Qiliang He 615-999-8838 duncan.heqiliang@gmail.com

**Research Interest**

My research focuses on investigating how the interactions between environmental properties, stress and sensory stimulation affect memory and decision-making. In addition, I study how such interactions can be leveraged to improve learning efficiency in young adults and to slow cognitive decline in old adults. I study these topics in naturalistic spatial navigation settings using multimodal methods (Virtual Reality[VR], MRI, EEG, and computational modeling).

**Academic Positions**

* *Assistant Professor, Department of Psychology, University of Texas at San Antonio, 2024.1 - present*
* *Academic Professional in Neuroscience, School of Psychology, Georgia Institute of Technology, 2022.7 – 2023.12*
* *Postdoctoral Fellow, School of Psychology and Department of Biomedical Engineering, Georgia Institute of Technology, 2018.1 – 2022.6*

Advisor: Dr. Thackery I. Brown and Dr. Annabelle C. Singer

**Education**

*Department of Psychology, Vanderbilt University,* 2012 – 2017

Doctor of Philosophy, Cognition and Cognitive Neuroscience, graduate minor in Quantitative Methods

Advisor: Dr. Timothy P. McNamara

**Funding**

*Completed*

* The Warren Alpert Distinguished Scholar Fellowship (2021 – 2023, total cost: $400,000)
  + Role: Principal Investigator
  + Title: The neural and cognitive effects of sensory gamma stimulation on old adults (https://www.warrenalpertfoundation.org/awards/)

**Publications** \*denotes mentees

1. **He, Q**., Liu, J.L\*., Eschapasse, L.\*, & Brown, T.I. (2023). Neural mechanisms of memory integration in value-based decision-making during spatial navigation. *Neuropsychologia*, 193, 108758. https://doi.org/10.1016/j.neuropsychologia.2023.108758
2. Baumann, M. R., Kretz, D. R., & **He, Q.** (2024). A review of multiteam systems with an eye toward applications for collective spatial reasoning. *Collective spatial cognition*, 209-234.
3. Maxim, P., **He, Q.**, & Brown, T. I. (2023). Stress and navigation. *In Reference Module in Neuroscience and Biobehavioral Psychology*. Elsevier. https://doi.org/10.1016/B978-0-12-820480-1.00027-9
4. **He, Q**., Beveridge, E.H.\*, Vargas, V.,\* Salen, A.N.\*, & Brown, T.I. (2023). Effects of acute stress on rigid learning, flexible learning and value-based decision-making in spatial navigation. *Psychological Science*. <https://doi.org/10.1177/09567976231155870>
5. **He, Q**., Liu, J.L.\*, Eschapasse, L.\*, Beveridge, E.H.\*, & Brown, T.I. (2022). A comparison of reinforcement learning models of human spatial navigation. *Scientific Reports*, 12(1), 13923. https://doi.org/10.1038/s41598-022-18245-1
6. **He, Q**., Starnes, J., & Brown, T.I. (2022). Environmental overlap influences goal-oriented hippocampal coding of spatial sequences. *Hippocampus,*1–17. https://doi.org/10.1002/hipo.23416
7. **He, Q**., Liu, J.L.,\* Beveridge, E.H.\*, Eschapasse, L.\*, Vargas,V.\*, & Brown, T.I. (2022). Episodic memory integration shapes value-based decision-making in spatial navigation. *Journal of Experimental Psychology: Learning, Memory, and Cognition.* http://dx.doi.org/10.1037/xlm0001133
8. Biju, K., Wei, E.X., Rebello, E., Matthews, J., **He, Q**., McNamara, T.P., Agrawal, Y. (2021). Performance in real world- and virtual reality-based spatial navigation tasks in patients with vestibular dysfunction. *Otology and Neurotology*. doi: 10.1097/MAO.0000000000003289
9. Brown, T.I., **He, Q**., Aselcioglu, I., Stern C.E. (2021). Evidence for a gradient within the medial temporal lobes for flexible retrieval under hierarchical task rules. *Hippocampus.* https://doi.org/10.1002/hipo.23365
10. **He, Q**., Colon‐Motas, K. M., Pybus, A. F., Piendel, L., Seppa, J. K., Walker, M. L., ... & Singer, A. C. (2021). A feasibility trial of gamma sensory flicker for patients with prodromal Alzheimer's disease. *Alzheimer's & Dementia: Translational Research & Clinical Interventions*, *7*(1), e12178. https://doi.org/10.1002/trc2.12178
11. **He, Q**., Beveridge, E.H.\*, Starnes, J.M., Goodroe, S.C. & Brown, T.I. (2021). Environmental overlap and individual encoding strategy modulate memory interference in spatial navigation. *Cognition*, 207, 104508. https://doi.org/10.1016/j.cognition.2020.104508
12. **He, Q**., Han, A.T.\*, Churman, T.A.\* & Brown, T.I. (2021). The role of working memory capacity in spatial learning depends on spatial information integration difficulty in the environment. *Journal of Experimental Psychology: General*, *150*(4), 666–685. https://doi.org/10.1037/xge0000972
13. **He, Q**., & Brown, T.I. (2020). Heterogeneous correlations between hippocampus volume and cognitive map accuracy among healthy young adults. *Cortex,* 124, 167–175. https://doi.org/10.1016/j.cortex.2019.11.011
14. **He, Q**., McNamara, T.P. & Brown, T.I. (2019). Manipulating the visibility of barriers to improve spatial navigation efficiency and cognitive mapping. *Scientific Reports*, *9*(1), 1–12. https://doi.org/10.1038/s41598-019-48098-0
15. **He, Q**., & Brown, T. I. (2019). Environmental Barriers Disrupt Grid-like Representations in Humans during Navigation. *Current Biology*, 29(16), 2718-2722.e3. https://doi.org/10.1016/j.cub.2019.06.072
16. **He, Q**., McNamara, T.P., Bodenheimer, B., & Klippel, A. (2019). Acquisition and transfer of spatial knowledge during wayfinding. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 45*(8), 1364–1386. https://doi.org/10.1037/xlm0000654
17. **He, Q**. & McNamara, T.P. (2018). Virtual Orientation Overrides Physical Orientation to Define a Reference Frame in Spatial Updating. *Front. Hum. Neurosci.* 12:269.
18. **He, Q**., McNamara, T.P. & Kelly, J.W. (2018). Reference frames in spatial updating when body-based cues are absent. *Memory & Cognition,* 46, 89-99.
19. **He, Q.** & McNamara, T.P. (2018). Spatial Updating Strategy Affects the Reference Frame in Path Integration. *Psychonomic Bulletin & Review*, 25, 1073-1079*.*
20. Paris, R., Joshi, M., **He, Q**., Narasimham, G., McNamara, T.P., & Bodenheimer, B. (2017). Acquisition of Survey Knowledge using Walking in Place and Resetting Methods in Immersive Virtual Environments. *In Proceedings of the ACM Symposium on Applied Perception* (p. 7:1–7:8). New York, NY, USA: ACM.
21. **He, Q**., McNamara, T.P. & Kelly, J.W. (2016). Environmental and Idiothetic Cues to Reference Frame Selection in Path Integration. In T. Barkowsky et al. (Eds.), *Spatial Cognition X*. Berlin Heidelberg: Springer.
22. C. Zancada-Menendez, **Q. He**, P. Sampedro-Piquero, L. Lopez & T. P. McNamara (2016): Influence of bidirectional perspective on learning routes and spatial layout. *Journal of Cognitive Psychology*, 28(4), 474-485. [https://doi.org/10.1080/20445911.2016.1143476](https://psycnet.apa.org/doi/10.1080/20445911.2016.1143476)
23. Chen, X., **He, Q**., Kelly, J. W., Fiete, I. R., & McNamara, T. P. (2015). Bias in human path integration is predicted by properties of grid cells. *Current Biology*, 25(13), 1771-1776.

**Manuscripts under review or in prep**

* **He, Q**., Salen, A.N., Vargas, V., Singer, A.S., & Brown, T.I. (in prep). The neural and cognitive effects of gamma sensory stimulation on older adults

**Teaching Experience**

* **Principle in Neuroscience** (co-lecturer, Georgia Institute of Technology)
* **Methods in Neuroscience** (primary lecturer, Georgia Institute of Technology)
* **Research Methods in Psychology** (primary lecturer, Georgia Institute of Technology)
* **General Psychology** (primary lecturer, Georgia Institute of Technology)
* **Data pre-processing, analysis and visualization in Python** (summer workshop instructor for lab undergraduate assistants, Georgia Institute of Technology)
* **Virtual Reality in Psychology and Neuroscience** (summer workshop instructor for lab undergraduate assistants, Georgia Institute of Technology)

**Awards**

* Georgia Tech Student Recognition of Excellence in Teaching (2022, 2023)
* Best Poster of College of Sciences, Georgia Tech Postdoctoral Research Symposium, 2018
* Vanderbilt Graduate Student Travel Award, 2013, 2015, 2016
* International Spatial Cognition Summer Institute Travel Award*,* 2013

**Conference Presentations**

* Effects of acute stress on rigid learning, flexible learning and value-based decision-making in spatial navigation, *interdisciplinary Navigation Symposium* (iNAV), 2022, poster
* Reinforcement learning models provide unique insight in characterizing individual differences of navigation behaviors, *Psychonomic Society Annual Meeting*, 2021, poster
* Seeing through barriers to improve spatial navigation efficiency and cognitive mapping, *Cognitive Neuroscience Society*, 2019, poster
* Acquisition of spatial knowledge during wayfinding, *Psychonomic Society Annual Meeting*, 2016, poster
* Difficult spatial updating relies on the initial facing orientation as reference direction in path integration, *Spatial Cognition 2016,* poster
* Difficult spatial updating relies on a single static reference direction, *Psychonomic Society Annual Meeting*, 2015, poster
* Human Path Integration and Grid Cells, *International Spatial Cognition Summer Institute,* 2013, oral presentation

**Research Skills**

* Experiment Implementation: Unity and Vizard (Virtual Reality), PsychoPy and Psychtoolbox (2D stimuli)
* 3D Model Construction: Sketchup
* Computer Programing (from most to least proficient): Python, Matlab, R, C# and C++

* Space Syntax Analysis: DepthMapX
* Neuroimaging Data Analysis (MRI and EEG): SPM, FSL, FreeSurfer, AFNI, and EEGLAB

**Ad Hoc Journal Referee**

■ Behavioural Brain Research ■ Behavior and Information Technology ■ Cell Reports ■ Cognition ■ Cognitive Neurodynamics ■ Cognitive Research: Principles and Implications ■ Frontiers in Human Neuroscience ■ IEEE International Symposium on Mixed and Virtual Reality ■ IEEE Transactions on Visualization and Computer Graphics ■ Journal of Experimental Psychology: General ■ Journal of Experimental Psychology: Human Perception and Performance ■ Journal of Experimental Psychology: Learning, Memory and Cognition ■ Quarterly Journal of Experimental Psychology ■ Scientific Reports

**References**

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