J.** & Cavanagh, J. F. (2012). The role of rostral cingulate cortex in the adaptive control of action. Poster presented at the annual **Wisconsin Symposium on Emotion**, Madison, WI.
- [32] **Shackman, A. J.**, Shackman, J. E., Salomons, T. V., Slagter, H. A., Fox, A. S., Winter, J. J., Jenness, J. L., Pollak, S. D. & Davidson, R. J. (2012). Anxiety and adaptive control in rostral cingulate cortex. **University of Colorado at Boulder Annual Conference: Determinants of executive function & dysfunction**. \*\* Selected as one of the top five posters.
- [31] Starr, M. J., Bradford, D. E., **Shackman, A. J.** & Curtin, J. J. (2011). An empirical comparison of commonly used methods of quantifying startle potentiation. *Psychophysiology*, 48, S53.
- [30] Guller, Y., Ferrarelli, F., Sarasso, S., **Shackman, A. J.**, Meyerand, M. E., Tononi, G. & Postle, B. R. (2011). Disrupted TMS-evoked response in the thalamus of patients with schizophrenia as measured with fMRI. *Biological Psychiatry*, 69, S951..
- [29] Weng, H. Y., Fox, A. S., **Shackman, A. J.**, Stodola, D. E., Caldwell, J., Olson, M. C., Rogers, G. & Davidson R. J. (2011). Alterations in neural responses to suffering after compassion training predict increased altruistic redistribution. Poster presented at the annual **Wisconsin Symposium on Emotion**, Madison, WI.
- [28] **Shackman, A. J.**, Guller, Y., Riggall, A. C., Johnson, J. S. & Postle, B. R. (2011). The role of frontal eye fields in spatial working memory and attention: A concurrent TMS-fMRI approach. Poster presented at the annual meeting of the **Cognitive Neuroscience Society**, San Francisco, CA.
- [27] Guller, Y., **Shackman, A. J.**, Feredoes, E., Ferrarelli, F., Tononi, G., Meyerand, E. M. & Postle, B. R. (2010). Using simultaneous TMS-fMRI to probe the integrity of cortico-thalamic circuits. Talk presented at the annual meeting of the **Society for Neuroscience** (Nanosymposium on *Genetics and Brain Imaging in Psychiatric Illness*), San Diego, CA.
- [26] Guller, Y., Feredoes, E., **Shackman, A. J.**, Acheson, D. J., Riggall, A. C., Ferrarelli, F., Tononi, G., Meyerand, E. M. & Postle, B. P. (2010). Using combined TMS-fMRI to probe the integrity of the thalamic reticular nucleus. Poster presented at the annual meeting of the **Organization for Human Brain Mapping**, Barcelona, Spain.
- [25] Fox, A.S., Shelton, S.E., Alexander, A.L., Oakes, T.R., **Shackman, A. J.**, Davidson, R.J. & Kalin, N.H. (2009). Diffusion tensor imaging (DTI) demonstrates that prefrontal-amygdala white-matter tracts relate to anxious temperament and amygdala metabolism. Poster presented at the annual meeting of the **Organization for Human Brain Mapping**, San Francisco, CA.
- [24] Salomons, T.V., **Shackman, A. J.**, Winter, J., Nacewicz, B., & Davidson, R.J. (2008). Dorsal ACC is involved in



affective processing: Examining the functional subdivisions of anterior cingulate cortex using quantitative meta-analysis. Poster presented at the annual meeting of the *Society for Neuroscience*, Washington, DC.

- [23] Nusslock, R., **Shackman, A. J.**, McMenamin, B.W., Greischar, L.L., Kovacs, M. & Davidson, R.J. (2008). Anxiety moderates relations between frontal EEG alpha asymmetry and depression. *Psychophysiology*, 45, S77.
- [22] **Shackman, A. J.**, Maxwell, J.S., McMenamin, B.W., Fox, A.S., Greischar, L.L. & Davidson, R.J. (2008). Parietal cortex mediates the selective disruption of spatial working memory by threat-induced anxiety. Poster presented at the annual meeting of the *Cognitive Neuroscience Society*, San Francisco, CA.
- [21] Nusslock, R., **Shackman, A. J.**, Greischar, L.L., McMenamin, B.W., Kovacs, M. & Davidson, R.J. (2007). Frontal EEG alpha asymmetry in depression: The role of clinical state and emotion regulation. *Psychophysiology*, 44, S7.
- [20] Maxwell, J.S., Slagter, H.A., **Shackman, A. J.** & Davidson, R.J. (2007). Cognitive and emotional influences in dorsal anterior cingulate cortex. Poster presented at the annual meeting of the *Cognitive Neuroscience Society*, New York, NY.
- [19] Slagter, H.A., Beets, I.A.M. , Johnstone, T., **Shackman, A. J.**, Van Reekum, C.M. & Davidson R.J. (2007). Threat-evoked anxiety modulates attentional resource distribution. Poster presented at the annual meeting of the *Cognitive Neuroscience Society*, New York, NY.
- [18] Maxwell, J.S., **Shackman, A.J.**, McMenamin, B.W., Greischar, L.L., Nacewicz, B.M. & Davidson, R.J. (2007). Detecting high-stakes deception. Poster presented at the *Intelligence Community Postdoctoral Research Fellowship Colloquium*, Chantilly, VA.
- [17] Norris, C. J., van Reekum, C. M., Greischar, L. L., Lapate, R. C., **Shackman, A. J.**, McMenamin, B. W., & Davidson, R. J. (2007). Activation of the ventromedial prefrontal cortex predicts psychological well-being and emotion regulation: A source localization study. Poster presented at the 2nd annual preconference on Emotion preceding the 8th annual meeting of the *Society for Personality and Social Psychology*, Memphis, TN.
- [16] Norris, C. J., van Reekum, C. M., Greischar, L. L., Lapate, R. C., **Shackman, A. J.**, McMenamin, B. W., Beguhn, G. M., Rawlings, N. B., & Davidson, R. J. (2006). Ventromedial prefrontal activation at baseline and in response to affective pictures predicts positive affective style: A source localization study. *Psychophysiology*, 43, S72.
- [15] Nusslock, R., Coan, J.A., **Shackman, A. J.**, Abramson, L.Y., Harmon-Jones, E., Alloy, L.B., & Hogan, M.E. (2006). Frontal EEG asymmetry predicts cognitive vulnerability to depression. Poster presented at the annual meeting of the *Society for Research in Psychopathology*, San Diego, CA.
- [14] Nusslock, R., Coan, J.A., **Shackman, A. J.**, Abramson, L.Y., Harmon-Jones, E., Alloy, L.B., & Hogan, M.E. (2006). Frontal EEG Asymmetry predicts cognitive vulnerability to depression. *Psychophysiology*, 43, S72.
- [13] Maxwell, J. S., **Shackman, A. J.**, McMenamin, B. W., Greischar, L. L. & Davidson, R. J. (2005). Threat-induced anxiety alters the visual processing of non-emotional targets. *Psychophysiology*, 42, S86.
- [12] **Shackman, A. J.**, Maxwell, J. S. & Davidson, R. J. (2005). Measuring the impact of threat-evoked anxiety on working memory and prefrontal cortex. Poster No. E116. Abstract Viewer/Itinerary Planner. Davis,

CA: *Cognitive Neuroscience Society*.

- [11] Maxwell, J. S., **Shackman, A. J.**, McMenamin, B.W. & Davidson, R. J. (2005). Threat evoked anxiety biases the visual-cognitive processing of non-emotional information. Program No. B123. Abstract Viewer/Itinerary Planner. Davis, CA: *Cognitive Neuroscience Society*.
- [10] Maxwell, J. S., **Shackman, A. J.** & Davidson, R. J. (2004). Threat evoked anxiety biases the early visual processing of non-emotional stimuli. Program No. 547.11. Abstract Viewer/Itinerary Planner. Washington, DC: *Society for Neuroscience*.
- [9] **Shackman, A. J.**, Maxwell, J. S. & Davidson, R. J. (2004). Prefrontal EEG asymmetry, corrugator EMG and self-report measures of threat-evoked anxiety. *Psychophysiology*, 41, S59.
- [8] **Shackman, A. J.**, Maxwell, J. S. & Davidson, R. J. (2004). Predicting individual differences in threat-evoked anxiety using resting prefrontal EEG asymmetry and self-report measures of affective style. *Psychophysiology*, 41, S59.
- [7] Greischar, L.L., Springborn, K.D., **Shackman, A. J.** & Davidson, R. J. (2004). Using independent component analysis to remove eye artefacts from high-density (256 channel) EEG recordings. *Psychophysiology*, 41, S99.
- [6] Pizzagalli, D., Schaefer, H. S., Hendrick, A. M., Horras, K. A., **Shackman, A. J.**, Anderle, M. J., Pederson, A. J. C., Lavric, A., Sarinopoulos, I., Zhang, R. and Davidson, R.J. (2001). Amygdalar activation during acquisition of aversive conditioning is modulated by stimulus contingencies: An event-related fMRI study. *Psychophysiology*, 38, S77.
- [5] Larson, C.L., Irwin, W., Nitschke, J.B., Navin, S.D., Ruffalo, D., **Shackman, A. J.**, & Davidson, R.J. (2000). Self-report correlates of reactivity to visual affective stimuli indexed with affect-modulated startle: specificity of a new measure. *Psychophysiology*, 37, S62.
- [4] **Shackman, A. J.**, Slagter, H. A., Lavric, A., Irwin, W., Sarinopoulos, I., Oakes, T. R. & Davidson, R. J. (2000). Hemispheric asymmetry of verbal and spatial working memory in prefrontal cortex. Poster presented at the annual meeting of the *Society for Neuroscience*, New Orleans, LA.
- [3] Lavric, A., **Shackman, A. J.**, Sarinopoulos, I., Pederson, A. J. C. & Davidson, R. J. (2000). Effects of threat-of-shock on verbal and spatial working memory. *Psychophysiology*, 37, S62.
- [2] **Shackman, A. J.** & Davidson, R. J. (1999). Characterizing the inhibition of anxiety: An emotion-modulated startle study. *Psychophysiology*, 36, S105.
- [1] Sutton, S. K., **Shackman, A. J.** & Davidson, R. J. (1998). Monetary incentive and working memory load modulate anterior brain activity. *Psychophysiology*, 35, S81.

## Professional Societies and Service

### *Memberships*

American Psychological Association; Anxiety and Depression Association of America; Association for Psychological

Science; Association for Research in Personality; Cognitive Neuroscience Society; Social and Affective Neuroscience Society; Society for Affective Science; Society for Neuroscience; Society for Psychophysiological Research; Society for Research in Psychopathology; Society for a Science of Clinical Psychology (APA Division 12, Section 3; Society of Biological Psychiatry)

### **Service**

2014–2017 Member, Annual Meeting Program Planning Committee  
Society of Biological Psychiatry

### **Professional Development and Mentorship Roundtables**

Society for Psychophysiological Research Annual Meeting (2015)  
Society of Biological Psychiatry Annual Meeting (2016, 2017)

### **Intramural Service**

2016–2017 Member, Information Technology Infrastructure Work Group  
University of Maryland, College Park

2016–2017 Member, Neuroscience Faculty Search Committee  
Department of Psychology

2016 Reviewer  
UMD-UMB Research and Innovation Seed Grant Program

2015–2018 Member, Executive Board  
Neuroscience and Cognitive Science Program

2015–2017 Member, Faculty Recruiting Committee  
Department of Psychology

2015 Member, Salary/Merit Review Committee  
Department of Psychology

### **Teaching Experience**

Fall 2016	<i>Graduate Seminar in Temperament &amp; Personality</i>	Psychology 612 (3 cred.) Cross-listed through NACS	14 graduates
	<i>Advanced Temperament &amp; Personality</i>	Psychology 435 (3 cred.)	67 undergraduates
Spring 2016	<i>Introduction to Temperament &amp; Personality</i>	Psychology 210 (3 cred.)	84 undergraduates
Fall 2015	<i>Graduate Seminar in Temperament &amp; Personality</i>	Psychology 612 (3 cred.) Cross-listed through NACS	21 graduates
	<i>Advanced Temperament &amp; Personality</i>	Psychology 435 (3 cred.)	75 undergraduates

Spring 2014	<i>Introduction to Temperament &amp; Personality</i>	Psychology 210 (3 cred.)	109 undergraduates
Fall 2014	<i>Graduate Seminar in Temperament &amp; Personality</i>	Psychology 612 (3 cred.) Cross-listed through NACS	8 graduates
Spring 2014	<i>Introduction to Temperament &amp; Personality</i>	Psychology 210 (3 cred.)	71 undergraduates
Fall 2013	<i>Graduate Seminar in Temperament &amp; Personality</i>	Psychology 612 (3 cred.) Cross-listed through NACS	18 graduates

*Note: Course syllabi and other materials are available at [shackmanlab.org](http://shackmanlab.org)*

## **Research Supervision and Professional Mentorship**

### ***Staff Supervision***

#### **Staff Scientist**

J. Smith, 2014-

#### **Postdoctoral Fellow**

J. Hur, 2017-

#### **Masters-Level Project Lead**

K. DeYoung, 2016-

#### **Post-baccalaureate Fellow/Project Coordinator**

A. Anderson, 2017-

S. Islam, 2017-

### ***Graduate Student Research Supervision***

#### **Ph.D. Supervisor**

C. Kaplan, 2014-

R. Tillman, 2014-

#### **Ph.D. Co-Supervisor**

M. Stockbridge, Department of Hearing and Speech Sciences, 2014-

#### **Neuroscience and Cognitive Science Certificate (Ph.D. Minor) Supervisor**

M. Barstead, Department of Human Development and Quantitative Methodology, 2015-

D. Ampofo, 2017-

#### **Ph.D. Committees**

J. McCarthy, 2013-16

D. Bryden, Neuroscience and Cognitive Science Program, 2015

J. Chrabaszcz, 2016

A. Umemoto, Department of Psychology, University of Victoria, BC, Canada, 2016

K. Bradshaw, 2016-  
A. Alfini, Department of Kinesiology, 2016-  
M. Stockbridge, Department of Hearing and Speech Sciences, 2016-

### **Masters Committees**

M. Lipton, 2013-2014  
L. Anderson, 2014-16  
N. Wolf, 2015-16  
M. Stockbridge, Hearing and Speech Sciences, 2015-16  
C. Kaplan, 2015-17  
R. Tillman, 2015-17

### **Qualifying Examinations Committees**

*Various*, Clinical area group, Department of Psychology, 2013-  
A. Alfini, Department of Kinesiology, 2015  
M. Stockbridge, Department of Hearing and Speech Sciences, 2015  
K. Crowley, iSchool, 2016-17  
K. Castellanos, Department of Government and Politics, 2017  
L. wiss, Department of Kinesiology, 2017

### **Neuroscience and Cognitive Science Student Committee**

M. Ahmadi, 2016-17

### ***Graduate Student Mentored Fellowships and Awards***

#### **Graduate Research Fellowships, National Science Foundation**

R. Tillman (Honorable Mention, 2015)  
C. Kaplan (2016-19)

#### **Poster/Travel Award, Society for Research in Psychopathology**

C. Kaplan (2016)

#### **Fellowship/Travel Award, Tools of Trade Workshop: Human Neuroimaging Methods and Best Practices (Sponsored by the NIH and Stanford Center for Reproducible Neuroscience)**

R. Tillman (2017)

#### **McNair Graduate Fellowship**

D. Sambrano (2017, *declined*)

### ***Regular Undergraduate Student Research Supervision at the University of Maryland***

† indicates co-author on a manuscript or publication

†† indicates co-author on a conference presentation

#### **2016-17 (15 students)**

A. Anderson, A. Antonacci, K. Bohlke, M. Chen, M. Dib, M. Hawley, R. Hum, A. Frederique, C. Grubb, J. Furcolo, G. Kim, J. Kuang, J. Stimely, M. Skibniewska, M. Vogel

#### **2015-16 (12 students)**

J. Aepfelbacher, C. Bloomer, K. Bohlke, V. Bonetti, M. Brinkman ††, J. Kang, A. Silver, M. Skibniewska, J. Stimely, J. Swayambunathan, J. Vadhan, C. Zacarias

**2014-15 (13 students)**

J. Aepfelbacher, D. Ansah, C. Bloomer †, A. Dizik, A. Fredman, J. Kang, J. Myers (doctoral student at Howard University), S. Shah, J. Stimely, J. Swayambunathan, J. Vadhan, J. Weinstein †

**2013-14 (12 students)**

D. Ansah, L. Bjorkman (post-baccalaureate); C. Bloomer †, A. Dizik, T. Fedechko, A. Fredman, S. Hudja (post-baccalaureate; now a doctoral student in economics at Purdue), J. Kau, A. Malone, E. Qi, M. Sood, J. Weinstein †

***Specialized Undergraduate Student Research Supervision at Maryland***

**Biological Sciences Honors Intern**

A. Dizik, 2014

**Biology Honors Program**

R. Hum, 2017-

**Integrated Life Sciences (ILS) Honors Program**

J. Kang, 2014

M. Chen, 2017

**Research Internship in Science and Engineering (RISE) Scholar**

J. Kau, 2013-2014

**Summer Research Initiative (SRI) Fellow**

S. Bermudez-Cruz, 2015

***Specialized Undergraduate Student Research Supervision at Wisconsin***

**NASA Summer Scholar**

U. Amadi, 2005

**Research Scholars Program**

S. Austin, 2005

M. Dick, 2005

**Senior Theses**

J. Nichols, 2004

K. Petersen, 2004

M. Long, 2004

K. Springborn, 2004

S. Blume, 2006

A. Eggleston, 2006

E. Eggleston, 2006

B. Kosobucki, 2006

B. Kelly, 2007

J. Winter, 2007 † co-author of Shackman et al. *Nature Reviews Neuroscience*, 2011

### ***Mentored Undergraduate Fellowships and Awards at Maryland***

#### **BSOS Undergraduate Researcher of the Year**

J. Weinstein, 2015 † co-author of Shackman et al. *Emotion*, in press

### ***Mentored Undergraduate Fellowships and Awards at Wisconsin***

#### **Hilldale Senior Thesis Research Fellowships**

J. Nichols, 2003

M. Long, 2004

B. Kosobucki, 2005

## **Select Media Coverage**

April 25, 2016: <http://www.dbknews.com/2016/04/26/um-d-receives-3-4m-grant-to-study-mental-health/>

April 5, 2016: <https://www.umdrightnow.umd.edu/news/um-d-research-team-awarded-34-million-study-root-causes-anxiety-depression>

September 18, 2015: <http://emotionnews.org/amgydala/>

July 13, 2015: <http://www.foxnews.com/health/2015/07/13/anxious-brains-are-inherited-study-finds>

July 8, 2015: <http://www.examiner.com/article/ape-study-shows-anxiety-and-depression-are-inherited>

July 8, 2015: <http://www.iflscience.com/brain/anxiety-may-be-transferred-parent-child>

July 8, 2015: <http://www.independent.co.uk/life-style/health-and-families/health-news/parents-can-pass-anxiety-and-depression-on-to-their-children-study-suggests-10375509.html>

July 7, 2015: <http://www.thedailybeast.com/articles/2015/07/07/children-inherit-their-parents-anxiety.html>

July 7, 2015: <http://www.dailymail.co.uk/sciencetech/article-3151227/Anxiety-HEREDITARY-Brain-scans-reveal-anxious-parents-likely-nervous-depressed-children.html>

## **Scholarly and Public Outreach**

Our laboratory maintains an active presence on Academia.Edu (>400 followers | >10,000 views), Epernicus, Facebook (>600 friends), GooglePlus (274 followers | >40,000 views), LinkedIn (>2,300 connections), Loop/Frontiers (>75 connections | ~25,000 views), Mendeley (>3,200 readers | >11,000 views), ResearchGate (RG Score: 36.04 Impact Percentile: 95%), and Twitter (~700 followers). In addition, shackmanlab.org serves up tens of thousands of page views each month.