Taylor W. Webb

Contact

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Appointments

University of California, Los Angeles Los Angeles, CA
Postdoctoral Research Fellow 2019 – 2023
Advisers: Hakwan Lau, Keith Holyoak, Hongjing Lu

Princeton University Princeton, NJ
Postdoctoral Research Fellow 2018 – 2019
Adviser: Jonathan Cohen

Education

Princeton University Princeton, NJ
PhD, MA, Cognitive Psychology and Neuroscience 2012 – 2018
Adviser: Michael Graziano

University of Southern California Los Angeles, CA
BA, Neuroscience 2005 – 2010
BM, Music Composition

Awards

F32 Postdoctoral National Research Service Award (NIH) 2019 – 2021
T32 Training Fellowship in Computational Neuroscience (NIH) 2018 – 2019
Charlotte Elizabeth Procter Fellowship (Princeton University) 2017
Graduate Student Teaching Award (Princeton University) 2017
Graduate Student Fellowship (Princeton University) 2017
Graduate Student Research Funding (Princeton University) 2016 – 2017
Discovery Scholar Award (University of Southern California) 2010
Undergraduate Research Fellowship (Rose Hills Foundation) 2008 – 2010

Research interests

Analogy and relational reasoning; metacognition; decision-making; visual attention; computational modeling; artificial intelligence; neuroimaging

Publications

h-index = 14

Webb, T. W.*, Fu, S.*, Bihl, T., Holyoak, K. J., & Lu, H. (2023). Zero-shot visual reasoning through probabilistic analogical mapping. *Nature Communications, 15*, 5144. doi.org/10.1038/s41467-023-40804-x.

* *Equal contribution*

Webb, T. W., Holyoak, K. J., & Lu, H. (2023). Emergent analogical reasoning in large language models. *Nature Human Behaviour.* doi.org/10.1038/s41562-023-01659-w

Webb, T. W., Miyoshi, K., Yan So, T., Rajananda, S., & Lau, H. (2023). Natural statistics support a rational account of confidence biases. *Nature Communications, 14*, 3992. doi.org/10.1038/s41467-023-39737-2

Mondal, S. S.*, **Webb, T. W.***, & Cohen, J. D. (2023). Learning to reason over visual objects. In *11th International Conference on Learning Representations (ICLR†).* doi.org/10.48550/arXiv.2303.02260

Webb, T. W., Sinha, I., & Cohen, J. D. (2021). Emergent symbols through binding in external memory. In *9th International Conference on Learning Representations (ICLR†).* doi.org/10.48550/arXiv.2012.14601

Webb, T. W., Dulberg, Z., Frankland, S. M., Petrov, A. A., O'Reilly, R. C., & Cohen, J. D. (2020). Learning representations that support extrapolation. In *37th International Conference on Machine Learning (ICML†).* (pp. 10136-10146). doi.org/10.48550/arXiv.2007.05059

† *ICLR and ICML are competitively peer-reviewed, archival conference proceedings, and are considered to be premier venues for publishing work in machine learning and artificial intelligence.*

Wilterson, A. I., Kemper, C. M., Kim, N., **Webb, T. W.**, Reblando, A. M., & Graziano, M. S. A. (2020). Attention control and the attention schema theory of consciousness. *Progress in Neurobiology, 195*, 101844. doi.org/10.1016/j.pneurobio.2020.101844

Guterstam, A., Kean, H. H., **Webb, T. W.**, Kean, F. S., & Graziano, M. S. A. (2019). Implicit model of other people's visual attention as an invisible, force-carrying beam projecting from the eyes. *Proceedings of the National Academy of Sciences, 116*(1), 328-333. doi.org/10.1073/pnas.1816581115

Bio, B. J., **Webb, T. W.**, & Graziano, M. S. A. (2018). Projecting one's own spatial bias onto others during a theory-of-mind task. *Proceedings of the National Academy of Sciences, 115*(7), E1684-E1689. doi.org/10.1073/pnas.1718493115

Webb, T. W., Igelstrom, K. M., Schurger, A., & Graziano, M. S. A. (2016). Cortical networks involved in visual awareness independent of visual attention. *Proceedings of the National Academy of Sciences, 113*(48), 13923-13928. doi.org/10.1073/pnas.1611505113

Igelstrom, K. M., **Webb, T. W.**, & Graziano, M. S. A. (2016). Functional connectivity between the temporoparietal cortex and cerebellum in autism spectrum disorder. *Cerebral Cortex, 27*(4), 2617-2627. doi.org/10.1093/cercor/bhw079

Igelstrom, K. M., **Webb, T. W.**, Kelly, Y. T., & Graziano, M. S. A. (2016). Topographical organization of attentional, social and memory processes in the human temporoparietal cortex. *Eneuro, 3*(2). doi.org/10.1523/ENEURO.0060-16.2016

Webb, T. W., Kean, H. H., & Graziano, M. S. A. (2016). Effects of awareness on the control of attention. *Journal of Cognitive Neuroscience, 28*(6), 842-851. doi.org/10.1162/jocn_a_00931

Igelstrom, K. M., **Webb, T. W.**, & Graziano, M. S. A. (2015). Neural processes in the human temporoparietal cortex separated by localized independent component analysis. *Journal of Neuroscience, 35*(25), 9432-9445. doi.org/10.1523/JNEUROSCI.0551-15.2015

Webb, T. W., & Graziano, M. S. A. (2015). The attention schema theory: a mechanistic account of subjective awareness. *Frontiers in psychology, 6*, 500. doi.org/10.3389/fpsyg.2015.00500

Graziano, M. S. A., & **Webb, T. W.** (2014). A mechanistic theory of consciousness. *International Journal of Machine Consciousness, 6*(02), 163-176. doi.org/10.1142/S1793843014400174

Kelly, Y. T., **Webb, T. W.**, Meier, J. D., Arcaro, M. J., & Graziano, M. S. A. (2014). Attributing awareness to oneself and to others. *Proceedings of the National Academy of Sciences, 111*(13), 5012-5017. doi.org/10.1073/pnas.1401201111

Conference proceedings (non-archival)

Webb, T. W., Miyoshi, K., Yan So, T., & Lau, H. (2021). A task-optimized neural network model of decision confidence. In *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society*. pdf

Dulberg, Z., **Webb, T. W.**, & Cohen, J. D. (2021). Modelling the development of counting with memory-augmented neural networks. In *Proceedings of the 43rd Annual Meeting of the Cognitive Science Society*. doi.org/10.48550/arXiv.2105.10577

Frankland, S. M., **Webb, T. W.**, Petrov, A. A., O'Reilly, R. C., & Cohen, J. D. (2019). Extracting and Utilizing Abstract, Structured Representations for Analogy. In *Proceedings of the 41st Annual Meeting of the Cognitive Science Society*. pdf

Book chapters

Graziano, M. S. A., & **Webb, T. W.** (2018). Understanding consciousness by building it. In *The Bloomsbury Companion to the Philosophy of Consciousness*, 187. pdf

Graziano, M. S. A., & **Webb, T. W.** (2016). From sponge to human: The evolution of consciousness. In *Evolution of Nervous Systems: Second Edition* (pp. 547-554). Kaas J. and Krubitzer L., Eds., Elsevier. pdf

Conference presentations

2023. Emergent analogical reasoning in large language models. Invited talk at *Large language models meet cognitive science* workshop, Cognitive Science Society Annual Meeting, Sydney.

2023. Emergent analogical reasoning in large language models. Invited talk at the Santa Fe Institute. Santa Fe, NM.

2021. Performance-optimized neural networks as an explanatory framework for decision confidence. Invited talk at *Metacognition in the Age of AI: Challenges and Opportunities* workshop, Neural Information Processing Systems (NeurIPS), Virtual.

2021. Emergent symbols through binding in external memory. Talk presented at the International Conference on Learning Representations (ICLR), Virtual.

2019. Canonical representations for generalization in relational reasoning. Talk presented at the *Understanding interactions amongst cognitive control, learning and representation* symposium, Cognitive Science Society Annual Meeting, Montreal.

2017. A functional role for consciousness in model-based control of attention. Talk presented at the Association for the Scientific Study of Consciousness Annual Meeting, Beijing.

2016. Manipulating visual awareness while controlling attention: effects on cortical networks. Talk presented at the Association for the Scientific Study of Consciousness Annual Meeting, Buenos Aires.

Teaching

Assistant Instructor, Princeton University

Life Cycles of Behavior.	2017
Introduction to Clinical Neuropsychology.	2015 – 2016
Introduction to Cognitive Neuroscience.	2014 – 2016
Fundamentals of Neuroscience.	2013 – 2014

Mentorship

- Hope Kean, PhD student at MIT.
- Alexandra Reblando, research assistant at Columbia University.
- Ishan Sinha, product manager at LinkedIn.
- Sivananda Rajananda, masters student at Harvard University.
- Zach Dulberg, PhD student at Princeton University.
- Shanka Subhra Mondal, PhD student at Princeton University.
- Yichen Wang, undergraduate student at UCLA.
- Jiayi Sun, undergraduate student at UCLA.
- Miles Garofola-Lam, undergraduate student at UCLA.

Outreach

Volunteer Instructor, Princeton Prison Teaching Initiative. 2014 – 2018