

Jonathan Nicholas

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EDUCATION

- 2019 -2023 **Columbia University**
PhD, Psychology (Cognitive Neuroscience)
Thesis: Hindsight for foresight: adaptive uses of memory in value-based decision making
Advisor: Daphna Shohamy
- 2017 -2019 **Columbia University**
MA, Psychology (Cognitive Neuroscience)
Thesis: Uncertainty-based arbitration between incremental and episodic control
Advisor: Daphna Shohamy
- 2011 -2015 **Brown University**
BS, Cognitive Neuroscience
Thesis: Temporal dynamics of working memory filtration
Advisor: David Badre

EMPLOYMENT HISTORY

- 2023 - now **Postdoctoral Researcher**, New York University, Advisor: Marcelo Mattar
- 2015 - 2017 **Software Developer**, Stanford University Cognitive and Systems Neuroscience Lab

HONORS AND AWARDS

- 2022 Edward E. Smith Memorial Award in Cognitive Neuroscience
- 2021 Leo Rubinstein Endowed Fellowship
- 2017 - 2020 NSF Graduate Research Fellowship
- 2015 Kling Premium in Psychology
Election to Sigma Xi
- 2014 Karen T. Romer Undergraduate Teaching and Research Award
1st Place, Brown Institute for Brain Sciences Neural Decoding Competition

PUBLICATIONS

- In Prep **Nicholas, J., Daw, N.D., Shohamy, D.** Multiple mechanisms for integrating memory with reward in the human brain.
Montaser-Kouhsari, L.[†], Nicholas, J.[†], Shohamy, D. Competition between incremental learning and episodic memory is impaired in Parkinson's Disease. [[†]Denotes co-first author]
- Preprints **Nicholas, J., Amlang, C.J., Lin, C.Y., Desai, N., Montaser-Kouhsari, L., Kuo, S.H., Shohamy, D.** The role of the cerebellum in learning to predict reward: evidence from cerebellar ataxia. *Under Review*.
- 2022 **Nicholas, J., Daw, N.D., Shohamy, D.** (2022) Uncertainty alters the balance between incremental learning and episodic memory. *eLife*.
Grossman, I., Rotella, A., Hutcherson, C.A., ..., Nicholas, J., ..., The Forecasting Collaborative (2022) Insights into accuracy of social scientists' forecasts of societal change. *Nature Human Behaviour (in press)*.

- 2021 Chen, L., Iuculano, T., Mistry, P., **Nicholas, J.**, Zhang, Y., Menon, V. (2021) Linear and nonlinear profiles of weak behavioral and neural differentiation between numerical operations in children with math learning difficulties. *Neuropsychologia*.
- 2020 Iuculano, T., Padmanabhan, A., Chen, L., **Nicholas, J.**, Mitsven, S., de los Angeles, C., Menon, V. (2020) Neural correlates of cognitive variability in childhood autism and relation to heterogeneity in decision-making dynamics. *Developmental Cognitive Neuroscience*.
- 2018 Dimsdale-Zucker, H.[†], **Nicholas, J.**[†] (2018) Is spatial context privileged in the neural representation of events? *Journal of Neuroscience*. [[†]Denotes co-first author]
- Taghia, J., Cai, W., Ryali, S., Kochalka, J., **Nicholas, J.**, Chen, T., Menon, V. (2018) Uncovering hidden brain state dynamics that regulate performance and decision-making during cognition. *Nature Communications*.
- 2016 Ryali, S., Supekar, K., Chen, T., Kochalka, J., Cai, W., **Nicholas, J.**, Padmanabhan, A., Menon, V. (2016) Temporal dynamics and developmental maturation of salience, default and central-executive network interactions revealed by variational Bayes hidden Markov modeling. *PLOS Computational Biology*.

INVITED TALKS AND CONFERENCE PRESENTATIONS

- 2022 **Nicholas, J.**, Daw, N.D., Shohamy, D. (2022). Uncertainty alters the balance between incremental learning and episodic memory. *5th Multidisciplinary Conference on Reinforcement Learning and Decision Making*, Providence, RI.
- Nicholas, J.**, Daw, N.D., Shohamy, D. (2022). Uncertainty alters the balance between incremental learning and episodic memory. *Society for Neuroeconomics*, Arlington, VA.
- 2019 **Nicholas, J.**, Daw, N.D., Shohamy, D. (2019) Uncertainty-based arbitration between incremental and episodic control over decisions. *Columbia Interdisciplinary Decision Making Meeting*, New York, NY.
- Nicholas, J.**, Daw, N.D., Shohamy, D. (2019) Uncertainty-based arbitration between incremental and episodic control over decisions. *Manhattan Area Memory Meeting*, Princeton, NJ.
- 2017 Iuculano, T., **Nicholas, J.**, T.T. Chang, A. Metcalfe, V. Menon. (2017) Failure to neurally differentiate between addition and subtraction problems as a key neurocognitive feature of developmental dyscalculia. *Society for Neuroscience*, Washington, DC.

POSTERS

- 2022 **Nicholas, J.**, Daw, N.D., Shohamy, D. (2022). Multiple mechanisms for memory integration in the human brain. *Society for Neuroscience*, San Diego, CA.
- Nicholas, J.**, Daw, N.D., Shohamy, D. (2022). Uncertainty alters the balance between incremental learning and episodic memory. *Neurobiology of Reward and Decision Making*, Lake Arrowhead, CA.
- Nicholas, J.**, Daw, N.D., Shohamy, D. (2022). Uncertainty alters the balance between incremental learning and episodic memory. *5th Multidisciplinary Conference on Reinforcement Learning and Decision Making*, Providence, RI.
- Nicholas, J.**, Amlang, C.J., Lin, C.Y., Desai, N., Montaser-Kouhsari, L., Kuo, S.H., Shohamy, D. (2022). Impaired reinforcement learning in patients with cerebellar ataxia. *18th Annual Context and Episodic Memory Symposium*, Philadelphia, PA.

- Nicholas, J., Amlang, C.J., Lin, C.Y., Desai, N., Montaser-Kouhsari, L., Kuo, S.H., Shohamy, D. (2022).** Impaired reinforcement learning in patients with cerebellar ataxia. *International Congress of Parkinson's Disease and Movement Disorders, Madrid, Spain.*
- Nicholas, J., Amlang, C.J., Lin, C.Y., Desai, N., Montaser-Kouhsari, L., Kuo, S.H., Shohamy, D. (2022).** Impaired reinforcement learning in patients with cerebellar ataxia. *International Congress for Ataxia Research, Dallas, TX.*
- 2021 Insel, K., **Nicholas, J., Shohamy, D. (2021)** Reward volatility modulates the use of multiple learning systems during adolescence. *2021 Annual Flux Congress, Virtual.*
- 2019 **Nicholas, J., Daw, N.D., Shohamy, D. (2019)** Uncertainty-based arbitration between incremental and episodic control over decisions. *Society for Neuroscience, Chicago, IL.*
- Nicholas, J., Shohamy, D. (2019)** Uncertainty-based arbitration between incremental and episodic control over decisions. *Cognitive Neuroscience Society, San Francisco, CA.*
- 2017 Cai, W., Duberg, K., Rehert, R., Chen, J., Zhang, K., **Nicholas, J., Chen, T., Pennington, B., Hinshaw, S., Nigg, J., Menon, V. (2017)** Brain mechanisms of reactive and proactive control in children. *Society for Neuroscience, Washington, DC.*
- 2016 **Nicholas, J., Supekar, K., Menon, V. (2016)** Natural language processing of fMRI reveals cognitive learning induced changes in brain circuit dynamics. *Fourth Annual Flux Congress, St. Louis, MO.*
- Metcalfe, A., Battista, C., **Nicholas, J., Mitsven, S., Hundia, R., Iuculano, T., Chen, L., Menon, V. (2016)** Rapid, online assessment of children's numerical cognition skills. *International Mind, Brain, and Education Society, Toronto, Canada*
- 2014 **Nicholas, J., Chatham, C., Badre, D. (2014)** The temporal dynamics of working memory filtration. *2014 Brown Summer Research Symposium, Providence, RI.*

SERVICE AND OUTREACH

- 2022 Research Mentor, Columbia Summer Internship Program in Psychological Science
- 2021 - 2022 Research Mentor, Indigo Research Institute
- 2020 - 2021 Instructor, Columbia University Introduction to Programming Bootcamp
- 2020 Organizer, Columbia Interdisciplinary Decision Making Meeting
- 2020 Scientific Computing Support Staff, Columbia Psychology Department
- 2019 Organizer, Columbia University Introduction to Programming Bootcamp
- 2019 Organizer, Manhattan Area Memory Meeting

TEACHING

- 2022 Teaching Fellow, Science of Psychology, Columbia University
- 2022 Teaching Fellow, Cognitive Neuroscience, Columbia University
- 2020 Teaching Fellow, Statistics for Behavioral Scientists, Columbia University
- 2019 Teaching Fellow, Cognitive Neuroscience, Columbia University
- 2018 Teaching Fellow, Experimental Methods, Columbia University
- 2017 Teaching Fellow, Behavioral Neuroscience, Columbia University
- 2015 Teaching Assistant, Computational Cognitive Science, Brown University

MENTORING

Undergraduate Honors: Jessica Hecht (2018-2020), Nicole van Amerongen (2019-2020); Research Assistants: Annie Xu (2022), Sukriti Gupta (2022), Natasha King (2019), Jesse Eiseman (2020)

High School Andy Feng (2022), Hitomi Nakamura (2022), Pradnya Rajalakshmi (2021-2022), Loc Nguyen (2021), Brad Ji (2021)

TECHNICAL SKILLS

Research Methods Task design, Bayesian modeling, Reinforcement learning, Eyetracking, fMRI

Programming Languages Proficient: Python, Matlab, Javascript
Competent: R, Unity/C#, Bash, Git, HTML/CSS