Catrina McKenzie Hacker

SUMMARY

Electrophysiologist and computational neuroscientist interested in how neural populations dynamically and flexibly support cognitive processes. 6+ years of experience thinking critically about complex datasets, conducting electrophysiological and behavioral experiments, and communicating complicated ideas. Passionate about clear scientific communication, collaborative science, and translation across model species.

EDUCATION

University of Pennsylvania, PhD in neuroscience **2019 – Present**

University of Southern California, Neuroscience B.S. with honors, *Summa cum laude* **2015 – 2019**

RESEARCH EXPERIENCE

Graduate Student, *University of Pennsylvania* **2019 – Present**
Advisor: Nicole C. Rust, Ph.D.

Perform electrophysiological recordings and execute computational analyses to elucidate neural mechanisms of visual recognition memory.

Undergraduate Research Assistant, *University of Southern California* **2018 – 2019**
Advisor: Sarah W. Bottjer, Ph.D.

Assist in electrophysiological and optogenetic experiments studying cortico-basal ganglia circuits of zebra finches to understand the neural basis of song learning and production.

Undergraduate Research Assistant, *University of Southern California* **2016 – 2019**
Advisor: Irving Biederman, Ph.D.

Design, execute and analyze psychophysical studies investigating nature and limits of human face recognition to develop neurocomputational accounts of face processing.

PUBLICATIONS

Preprints

Bohn, S., **Hacker, C.M.**, Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2025). Resolving a paradox about how vision is transformed into familiarity. *bioRxiv*. doi: 10.1101/2025.06.13.659490.

Jannuzi, B.G.L., **Hacker, C.M.**, Bohn, S., Meyer, T., Hay, M.L. & Rust, N.C. (2025). Sharpened visual memory representations are reflected in inferotemporal cortex. *bioRxiv*. doi: 10.1101/2025.04.28.651105.

Rust, N.C., Yang, Y., **Hacker, C.M.** & Stuphorn, V. (2025). The representation of mood in primate anterior insular cortex. *bioRxiv*. doi: 10.1101/2025.04.22.650010.

Hacker, C.M. & Biederman, I. (2019). The proficiency for distinguishing faces is independent of the proficiency for remembering them. *PysArxiv*. doi: 10.31234/osf.io/9bwct.

Hacker, C.M. & Biederman, I. (2019). The invariance of recognition to the stretching of faces is not explained by familiarity or warping to an average face. *PsyArxiv*. doi: 10.31234/osf.io/e5hgx.

PUBLICATIONS (CONT.)

Primary Research Articles

Hacker, C.M., Biederman, I., Zhu, T., Nelken, M. & Meschke, E.X. (2022). The sizable difficulty in matching unfamiliar faces differing only moderately in orientation in depth is a function of image dissimilarity. *Vision Research*. doi: 10.1016/j.visres.2021.09.005.

Hacker, C.M., Meschke, E.X. & Biederman, I. (2019). A Face in a (Temporal) Crowd. *Vision Research*, doi: 10.1016/j.visres.2018.02.007.

Reviews

Biederman, I., Shilowich, B.E., Herald, S.B., Margalit, E., Maarek, R., Meschke, E.X. & **Hacker, C.M.** (2018). The Cognitive Neuroscience of Person Identification. *Neuropsychologia*, 116, 205-214. doi: 10.1016/j.neuropsychologia.2018.01.036.

Other

Hacker, C.M. & Rust, N.C. (2022). Ritalin as a causal perturbation. *Trends in Cognitive Sciences*, Research Spotlight. doi: 10.1016/j.tics.2022.04.002.

POSTERS AND PRESENTATIONS

Talks

Hacker, C.M, Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2024). Identifying the neural correlates of contextual influences on image memorability. Invited talk at the Workshop on Synergizing the Human Brain and Artificial Neural Networks, virtual.

Hacker, C.M, Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2023). Identifying the neural correlates of contextual influences on image memorability. Talk presented at the annual Neuroscience/Vision/Auditory Training Grant Retreat, Philadelphia, PA. May.

Hacker, C.M., Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2022). Worse remembering of a dog when viewed in a sequence of dogs is dominated by changes in memory mechanisms as opposed to sensory adaptation. Talk presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/jov.22.14.4075.

Posters Presented

Hacker, C.M., Bohn, S., Foster, B.L., Rust, N.C. (2025). A systematic comparison of the visual memory representations in spikes and LFPs. Poster presented at the meeting of the Simian Collective. Durham, NC. August.

Hacker, C.M., Bohn, S., Foster, B.L., Rust, N.C. (2025). Would the same inferences about visual memory have been made with LFPs as compared to spikes? Poster presented at the 8th Annual Conference on Cognitive Computational Neuroscience, Amsterdam, The Netherlands. August.

Hacker, C.M., Bohn, S., Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2024). A systematic comparison of the visual memory information in spikes, high gamma, and LFPs in inferotemporal cortex. Poster presented at the annual meeting of the Society for Neuroscience, Chicago, IL. October.

Hacker, C.M., Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2023). A role for cortical pattern separation in enhancing visual memory. Poster presented at 150th Scheie Eye Anniversary Meeting, Philadelphia, PA. May.

POSTERS AND PRESENTATIONS (CONT.)

Posters Presented (cont.)

Hacker, C.M., Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2023). A role for cortical pattern separation in enhancing visual memory. Poster presented at COSYNE, Montreal, Québec, Canada. March.

Hacker, C.M., Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2022). Evidence that the extrinsic effects on memorability are computed in inferotemporal cortex and inherited by the hippocampus. Poster presented at the annual meeting of the Society for Neuroscience, San Diego, CA. November.

Hacker, C.M. & Biederman, I. (2019). The capacity for face perception is independent of the capacity for face memory. Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/19.10.139a.

Hacker, C.M., Meschke, E.X. & Biederman, I. (2018). Recognition of Stretched Faces. Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/18.10.160.

Meschke, E.X.*, **Hacker, C.M.***, Juarez, J.J., Maarek, R.S. & Biederman, I. (2017). Detecting Unspecified Familiar Faces. Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/17.10.1027.

Posters Co-Authored

Bohn, S., **Hacker, C.M.**, Jannuzi, B.G.L., Meyer, T., Hay, M.L. & Rust, N.C. (2022) Disambiguating familiarity from visual modulation: A role for the hippocampus in recognition memory. Poster presented at the annual meeting of the Society for Neuroscience, San Diego, CA. November.

Jannuzi, B.G.L., **Hacker, C.M.,** Meyer, T., Hay, M.L. & Rust, N.C. (2022) Neural analogs of memory sharpening behavior emerge earlier in inferotemporal cortex than the hippocampus. Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/jov.22.14.4025.

Jannuzi, B.G.L., Meyer, T., Hay, M.L., **Hacker, C.M.** & Rust, N.C. (2021) The remarkable visual specificity of visual recognition memory behavior is shaped by representational sharpening, reflected in inferotemporal cortex. Poster presented at the annual meeting of the Society for Neuroscience, virtual. November.

Biederman, I., Zhu, T., Nelken, M., Meschke, E.X. & **Hacker, C.M.** (2019). The cost of matching depth-rotated faces: A simple, additive function of image similarity. Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/19.10.136b.

Meschke, E.X., **Hacker, C.M.** & Biederman, I. (2018). How Many Faces Can We Recognize? Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/18.10/158.

Zhu, T., Nelken, M., **Hacker, C.M.**, Meschke, E.X. & Biederman, I. (2018). Matching Depth-Rotated Faces at Varying Degrees of Physical Similarity. Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/18.10.932.

POSTERS AND PRESENTATIONS (CONT.)

Posters Co-Authored (cont.)

Biederman, I., Margalit, E., Maarek, R.S., Meschke, E.X., Shilowich, B.S., **Hacker, C. M.**, Juarez, J.J., Seamans, T. J. & Herald, S.B. (2017). What is the Nature of the Perceptual Deficit in Congenital Prosopagnosia? Poster presented at the annual meeting of the Vision Sciences Society, St. Petersburg Beach, FL. May. doi: 10.1167/17.10/619.

HONORS AND AWARDS

Jameson-Hurvich Travel Award, *Recipient* **2022, 2025**

NSF Graduate Research Fellowship, *Honorable Mention* **2020**

USC Discovery Scholar, *Distinction recipient*, *Prize finalist* **2019**
Graduation distinction awarded to students who excel in the classroom while demonstrating the ability to create exceptional new scholarship.

USC Neuroscience Outstanding Student of the Year Award, *Recipient* **2019**
Award given to USC's best neuroscience student with senior standing.

Brian Phillip Rakusin Neuroscience Scholarship Award, *Recipient* **2018**
$10,000 Scholarship awarded each year to the most outstanding sophomore or junior demonstrating exceptional achievements and aspirations in the field of Neuroscience.

USC Provost's Undergraduate Research Fellowship, *Six-time Recipient* **2017 – 2019**
Fellowship awarded to select undergraduates demonstrating excellent academic standing and engaged in research, total value of $8,000 over six semesters.

TEACHING

Computer Vision and Imaging Module, *University of Birmingham* **2024**
Invited Guest Lecturer
Invited to give a virtual 45-minute lecture on the relationship between neuroscience and computer science for senior undergraduates.

Computational Neuroscience: Vision, *Cold Spring Harbor Laboratory* **2024**
Teaching Assistant
Course Organizers: Jonathan Pillow, Emily Cooper, John Serences
From a group of 24 students I was one of two selected to return as a TA the following year. In this two-week course I discussed course material and projects one-on-one with students, maintained the course website, and gave a lecture about my research.

Computational and Theoretical Neuroscience, *University of Pennsylvania* **2023**
Recitation Leader
Taught a weekly "computational tutorial" reviewing mathematical concepts for undergraduate and graduate students with a neuroscience background.

CORE II: The Electrical Language of Cells, *University of Pennsylvania* **2020 – 2022**
Recitation Leader
Taught weekly recitations for first-year graduate students to supplement lectures on electrical and chemical signaling in excitable cells.

TEACHING (CONT.)

Cognitive Neuroscience, *University of Pennsylvania* **2021**
Teaching Assistant
Presented a lecture about object recognition, held office hours, and graded exams for an introductory undergraduate course.

OUTREACH AND SERVICE

Penn NeuroKnow **2021 – Present**
Writer (2021-Present), Co-Editor (2022-Present)
Student-curated blog with posts about neuroscientific research written for the public. I have written 23 posts and edited over 125.

GLIA **2019 – Present**
Member (2019-Present), Co-Director (2022-2023)
Coalition of neuroscience graduate students organizing outreach and professional development events. As co-director I oversaw the eight-member executive board and allocation of a $36,500 budget.

Simons Collaboration on the Global Brain News Site **2022, 2025**
Writer
Contributed journalistic news pieces written for a broad neuroscience audience about internal brain states and the International Brain Laboratory.

CNI +/- Seminar **2021 – 2023**
Organizer
Seminar for students and postdocs of the Computational Neuroscience Initiative to present and get feedback about ongoing research.