QIONG ZHANG

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PROFESSIONAL POSITIONS

2021-present Assistant Professor, Psychology Department, Rutgers University
Assistant Professor, Computer Science Department, Rutgers University

2019-2021 Postdoctoral fellow, Princeton Neuroscience Institute, Princeton University
(Advisors: Kenneth Norman, Thomas Griffiths)

EDUCATION

2019 Ph.D. Neural Computation & Machine Learning, Carnegie Mellon University
Thesis: The When, Where, and Why of Human Memory Retrieval
(Advisors: John Anderson, Robert Kass)

2014 M.A. Machine Learning, Carnegie Mellon University

2013 B.S. Computational Biology, National University of Singapore

AWARDS AND GRANTS

AWARDS

2019-2021 Recipient, C.V. Starr Research Fellowship

2015-2016 Recipient, Richard King Mellon Foundation Presidential Fellowship

2013 Recipient, Lijen Industrial Development Metal for the Honors year student with the best academic exercise/project

2011 Recipient, Lim Soo Peng Book Prize for best student in the Computer Science stream

GRANTS

External - Active

2023-2026 NSF-PAC: *Towards a unified account of when external cues are beneficial or detrimental during memory search*. $430,762.
Award ID: 2316716. Role: PI

External - Inactive

2021-2024 Collaborative Research: NCS-FO: *How cognitive maps potentiate new learning: constraining a computational model by decoding the thoughts of superior memorists*. $230,000.
Award ID: 2024587. Role: Co-PI (PI: Kenneth Norman)

Internal - Active

2024-2026 *Metacognitive Mechanisms underlying Neural Encoding of Lasting Memories*. $35,000.
Rutgers Brain Health Institute pilot grant. Role: PI

PUBLICATIONS

JOURNAL ARTICLES

Published/In Press

Angne, H., Cornell, C. A., & **Zhang**, Q. (in press). A Context-Based Model of Collaborative Inhibition during Memory Search. *Scientific Reports*.

Binz, M., Alaniz, S., Roskies, A., Aczel, B., Bergstrom, C.T., Allen, C., Schad, D., Wulff, D., West, J.D., **Zhang**, Q., Shiffrin, S.M., Gershman, S.J., Popov, V., Bender, E.M., Marelli, M., Botvinick, M.M., Akata, Z., & Schulz, E. (in press) How Should the Advent of Large Language Models Affect the Practice of Science. *Proceedings of the National Academy of Sciences*.

Ma, S., Popov, V., & **Zhang**, Q. (2024). A Neural Index Reflecting the Amount of Cognitive Resources Available during Memory Encoding: a Model-based Approach. *Journal of Experimental Psychology: Learning, Memory, and Cognition*.

Xu, Z., Hemmer, P., & **Zhang,** Q. (2024). Towards a Generalized Bayesian Model of Reconstructive Memory. *Computational Brain & Behavior*.

Lu, Q., Nguyen, T., **Zhang**, Q., Hasson, U., Griffiths, T. L., Zacks, J. M., Gershman, S. J., Norman, K. A. (2024). Reconciling Shared versus Context-Specific Information in a Neural Network Model of Latent Causes. *Scientific Reports*.

Devraj A., Griffiths, T.L., & **Zhang**, Q. (2024). Reconciling Categorization and Memory through Environmental Statistics. P*sychonomic Bulletin & Review*.

Cornell, C. A. ¸Norman, K. A., Griffiths, T. L., & **Zhang**, Q. (2024). Improving Memory Search through Model-based Cue Selection. *Psychological Science.*

Callaway, F., Norman, K., Griffiths, T.L., & **Zhang**, Q. (2023) Optimal Metacognitive Control of Memory Recall. *Psychological Review.*

Zhang, Q., Griffiths, T.L., & Norman, K. (2022). Optimal Policies in Free Recall. *Psychological Review*.

Popov, V., **Zhang**, Q., Koch, G.E., Calloway, R.C., & Coutanche, M.N. (2019). Semantic Knowledge Influences whether Novel Episodic Associations are Represented Symmetrically or Asymmetrically. *Memory & Cognition.*

Anderson, J.R., Borst , J.P., Fincham, J.M., Ghuman, A.S., Tenison, C., & **Zhang**, Q. (2018). The Common Time Course of Memory Processes Revealed. *Psychological Science.*

Zhang, Q., Walsh, M.M., & Anderson, J.R. (2018). The Impact of Inserting an Additional Mental Process. *Computational Brain & Behavior.*

Zhang, Q., van Vugt, M., Borst, J.P., & Anderson, J.R. (2018). Mapping Working Memory Retrieval in Space and in Time: A Combined Electroencephalography and Electrocorticography Approach. *NeuroImage*. 174, 472-484.

Zhang, Q., Borst, J.P., Kass, R.E., & Anderson, J.R. (2017). Inter-Subject Alignment of MEG Datasets in a Common Representational Space. *Human Brain Mapping*, 38(9), 4287-4301.

Mousavi, M., Koerner, A.S., **Zhang**, Q., Noh, E., & de Sa, V.R. (2017). Improving Motor Imagery BCI with User Response to Feedback. *Brain-Computer Interfaces*, 4(1-2), 74-86.

Zhang, Q., Walsh, M.M., & Anderson, J.R. (2017). The Effects of Probe Similarity on Retrieval and Comparison Processes in Associative Recognition. *Journal of Cognitive Neuroscience*, 29(2), 352-367.

Anderson, J.R., **Zhang**, Q., Borst, J., & Walsh, M.M. (2016). The Discovery of Processing Stages: Extension of Sternberg's Method. *Psychological Review*, 123(5), 481.

BOOKS & BOOK CHAPTERS

Zhang, Q. (2022). How and why does schematic knowledge affect memory? In J. Musolino, P. Hemmer, & J. Sommer (Eds.), The Cognitive Science of Belief. Cambridge University Press.

REFEREED CONFERENCE PROCEEDINGS

(Peer reviewed, published in conference proceedings)

Angne, H., Cornell, C. A., & **Zhang**, Q. (2024). Why Two Heads Together are Worse Than Apart: A Context-Based Account of Collaborative Inhibition in Memory Search. Proceedings of the 46th Annual Conference of the Cognitive Science Society.

Salvatore, N., & **Zhang**, Q. (2024). Parallels between Neural Machine Translation and Human Memory Search: A Cognitive Modeling Approach. Proceedings of the 46th Annual Conference of the Cognitive Science Society.

Cornell, C. A., Jin, S., & **Zhang**, Q. (2024). The Role of Episodic Memory in Storytelling: Comparing Large Language Models with Humans. Proceedings of the 46th Annual Conference of the Cognitive Science Society.

Devraj A., **Zhang**, Q., & Griffiths, T.L. (2021). The dynamics of exemplar and prototype representations depend on environmental statistics. Proceedings of the 43th Annual Conference of the Cognitive Science Society.

Wilson S., Arora S., **Zhang**, Q., & Griffiths, T.L. (2021). A rational account of anchor effects in hindsight bias. Proceedings of the 43th Annual Conference of the Cognitive Science Society.

Popov, V., **Zhang**, Q., Koch, G.E., Calloway, R.C., & Coutanche, M.N. (2019). The effect of semantic relatedness on associative asymmetry in memory. Proceedings of the 41th Annual Conference of the Cognitive Science Society.

Zhang, Q., Popov, V., Koch, G.E., Calloway, R.C., & Coutanche, M.N. (2018). Fast Memory Integration Facilitated by Schema Consistency. Proceedings of the 40th Annual Conference of the Cognitive Science Society.

Zhang, Q., Anderson, J.R.,& Kass, R.E. (2015) Consistency in Brain activation Predicts Success in Transfer. Proceedings of the 37th Annual Conference of the Cognitive Science Society.

Koerner, A.S., **Zhang**, Q., & de Sa, V.R. (2013). The effect of real-time positive and negative feedback on motor imagery performance. Proceedings of the Fifth International Brain-Computer Interface Meeting: Defining the Future.

TALKS AND PRESENTATIONS

INVITED TALKS

2024 *Purdue University*, Cognitive and Mathematical & Computational Psychology Colloquium. Invited speaker.

2024 *Indiana University Bloomington*, Cognitive Science Colloquium. Invited speaker.

2024 *University of Zurich*, Psychology Department Colloquium. Invited speaker.

2024 *Columbia University*, Seminar on Cognitive and Behavioral Neuroscience. Invited speaker.

2024 *Hong Kong Chinese University*, Psychology Department Colloquium. Invited speaker.

2023 *New York University*, Psychology Department, ConCats Colloquium. Invited speaker.

2022 *Princeton University*, Psychology Department Academic Development Series. Invited speaker.

2021 *Rutgers University*, Computer Science Department Colloquium. Invited speaker.

2020 *University of California Irvine*, Cognitive Science Department Colloquium. Invited speaker (Virtual).

2019 *Indiana University Bloomington*, Computer Science Department Colloquium. Invited speaker.

2018 Society for Mathematical Psychology satellite meeting at the 2018 Psychonomic meeting. Invited speaker.

PRESENTATIONS AT CONFERENCES AND MEETINGS

2024 Angne, H., Cornell, C. A., & **Zhang**, Q. (2024, July). Why Two Heads Together are Worse Than Apart: A Context-Based Account of Collaborative Inhibition in Memory Search. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Rotterdam.

Salvatore, N., & **Zhang**, Q. (2024, July). Parallels between Neural Machine Translation and Human Memory Search: A Cognitive Modeling Approach. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Rotterdam.

Cornell, C. A., Jin, S., & **Zhang**, Q. (2024, July). The Role of Episodic Memory in Storytelling: Comparing Large Language Models with Humans. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Rotterdam.

Callaway, F., Norman, K., Griffiths, T.L., & **Zhang**, Q. (2024, May). Optimal Metacognitive Control of Memory Recall. Spotlight talk presented at the Context and Episodic Memory Symposium, Philadelphia.

2023 Xu, Z., Hemmer, P., & **Zhang**, Q. (2023, July). Towards a Generalized Bayesian Model of Category Effects. Talk presented at the Annual Meeting of Psychonomic Society, San Francisco.

Cornell, C. A. ,Norman, K. A., Griffiths, T. L., & **Zhang**, Q. (2023, July). Improving Memory Search through Model-based Cue Selection. Talk presented at the Annual Meeting of Psychonomic Society, San Francisco.

Xu, Z., Hemmer, P., & **Zhang**, Q. (2023, July). Towards a Generalized Bayesian Model of Category Effects. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Amsterdam.

Cornell, C. A. ,Norman, K. A., Griffiths, T. L., & **Zhang**, Q. (2023, July). Improving Memory Search through Model-based Cue Selection. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Amsterdam.

Ma, S., Popov, V., & **Zhang**, Q. (2023, May). A Neural Index Reflecting the Amount of Cognitive Resources Available during Memory Encoding: a Model-based Approach. Spotlight talk presented at the Context and Episodic Memory Symposium, Orlando.

2022 **Zhang**, Q., Norman, K.A., & Griffiths T.L. (2022, Nov). Optimal Policies for Free Recall. Talk presented at the Annual Meeting of Psychonomic Society, Boston.

Callaway, F., Norman, K., Griffiths, T.L., & **Zhang**, Q. (2022, July). The Role of Metamemory in Rationally Directing Retrieval Efforts. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Toronto.

Devraj A., Griffiths, T.L., & **Zhang**, Q. (2022, July). Reconciling Categorization and Memory through Environmental Statistics. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Toronto.

Zhang, Q. (2022, May). Optimal Policies for Free Recall. Talk presented at the Context and Episodic Memory Symposium, Philadelphia.

2020 **Zhang**, Q., Norman, K.A., & Griffiths T.L. (2020, November). Optimal Behavior in Free Recall. Poster presented at the Annual Meeting of Psychonomic Society, Virtual.

Zhang, Q., Norman, K.A., & Griffiths T.L. (2020, July). The Method of Loci is an Optimal Policy for Memory Search. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Virtual.

Zhang, Q., Norman, K.A., & Griffiths T.L. (2020, July). The Method of Loci is an Optimal Policy for Memory Search. Poster presented at the Annual Meeting of the Cognitive Science Society, Virtual.

2018 **Zhang**, Q., &Anderson, J.R. (2018, July). Exploring Foraging Rules in Human Semantic Search. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Madison.

2017 **Zhang**, Q., van Vugt, M., Borst, J.P.,& Anderson, J.R. (2017, July). A Spatial-Temporal Analysis of a Visual Working Memory Task with EEG and ECoG. Poster presented at the Annual Meeting of the Cognitive Science Society, London.

Zhang, Q., Walsh, M.M., &Anderson, J.R. (2017, July). Neural Evidence of Insertion and Subtraction of Information Processing Stages. Talk presented at the Annual Meeting of Society of Mathematical Psychology, Warwick.

Zhang, Q., Borst, J.P., Kass, R.E.,& Anderson, J.R. (2017, June). Inter-Subject Alignment of MEG Datasets at the Neural Representational Space. Poster presented at the Annual Meeting of the Organization of Human Brain Mapping, Vancouver.

Mousavi, M., Koerner, A.S., **Zhang**, Q., Noh, E.,& de Sa, V.R. (2017, July). Detection of Feedback- related Mental States with Error-related Spectral. Poster presented at the Neuroadaptive Technology, Berlin.

2016 **Zhang**, Q., Walsh, M.M., &Anderson, J.R. (2016, August). Isolating the Effects of Probe Similarity on Processing Stages in Associative Recognition. Talk presented at the Annual Meeting of Society of Mathematical Psychology, New Brunswick.

Mousavi, M., Koerner, A.S., **Zhang**, Q., Noh, E.,& de Sa, V.R. (2016, June). Improving Motor Imagery BCI with User Response to Feedback. Poster presented at the Sixth International Brain-Computer Interface Meeting, Pacific Grove.

2015 **Zhang**, Q., Anderson, J.R., & Kass, R.E. (2015, December). A Hierarchical Bayesian Framework for Modeling Individual Differences in Mental Processing Stages with a Hidden semi-Markov Model. Spotlight talk and poster presented at the 5th NIPS Workshop on Machine Learning and Interpretation in NeuroImaging, Montreal.

Zhang, Q. , Anderson, J.R., & Kass, R.E. (2015, July). Consistency in Brain Activation Predicts Success in Transfer. Poster presented at the Annual Meeting of the Cognitive Science Society, Pasadena, USA.

Zhang, Q., Anderson, J.R. & Kass, R.E. (2015, June) Characterization of Brain Consistency via a Data- driven Brain Parcellation. Poster presented at the Seventh International Workshop on Statistical Analysis of Neural Data, Pittsburgh, USA.2014

2013 Mudrik, L., Maoz, U., Xu, D., Duncan, C., **Zhang**, Q., & Koch, C. (2013, June). Dissecting Different Types of Decision Making: an ERP study of Reasoned vs. Unreasoned Voluntary Decisions. Poster presented at the Annual Meeting of Society for Neuroscience, San Diego.

Rajagopal, V., **Zhang**, Q. & Kamm, R.D. (2013, September). A Multiscale Framework for Modeling and Investigating Cell Mechanics in 3D Extracellular Matrix Environments. Talk presented at the Annual Meeting of Biomedical Engineering Society, Seattle.

PROFESSIONAL ACTIVIETIES & SERVICE

EDITORIAL POSITIONS

2022- Associate Editor, Open Mind

GRANT REVIEWING

2022 Panelist, NSF National Artificial Intelligence Research Institutes

2023- Ad-hoc reviewer, NSF Perception, Action, and Cognition

AD-HOC JOURNAL REVIEWING

Journal of Experimental Psychology: General; Psychonomic Bulletin and Review; Memory & Cognition; Journal of Experimental Psychology: Learning, Memory and Cognition; Behavior Research Methods; Scientific Reports; Science of Learning; Computational Brain & Behavior; NeuroImage; PLOS One;

Annual Meeting of the Cognitive Science Society; Association for the Advancement of Artificial Intelligence; Organization for Human Brain Mapping; International Conference on Learning Representations; Annual Conference on Cognitive Computational Neuroscience.

PROFESSIONAL AFFILIATIONS

2023- Fellow, Psychonomic Society

2015- Member, Women of Mathematical Psychology

2015- Member, Society for Mathematical Psychology

2015- Member, Cognitive Science Society

2016- Member, Association for Psychological Science

PANELIST

2022 Hiring in academia. Psychology Department, Princeton University (Virtual).

2020 Cognitive Science and AI Collaborations. Cognitive Science Department, University of California, Irvine (Virtual).

DEPARTMENTAL SERVICE

2022- Member, Graduate admissions committee, Cognitive area, Department of Psychology, Rutgers

2022- Member, Undergraduate Honors thesis committee, Department of Psychology, Rutgers

2021-2022 Member, Diversity Committee, Department of Psychology, Rutgers

2020-2021 Member, Colloquium series organizing committee, Princeton Neuroscience Institute

2017-2018 Student Affairs Committee, Center for Neural Basis of Cognition, Carnegie Mellon

2016-2017 Department Representative, Carnegie Mellon Graduate Student Assembly

TEACHING

Undergraduate

830:303 Memory, Psychology Department, Rutgers University

(This course introduces the scientific study of human memory)

198:461 Machine Learning, Computer Science Department, Rutgers University

(This course introduces the basic principles of machine learning)

Graduate

185:601/198:598 Learning in Humans and Machines, Rutgers Cognitive Science Center

(This interdisciplinary course explores the parallels between human learning and machine learning)

830:546 Memory and Learning, Psychology Department, Rutgers University

(This graduate course delves into theoretical literature of human memory and learning)

STUDENTS

Postdoc Students

2023-2024 Carol He

Ph.D. Students

2022- Si Ma

2023- Hemali Angne

2023- Charlotte Cornell

2023- Nikolaus Salvatore

2022-2024 Zihao Xu (collaborating graduate student)

2023-2024 Shuning Jin (collaborating graduate student)

Master's Students

2023- Eric Zeng (research assistant)

2023-2024 Snigdha Mishra (class project)

2022-2023 Hemali Angne (independent research project; thesis project)

2022-2023 Siddhant Kochrekar (thesis project)

2022- 2023 Dhiraj Bagul (research assistant; thesis project)

2022-2022 Ishani Ghose (class project; outstanding graduating Master of Science student in Research)

Undergrad Students

2024- Joe Butta (research assistant)

2024-2024 Tej Shah (research assistant)

2023-2024 Claudia Santacruz (independent research project)

2022-2023 Josh Cooper (research assistant)

2021-2023 Charlotte Cornell (lab manager)

2020-2022 Arjun Devraj (research assistant; co-advised with Thomas Griffiths)

2020-2021 Stephen Polcyn (independent research project; co-advised with Kenneth Norman)

2020-2021 Samarie Wilson (class project; co-advised with Thomas Griffiths and Kenneth Norman)

2020-2021 Somya Arora (class project; co-advised with Thomas Griffiths)

2020-2021 Zachary Paris (research assistant; co-advised with Thomas Griffiths)

PhD Thesis Committee

2023 Theodoros Bermperidis

2022 Joseph Sommer

Qualifying Exam Committee

2024 Ana Rinzler

2023 Wenjie Qiu

2023 Zejun Xie

2022 Joseph Sommer

2022 Hanna Komlos

2022 Mona Elsayed

Master's Committee

2023 Hemali Angne

2023 Siddhant Kochrekar

2023 Dhiraj Bagul

2022 Theodoros Bermperidis