Curriculum Vitae
William H. Alexander
Center for Complex Systems and Brain Sciences
Florida Atlantic University
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Boca Raton, FL 33431
USA
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EDUCATION

Indiana University, Bloomington
Degree: Ph.D.   **2006**
Major: Cognitive Psychology
2nd Major: Cognitive Science
Dissertation: "A Real-Time Model of Attention"

University of Nevada, Reno
Degree: B.A.   **1999**
Major: Psychology
Minor: Philosophy

RESEARCH EXPERIENCE

Florida Atlantic University – Center for Complex Systems   **2018 - Present**
Assistant Professor
Research Topics: Computational Modeling, fMRI,
Cognitive Control, Decision-Making

Ghent University
Odysseus Laureate   **2013-2017**
Research Topics: Computational Modeling,
fMRI, Cognitive Control, Decision-Making

Indiana University, Bloomington
Postdoctoral Researcher – Cognitive Control Lab   **2007-2013**
Director: Joshua W. Brown
Research Topics: Executive Control, Decision Making,
Reinforcement Learning, Computational Modeling, fMRI

Okinawa Institute of Science and Technology
Researcher – Neural Computation Unit   **2006-2007**
Director: Kenji Doya
Research Topics: Attention, Computational
Modeling, Neuromodulation

Indiana University, Bloomington
Graduate Student – Computational Cognitive Neuroscience Lab   **2001-2006**
Director: Olaf Sporns
Research Topics: Neural Bases of
Reinforcement, Embodied Cognition, Robotics

FUNDING SOURCES

Title	Role	Dates

A Reinforcement Learning Framework for Cognitive Control (FWO G.OC44.13N). **€598,600**	Principal Investigator	**2013 - 2018**
Integrated Cognitive Architectures for Understanding Sensemaking (subcontract). PI: Joshua Brown	Co-Investigator	**2010-2013**
Neural Mechanisms of Risky Behavior Avoidance NIH/NIDA R01 DA026457. PI: Joshua Brown	Co-Investigator	**2009-2010**

TEACHING EXPERIENCE   *Denotes Graduate-Level Course*

Florida Atlantic University

*   **Instructor – Computational Neuroscience**   **Yearly (2018)**

Instructor – Experimental Design and Statistics   **Yearly (2019)**

Ghent University

*   **Instructor - Modeling Cognitive Processes**   **Fall, 2014**

*   **Guest Lecturer - Model-Based fMRI - Introduction to Neuroimaging**   **Fall, 2014**

Instructor - Model-Based fMRI Analysis - Practical Data Analysis and Modeling in Cognitive and Clinical Neuroscience Training School   **April, 2014**

Indiana University, Bloomington

*   **Assistant Instructor – Advanced Statistical Analysis**   **Fall, 2005**

Assistant Instructor – Statistical Techniques   **Spring, 2005**

*   **Assistant Instructor –Advanced Statistical Analysis**   **Fall, 2004**

Instructor – Methods of Experimental Psychology   **Spring, 2004**

PEER-REVIEWED MANUSCRIPTS   *Denotes First or Senior Author*

*   1. **Alexander, W.H.** and Womesldorf, T. (in prep). Interactions between medial and lateral prefrontal cortex in hierarchical predictive coding.

*   2. Vassena E., Deraeve, J., and **Alexander, W.H.** (2019). Surprise, value and control in anterior cingulate cortex during speeded decision-making. *Nature Human Behavior*

*   3. Cogliati-Dezza, I., Cleeremans, A., and **Alexander, W.H.** (2019). Should we control? The interplay between cognitive control and information integration in the resolution of the exploration-exploitation dilemma.

*   4.   Vassena, E., Deraeve, J., and **Alexander, W.H.** (2019). Task-specific prioritization of reward and effort information: Novel insights from behavior and computational modeling. *Cognitive, Affective, & Behavioral Neuroscience*

*   5.   **Alexander, W.H.**, and Brown, J.W. (2018). Frontal cortex function as derived from hierarchical predictive coding. *Scientific Reports* 8, 4312.

*   6.   Deraeve, J. and **Alexander, W.H.** (2018). Fast, accurate and stable feature extraction using neural networks. *Neuroinformatics*

*   7.   Cogliati-Dezza, I., Yu, A., Cleeremans, A., and **Alexander, W.H.** (2017). Learning the value of information and reward over time when solving exploration-exploitation problems. *Scientific Reports,* 7, 16919.

*   8.   **Alexander. W.H.**, and Brown, J.W. (2017). The role of anterior cingulate cortex in prediction error and signaling surprise. *Topics in Cognitive Science*

*   9.   Vassena, E., Holroyd, C., and **Alexander, W.H.** (2017). Computational models of anterior cingulate cortex: At the crossroads between prediction and effort. *Frontiers in Neuroscience,* 11, 316.

*   10. **Alexander, W.H.,** Vassena., E., Hayden., B.Y., Brown, J.W., and Collins, A.E. (2017). Prefrontal cortex in control: Broadening the scope to identify mechanisms. *Journal of Cognitive Neuroscience,* 29.

        11. Brown, J.W., and **Alexander, W.H.** (2017). Foraging value, risk avoidance, and multiple control signals: How the anterior cingulate cortex controls value-based decision-making. *Journal of Cognitive Neuroscience*, 29, 1656-1673.

*   12. **Alexander, W.H.**, Vassena, E., Deraeve, J., and Langford, Z. D. (2017). Integrative modeling of prefrontal cortex. *Journal of Cognitive Neuroscience,* 29, 1674-1683.

*   13. Vassena, E., Deraeve, J., and **Alexander, W.H.** (2017). Predicting motivation: computational models of PFC can explain neural coding of motivation and effort-based decision-making in health and disease. *Journal of Cognitive Neuroscience,* 29, 1633-1645.

        14. Jahn, A., Nee., D.E., **Alexander, W.H.**, and Brown, J.W. (2016). Distinct regions of pain and prediction error within medial prefrontal cortex. *Journal of Neuroscience* 36(49), 12385-12392.

*   15. **Alexander, W.H.**, and Brown, J.W. (2015). Hierarchical Error Representation: A computational model of anterior cingulate and dorsolateral prefrontal cortex. *Neural Computation*, 27, 2354-2410

*   16. **Alexander, W.H.,** Fukunaga, R., Finn, P., and Brown, J.W. (2015). Rewardsalience and risk aversion underlie differential ACC activity in substance dependence. *Neuroimage: Clinical* 8, 59-71.

        17. Silvetti, M., **Alexander, W.H.**, Verguts, T., and Brown, J.W. (2014). From

conflict management to reward-based decision making: Actors and critics in primate medial frontal cortex. *Neuroscience and Behavioral Reviews.* 46(1), 44-57.

* 18. **Alexander, W.H.** and Brown, J.W. (2014). A general role for medial prefrontal cortex in event prediction. *Frontiers in Computational Neuroscience*, 8:69

19. Jahn, A., Nee, D.E., **Alexander, W.H.**, and Brown, J.W. (2014). Distinct regions of anterior cingulate cortex signal prediction and outcome evaluation. *Neuroimage* 95,80-89

* 20. Zarr, N, Brown, J.W., and **Alexander, W.H.** (2014). Discounting of reward sequences: a test of competing formal models of hyperbolic discounting. *Frontiers in Psychology.*

* **21. Alexander, W.H**. and Brown, J.W. (2011). Medial prefrontal cortex as an action-outcome predictor. *Nature Neuroscience* 14(10), 1338-1344.

* 22. **Alexander, W.H.** and Brown, J.W. (2010). Computational models of response-outcome prediction as a basis for cognitive control. *Topics in Cognitive Science* 2(4), 658-677.

* 23. **Alexander, W.H.** and Brown, J.W. (2010). Hyperbolically discounted temporal difference learning. *Neural Computation* 22(6), 1511-27.

* 24. **Alexander, W.H.** and Brown, J.W. (2010). Competition between learned reward and error outcome predictions in anterior cingulate cortex. *Neuroimage,* 49(5), 3210-3218.

* 25. **Alexander, W.H.** (2007). Shifting Attention Using a Temporal Difference Prediction Error and High-Dimensional Input. *Adaptive Behavior,* 15, 121-133

* 26. **Alexander, W.H.** and Sporns, O. (2006). Temporal difference learning with learned attention shifts. *Proceedings of the Fifth International Conference on Development and Learning.* Bloomington, IN.

* 27. **Alexander, W.H.** and Sporns, O. (2004). Interactions of environment, behavior, and synaptic patterns in a neuro-robotic model. In: *Animals to Animats 8: Proceedings of the Eighth International Conference on the Simulation of Adaptive Behavior,* pp. 13-22, Schaal, S., Ijspeert, A., Billard, A., Vijayakumar, S., Hallam, J., and Meyer, J-A. (Editors). MIT Press: Cambridge, MA.

28. Sporns, O. and **Alexander, W.H.** (2003). Neuromodulation in a learning robot: Interactions between neural plasticity and behavior. *Proceedings of IJCNN 2003*, 2789-2794.

* 29. **Alexander, W.H.** and Sporns, O. (2003). An Embodied Model of Learning, Plasticity, and Reward. *Adaptive Behavior.* Vol 10(3-4), Sum 2002, pp. 143-159

30. Sporns, O., and **Alexander, W.H.** (2002). Neuromodulation and plasticity in an autonomous robot. *Neural Networks.* Vol 15(4-6), Jun-Jul 2002, pp. 761-774.

* 31. **Alexander, W.H.** and Sporns, O (2002). Timed delivery of reward signals in an autonomous robot. In: *Animals to Animats 7: Proceedings of the Seventh International Conference on the Simulation of Adaptive Behavior,* pp. 195-204, Hallam, B., Floreano, D., Hallam, J., Hayes, G. and Meyer, J-A. (Editors), MIT Press: Cambridge, MA.

32. Sporns, O., and **Alexander, W.H.** (2002). Dopamine, reward conditioning, and robot behavior. In: *Proceedings of the 2nd International Conference on Development and Learnin*g, pp. 265-270, IEEE Computer Society, Los Alamitos, CA.

BOOK CHAPTERS

1. **Alexander, W.H.**, and Brown, J.W. (2015). Reciprocal interactions of computational modeling and empirical investigation. In: *Model-based cognitive neuroscience: an introduction.* pp. 321-338. Forstmann, B. and Wagenmaakers, E.J. (Eds), Springer:New York, NY

2. Brown, J.W. and **Alexander, W.H.** (2011). Computational Neuroscience Models: Error monitoring, conflict resolution, and decision making. In: *Perception-reason-action cycle: Models, algorithms and systems.* pp. 169-186, Cutsurdis, V., Hussain, A, & Taylor, J.G. (Eds),Springer: New York, NY.

POSTERS/PRESENTATIONS   ** Denotes invited talk or symposium*

* 1. **Alexander, W.H.** (2017). Towards a theory of prefrontal cortex. Panel member at the 13th International Conference for Cognitive Neuroscience

* 2. **Alexander, W.H.** (2017). Error representations in dorsolateral prefrontal cortex. Invited talk at Cosyne 17. Salt Lake City, UT

3. **Alexander, W.H.**, and Vassena, E.(2016). Context and outcome uncertainty in anterior insula. Poster at the annual meeting of the Society for Neuroscience. San Diego, CA

4. Deraeve, J**.**, Vassena, E.., and **Alexander, W.H.** (2016). Task representations in the dorsolateral prefrontal cortex. Poster at the annual meeting of the Society for Neuroscience. San Diego, CA

5. Jahn, A., Nee, D.E., **Alexander, W.H.,** and Brown, J.W. (2016). Medial prefrontal cortex signals prediction errors across domains of pain and cognitive control. Poster at the annual meeting of the Society for Neuroscience. San Diego, CA

* 6. **Alexander, W.H.** (2016). Function following form: Representation in Prefrontal Cortex. Invited talk at the 5th workshop on the Computational Properties of Prefrontal Cortex. Lyon, France

*   7. **Alexander, W.H.** (2016). Representations of prediction error in cognitive control. Talk presented at the annual meeting of the Cognitive Neuroscience Society. New York, NY

*   8. **Alexander, W.H.** (2015). Effects of task representation on learning and behaviour. Talk at the conference for the European Society for Cognitive Psychology. Paphos, Cyprus.

    9. Deraeve, J., and **Alexander, W.H.** (2015). Task representations in dorsolateral prefrontal cortex. Poster at the conference for the European Society for Cognitive Psychology. Paphos, Cyprus.

10. Vassena, E., Verguts, T., Kochman, K., Latomme, J., and **Alexander, W.H.** (2015). Enhanced temporal prediction in musicians: evidence from behavior and model-based fMRI. Poster at the conference for the European Society for Cognitive Psychology. Paphos, Cyprus.

11. Vassena, E., **Alexander, W.H.**, Kochman, K., Latomme, J., Verguts, T. (2015). Higher-order temporal prediction in prefrontal cortex: a model-based fMRI study in expert musicians. Poster at the Conference for the Organization of Human Brain Mapping. Honolulu, HI.

*   12. **Alexander, W.H.** (2015). Understanding cingulate function from multiple perspectives. Invited talk at McLean Hospital/Harvard Medical.

*   13. **Alexander, W.H.** (2015). Error representation in dorsolateral prefrontal cortex. Invited talk at Brown University.

14. **Alexander, W.H.** (2015). The influence of order on hierarchical learning. Poster at the Fifth Symposium on Biological Decision Making. Paris, France.

15. Jahn, A., Nee, D.E., **Alexander, W.H.**, and Brown, J.W. (2014). Medial prefrontal cortex signals prediction errors across multiple domains of pain and cognitive control. Poster at the annual meeting of the Society for Neuroscience. Washington, D.C.

*   16. **Alexander, W.H.** (2014). E cingulus pluram: Multiple computational roles of anterior cingulate activity. Symposium talk at the International Conference on Cognitive Neuroscience. Brisbane, Australia.

17. **Alexander, W.H.** and Brown, J.W. (2014). A computational model of dorsolateral prefrontal cortex. Poster at the Cognitive Neuroscience Society annual conference. Boston, MA.

18. Jahn, A., Nee, D.E., **Alexander, W.H.**, and Brown, J.W. (2013). Distinct regions of anterior cingulate cortex signal prediction and outcome evaluation. Poster at the annual meeting of the Society for Neuroscience. San Diego, CA.

*   19. **Alexander, W.H.** (2013). The multiple functions of anterior cingulate: a computational reconciliation. Invited talk at the Workshop on Interfacing Models with Brain Signals to Investigate Cognition. University of California, Irvine.

20. **Alexander, W.H.**, and Brown, J.W. (2013). A general role for anterior cingulatecortex in predicting task-related events. Poster at the Cognitive

Neuroscience Society annual conference. San Francisco, CA.

21. Jahn, A., **Alexander, W.H.**, Nee, D.E., and Brown, J.W. (2013). Pain, Congruency,and Surprise: Prediction Violation Across Domains in the Anterior Cingulate Cortex. Poster at the Cognitive Neuroscience Society annual conference. San Francisco, CA.

22. **Alexander, W.H.,** Fukunaga, R, and Brown, J.W. (2012). Risk aversion underlies medial prefrontal cortex activity in substance dependence. Poster at the Cognitive Neuroscience Society annual conference. Chicago, IL.

* 23. **Alexander, W.H.** and Brown, J.W. (2010). Medial prefrontal cortex predicts the outcomes of actions. Nanosymposium talk at the annual meeting of the Society for Neuroscience. San Diego, CA.

24. **Alexander, W.H.** and Brown, J.W. (2010). Discounting time and probability by reward perception. Poster at the Society for Neuroeconomics annual conference. Evanston, IL.

25. **Alexander, W.H.** and Brown, J.W. (2010). A common mechanism for time and probability discounting. Poster at the Air Force Office of Scientific Research Cognition & Decision Joint Program Review. Arlington, VA.

26. **Alexander, W.H.** and Brown, J.W. (2008). A computational neural model of learned response-outcome predictions by anterior cingulate cortex. Poster at the annual meeting of the Society for Neuroscience. Washington, D.C.

27. **Alexander, W.H.** and Brown, J.W. (2008). Error likelihood effects in anterior cingulate cortex modulated by average reward and reinforcement learning. Poster at the annual conference for the Cognitive Neuroscience Society. San Francisco, CA.

* 28. **Alexander, W.H.** (2004). Mutual influences of environment and behavior on the development of a neural model. Invited talk at the workshop for Neurorobotic Models in Neuroscience and Neuroinformatics. Los Angeles, CA, July 17, 2004.

29. **Alexander, W.H.** and Sporns, O. (2003). Environmental influence on behavior and development of an autonomous robot. Poster at the Annual meeting of the Society for Neuroscience, New Orleans, LA.

30. Sporns, O., Bulwinkle, D., Chadderdon, G., and **Alexander, W.H.** (2003). Neuro-robotic models of learning and addiction. Poster at NIH Symposium (Biomedical Information Science and Technology Initiative) Digital Biology, The Emerging Paradigm. Bethesda, MD.

31. Malkoc, G., **Alexander., W.H.**, and Webster, M.A. (2001). Color and Adaptation in Perceptual Grouping. Poster at the 1st Annual Meeting of the Vision Sciences Society, Sarasota, FL.

32. Amberg, M.D., Yamashita, J.A., Merica, B.L., **Alexander, W.H.**, and

Wallace, W.P. (2001). Words with overlapping phonemes in early positions facilitate correct recall. Poster at the Annual Convention of the Western Psychological Associations. Tucson, AZ.

AWARDS

Odysseus II Program – Ghent University/Flanders Research Foundation, 2012

Cognitive Science Summer Research Fellowship – Indiana University, 2005

Outstanding Paper – International Conference on Development and Learning (co-author), 2002

Summer Research Incentive Fellowship – Indiana University, 2002

Faculty Commendation – Indiana University, 2001-2002

National Science Foundation Graduate Research Fellowship – Honorable Mention, 2002

Cognitive Science Supplemental Fellowship – Indiana University, 2001

PROFESSIONAL SERVICE

Ad-hoc Reviewer: *Adaptive Behavior*; *Cognitive, Affective, & Behavioral Neuroscience; Cognitive Science; Cortex; Neural Computation; Journal of Experimental Psychology: General; Neuroimage; Neuropsychologia*; *PLOS One; Topics in Cognitive Science; Proceedings of the National Academy of Sciences*

PROFESSIONAL MEMBERSHIPS

Society for Neuroscience
Cognitive Neuroscience Society