

Adam Safron, Ph.D.
The Kinsey Institute
Indiana University, Bloomington, IN, 47405
email: asafron@gmail.com

Professional Appointments

Postdoctoral Research Associate The Kinsey Institute Indiana University, Bloomington, IN	2019-present
Postdoctoral Researcher Department of Psychology Northwestern University, Evanston, IL	2017-2018

Other Academic Affiliations

Postdoctoral Affiliate Cognitive Science Program Indiana University, Bloomington, IN	2020-present
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Education

Ph.D. , Psychology (Brain, Behavior & Cognition) Northwestern University, Evanston, IL	2017
B.A. , Cognitive Science and Psychology (double major) (<i>Honors, cum laude, Phi Beta Kappa</i>) Northwestern University, Evanston, IL	2005

Preprints

Safron, A. (2020, August). Integrated World Modeling Theory (IWMT) Implemented: Towards Reverse Engineering Consciousness with the Free Energy Principle and Active Inference. Conference proceedings of the 1st International Workshop on Active Inference. PsyArXiv: <https://doi.org/10.31234/osf.io/paz5j>

Safron, A. (2019, December). Integrated World Modeling Theory (IWMT) Revisited. PsyArXiv: <https://doi.org/10.31234/osf.io/kjngH>

Safron, A. (2019, November). The radically embodied conscious cybernetic Bayesian brain: Towards explaining the emergence of agency. PsyArXiv: <https://doi.org/10.31234/osf.io/udc42>

Safron, A. (2019, November). Bayesian Analogical Cybernetics. ArXiv:1911.02362 [q-bio.NC]

Safron, A. (2019, November). Rapid Anxiety Reduction (RAR): A unified theory of humor. arXiv:1911.02364 [q-bio.NC].

Safron, A. (2019, October). Multilevel evolutionary developmental optimization (MEDO): A theoretical framework for understanding preferences and selection dynamics. ArXiv:1910.13443 [q-bio.NC]

Publications

Safron, A. (2020, June). An Integrated World Modeling Theory (IWMT) of consciousness: Combining Integrated Information and Global Neuronal Workspace Theories with the Free Energy Principle and Active Inference Framework; toward solving the Hard problem and characterizing agentic causation. *Frontiers in Artificial Intelligence*. 3(30).

Jabbour, J., Holmes, L., Sylva, D., Hsu, K., Semon, T.L., Rosenthal, A.M., Safron, S., Slettevold, E., Watts-Overall,

- T.M., Savin-Williams, R.C., Sylva, J., Rieger, G., Bailey, J.M. (2020, August) Robust evidence for bisexual orientation among men. *Proceedings of the National Academy of Sciences*, 117(31) 18369-18377.
- Safron, A., Sylva, D., Klimaj, V., Rosenthal, A.M., Bailey, J.M. (2019, August). Neural responses to sexual stimuli in heterosexual and homosexual men and women: men's responses are more specific. *Archives of Sexual Behavior*, 49(2), 433-445.
- Li, M., Woelfer, M., Colic, L., Safron, A., Chang, C., Heinze, H.J., Speck, O., Mayberg, H.S., Biswal, B.B., Salvatore, G., Fejtova, A., & Walter, M. (2018, October). Default mode network connectivity change corresponds to ketamine's delayed glutamatergic effects. *European Archives of Psychiatry & Clinical Neuroscience*.
- Safron, A. (2018, August). Sexual Orientation. In Shackelford, T. & Weekes-Shackelford, V. (Eds.), *Encyclopedia of Evolutionary Psychological Science*. New York City: Springer Publishing.
- Khalsa, Sahib S; Adolphs, Ralph; Cameron, Oliver G; Critchley, Hugo D; Davenport, Paul W; Feinstein, Justin S; Feusner, Jamie D; Garfinkel, Sarah N; Lane, Richard D; Mehling, Wolf E; Meuret, Alicia E; Nemeroff, Charles B; Oppenheimer, Stephen; Petzschner, Frederike H; et al.** (2018, June). Interoception and Mental Health: A Roadmap. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 3(6):501-513. **Interoception Summit 2016 participant coauthor (Laureate Institute for Brain Research).
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., Walter, M., & Bailey, J. M. (2018, January). Neural correlates of sexual orientation in heterosexual, bisexual, & homosexual women. *Scientific Reports*, 8.
- Safron, A., Sylva, D., Klimaj, V., Rosenthal, A., Li, M., Walter, M., & Bailey, J. M. (2017, February). Neural correlates of sexual orientation in heterosexual, bisexual, and homosexual men. *Scientific Reports*, 7.
- Safron, A., & Hoffmann, H. (2017, February). What does sexual responsiveness to one's nonpreferred sex mean? *Archives of Sexual Behavior*, 46(5), 1199-1202.
- Safron, A. (2016, October). What is orgasm? A model of sexual trance and climax via rhythmic entrainment. *Socioaffective Neuroscience & Psychology*, 6.
- Klimaj, V. & Safron, A. (2016, October). Introductory editorial to 'Orgasm: Neurophysiological, Psychological, and Evolutionary Perspectives.' *Socioaffective Neuroscience & Psychology*, 6.
- Poeppl, T.B., Langguth, B., Rupprecht, R., Safron, A., Bzdok, D., Laird, A. R., Eickhoff, S.B. (2016, October). The neural basis of sex differences in sexual behavior: A quantitative meta-analysis. *Frontiers in Neuroendocrinology*, 43, 28-43.
- Zhang, B., Li, S., Zhuo, C., Li, M., Safron, A., Genz, A., Qin, W., Yu, C., & Walter, M. (2016, October). Altered task specific deactivation in the default mode network depends on valence in patients with major depressive disorder. *Journal of Affective Disorders*, 207, 377-383.
- Demescu, L.R., Colic, L., Li, M., Safron, A., Biswal, B., Metzger, C. D., Li, S., & Walter, M. (2016, August). A spectroscopic approach toward depression diagnosis: Local metabolism meets functional connectivity. *European Archives of Psychiatry & Clinical Neuroscience*, 267(2), 95-105.
- Li, M., Metzger, C. D., Li, W., Safron, A., van Tol, M.J., Lord, A., Krause, A.L., Borchardt, V., Dou, W., Genz, A., Heinze, H.J., He, H., & Walter, M. (2014, December). Dissociation of glutamate and cortical thickness is restricted to regions subserving trait but not state markers in major depressive disorder. *Journal of Affective Disorders*, 169, 91-100.
- Paller, K. A., Creery, J. D., Florczak, S. M., Weintraub, S., Mesulam, M. M., Reber, P. J., Kiragu, J., Rooks, J., Safron, A., Morhardt, D., O'Hara, M., Gigler, K.L., Molony, J.M., & Maslar, M. (2014, August). Benefits of mindfulness training for patients with progressive cognitive decline and their caregivers. *American Journal of Alzheimer's Disease and Other Dementias*, 3, 257-267.
- Safron, A. (2013, November 4). Introductory editorial to 'Brain and Addiction.' *Socioaffective Neuroscience & Psychology*, 3.
- Sylva, D., Safron, A., Rosenthal, A. M., Reber, P. J., Parrish, T. B., & Bailey, J. M. (2013, September). Neural correlates of sexual arousal in heterosexual and homosexual women and men. *Hormones and Behavior*, 64(4), 673-684.
- Hou, M., Safron, A., Paller, K. A., & Guo, C. (2013, June). Neural correlates of familiarity and conceptual fluency in a recognition test with ancient pictographic characters. *Brain Research*, 1518, 48-60.
- Sandrone, S. & Safron, A. (2013, June). Pain and (e)motion in postural responses. *Frontiers in Human Neuroscience*, 7, 286.
- Eckert, U., Metzger, C. D., Buchmann, J. E., Kaufmann, J., Osova, A., Li, M., Safron, A., Liao, W., Steiner, J., Bogerts,

- B., & Walter, M. (2012, November). Preferential networks of the mediodorsal nucleus and centromedian–parafascicular complex of the thalamus—a DTI tractography study. *Human Brain Mapping*, 33(11), 2627–2637.
- Hoffmann, H., & Safron, A. (2012, March). Introductory editorial to ‘The Neuroscience and Evolutionary Origins of Sexual Learning.’ *Socioaffective Neuroscience & Psychology*, 2.
- Rosenthal, A. M., Sylva, D., Safron, A., & Bailey, J. M. (2012, February). The male bisexuality debate revisited: Some bisexual men have bisexual arousal patterns. *Archives of Sexual Behavior*, 41(1), 135–147.
- Rosenthal, A. M., Sylva, D., Safron, A., & Bailey, J. M. (2011, July). Sexual arousal patterns of bisexual men revisited. *Biological Psychology*, 88(1), 112–115.
- Safron, A., Barch, B., Bailey, J. M., Gitelman, D. R., Parrish, T. B., & Reber, P. J. (2007). Neural correlates of sexual arousal in homosexual and heterosexual men. *Behavioral Neuroscience*, 121(2), 237–248.

Manuscripts in Press, in Review & in Preparation

- Safron, A. & DeYoung, C. Integrating Cybernetic Big Five Theory with the Free Energy Principle: A new strategy for modeling personalities as complex systems. In *Measuring and Modeling Persons and Situations*. Amsterdam: Elsevier. (In press).
- Safron, A. Learned but Not Chosen: The Origins of Sexual Orientations. In VanderLaan, D. & Wong, I. (Eds.) *Gender and Sexuality Development: Contemporary Theory and Research*. New York City, NY: Springer. (In press).
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., & Bailey, J.M. Comparing the structure and function of social-cognition-related brain areas in bisexual, heterosexual, and homosexual women and men. (In review at *Archives of Sexual Behavior*).
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., & Bailey, J.M. Sexual Orientation and Neuroanatomy: An MRI Study of Gray Matter Differences in Homosexual, Bisexual, and Heterosexual Women and Men. (In review at *Frontiers in Behavioral Neuroscience*).
- Sheikbahaee, Z., Hesp, C., Badcock, P., Safron, A., Constant, A., Hoey, J., Friston, K., & Smith, R. Human Affective Dynamics: An Active Inference Account of Human Affect, Mood and Personality. (In preparation for *Frontiers in Computational Neuroscience*).

Oral Presentations & Invited Talks

- Safron, A. (2020, September 15). *Integrated World Modeling Theory (IWMT): Combining Integrated Information and Global Workspace Theories with The Free Energy Principle and Active Inference Framework*. The Science of Consciousness Conference (TSC 2020).
- Safron, A. (2020, September 14). *Integrated World Modeling Theory (IWMT): Towards understanding consciousness by using the Free Energy Principle and Active Inference (FEP-AI) framework to combine Integrated Information Theory (IIT) and Global Neuronal Workspace Theory (GNWT)*. 1st International Workshop on Active Inference (IWAI 2020), in conjunction with the European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECLM/PKDD).
- Safron, A. (2020, July 27). *Sex and flexibility: what characterizes individuals who show greater nonspecificity and erotic plasticity/fluidity?* International Academy of Sex Research (IASR), 2020 Annual Meeting.
- Safron, A. (2019, November 6). *Flexibility, personality, and understanding*. Inaugural Workshop of the Social Cultural Computational Psychiatry and Neuroscience Network, McGill University, Montreal, Canada.
- DeYoung, C. & Safron, A. (2019, March 1). *Connecting cybernetic/goal models to major personality dimensions*. Measuring and Modeling Persons and Situations expert meeting, organized by the U.S. Army Research Institute for the Behavioral and Social Sciences, Washington, D.C, U.S.
- Safron, A. (2018, December 5). *The blessings of constraints: rich embodiment as necessary condition for natural language understanding, and bottleneck for creating strong and safe AI*. NeurIPS AGI Safety Meetup, organized by DeepMind at the Annual Conference on Neural Information Processing Systems (NeurIPS), Montreal, Canada.
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., Walter, M., & Bailey, J.M. (2018, July 20). *Using structural MRI to compare homosexual, bisexual, and heterosexual women and men*. International Academy of Sex Research (IASR), 2018 Annual Meeting, Madrid, Spain.

- Safron, A. (2018, July 27). *Radical Embodiment, Dynamic Cores, and Predictive Power*. Presented to Professor Anil Seth's research group at the University of Sussex.
- Safron, A. (2018, July 24). *Radical Embodiment, Dynamic Cores, and Predictive Power*. Presented to Professor Andy Clark's research group at the University of Edinburgh.
- Safron, A. (2018, June 14). *Of MICEs and MAPs: Towards Integrating Integrated Information Theory with the Free Energy Principle*. Presented to Professor Giulio Tononi's research group at the Wisconsin Institute for Sleep and Consciousness, University of Wisconsin—Madison.
- Safron, A. (2018, April 4). *The radically embodied cybernetic Bayesian brain: Towards solving the Hard problem, grounding conscious intentionality, and rescuing free will by resurrecting homunculi and Cartesian theaters*. The Science of Consciousness Conference, Tucson, Arizona, US.
- Safron, A. (2018, March 13). *Radical Embodiment, Consciousness, and the Cybernetic Bayesian Brain: from Free Energy to Free Will through Active Inference*. Presented to Professor Karl Friston's Theoretical Neurobiology Group at the Wellcome Centre for Human Neuroimaging, UCL, UK.
- Safron, A. & Klimaj, V. (2017, November). *Neural correlates of sexual response in heterosexual, bisexual, and homosexual women*. SSSS 2017 Annual Meeting, Atlanta, Georgia, US.
- Safron, A. (2017, February 25). *What is orgasm? A model of sexual trance and climax via rhythmic entrainment*. (Invited speaker). International Society for the Study of Women's Sexual Health (ISSWSH) 2017 Annual Meeting, Atlanta, Georgia, US.
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., Walter, M., & Bailey, J. M. (2016, June 28). *Neural correlates of sexual response in heterosexual, bisexual, and homosexual women*. International Academy of Sex Research (IASR), 2016 Annual Meeting, Malmo, Sweden.
- Safron, A. (2016, January 28). *Neural correlates of sexual response in bisexual women*. Society for Personality and Social Psychology (SPSP), Sexuality preconference, San Diego, CA, US.
- Safron, A., Klimaj, V., Sylva, D., & Rosenthal, A. (2015, November 13). *The category specificity of neural activation patterns in heterosexual, bisexual, and homosexual men and women*. Society for the Scientific Study of Sexuality (SSSS), 2015 Annual Meeting, Albuquerque, NM, US.
- Safron, A., & Klimaj, V. (2015, March 21) *Neural correlates of sexual orientation*. Symposium on The Development of Sexual Orientation: Recent Advances in Theory and Methodology, Society for Research in Child Development (SRCD), Biennial Meeting, Philadelphia, PA, US.
- Rosenthal, A. M., Sylva, D., Safron, A.,* & Bailey, J.M. (2011, November 4) *Neural correlates of sexual arousal and orientation*. Society for the Scientific Study of Sexuality (SSSS), 2014 Annual Meeting, Houston, TX, US. *presenter
- Safron, A. (2011, September 16). *Neural correlates of sexual preferences*. Symposium: Unique Design Concerns in Imaging Sexual Reward Processing, Society for Psychophysiological Research (SPR), 51st Annual Meeting, Boston, MA, US.

Poster Presentations

- Safron, A. (2020, November 9-12). *Brains as disentangled Kalman variational auto-encoders; the conscious turbo code*. 2020 Cold Spring Harbor meeting: From Neuroscience to Artificially Intelligent Systems.
- Safron, A. & Klimaj, V. (2020, February 27). *What could the brain tell us about sexual plasticity, nonspecificity, and fluidity?* Sexuality preconference, Society for Personality and Social Psychology (SPSP), 2020 Annual Meeting, New Orleans, Louisiana.
- Safron, A., & Klimaj, V. (2019, July 25). *Brain Bases of Plasticity, Nonspecificity, and Fluidity*. Poster presented at the 2019 annual meeting of the International Academy of Sex Research (IASR) in Mexico City, Mexico.
- Safron, A. (2017, July 17) *The radically embodied cybernetic Bayesian brain: Towards understanding will, selves, and consciousness*. Summer Institute on Buddhism & Science, Mangalam Research Center, Berkeley, California.
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., Walter, M., & Bailey, J. M. (2016, June 27). *Reward-related brain activity is less category-specific in heterosexual compared with homosexual men*. Poster presented at the 2016 annual meeting of the International Academy of Sex Research (IASR) in Malmo, Sweden.
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., Walter, M., & Bailey, J. M. (2016, April 19). *Neural responses*

- to erotic images in heterosexual, homosexual, and bisexual men and women.* Poster presented at the 2016 annual Wisconsin Symposium on Emotion hosted by the University of Wisconsin–Madison HealthEmotions Research Institute.
- Klimaj, V., Safron, A., Sylva, D., Rosenthal, A., Li, M., Walter, M., Reber, P., & Bailey, J.M. (2015, October 16). *Differential sexual category specificity in the ventral striatum: results from heterosexual, bisexual, and homosexual men and women.* Poster presented at the 2015 annual meeting of the Society for Social Neuroscience (S4SN) in Chicago, IL.
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., Walter, M., & Bailey, J. M. (2015, August 10). *Neural responses to erotic images in heterosexual, homosexual, and bisexual men and women.* Poster presented at the 2015 meeting of the International Academy of Sex Research in Toronto, Canada.
- Safron, A., Klimaj, V., Sylva, D., Rosenthal, A., Li, M., Walter, M., & Bailey, J. M. (2014, June 26). *Neural correlates of sexual orientations: Bisexuality and category specificity.* Poster presented at the 2014 annual meeting of the International Academy of Sex Research in Dubrovnik, Croatia.
- Clark, C.M., Safron, A., & Paller, K.A. (2009, March 22). *Controlling mental imagery: Brain activity underlying mental image generation and inhibition.* Poster presented at the 16th annual meeting of the Cognitive Neuroscience Society, San Francisco, CA.
- Clark, C.M., Safron, A., Grabowecky, M., Paller, K.A. (2008, June 10). *Controlling mental image generation.* Poster presented at 2008 Mind and Life Summer Research Institute, Garrison, NY.
- Sylva, D.M., Safron, A., Reber, P.J., Bailey, J.M. (2008, May 22). *Neural correlates of sexual arousal in heterosexual and homosexual women.* Poster presented at the 2008 meeting of the Association for Psychological Science, Chicago, IL.

Research Grants and Fellowships

Summer Seminars in Neuroscience and Philosophy (SSNAP) Fellowship	2020
Graduate Research Fellowship; National Science Foundation	2011-2014
Fritz Klein Fellowship; American Institute of Bisexuality	2007-2010
Varela Award; Mind and Life Institute	2005

Workshops and Specialized Conferences

Inaugural Workshop of the Social-Cultural Computational Psychiatry and Neuroscience Network (SCCPNN), McGill University	2019
International Forum on Consciousness, Madison, WI	2018
Summer Institute on Buddhism & Science, Mangalam Research Center Berkeley, California	2017
Philosophy and Science of Self Control Summer Seminar; Florida State University	2017
Interoception Summit; Laureate Institute for Brain Research	2016
University of Chicago Neuroimaging Workshop (held in San Diego, CA)	2016
Is the Brain Bayesian? Center for Mind, Brain, and Consciousness Conference New York University	2015
University of Chicago Neuroimaging Workshop	2015
Summer fMRI Course in Neuroimaging, Otto von Guericke University	2013
Workshop on Connectivity in the Resting Brain; Otto von Guericke University	2008
Mind and Life Summer Research Institute	2005, 2006, 2008

Editorial Positions

Editorial Board Member, <i>Archives of Sexual Behavior</i>	2018-present
Associate Editor, <i>Socioaffective Neuroscience & Psychology</i>	2012-2019