Daniel Toker, PhD

Curriculum Vitae

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RESEARCH INTERESTS

I study how the brain loses and recovers consciousness under anesthesia, brain injury, and seizures. My work combines interpretable AI, clinical EEG and physiologic signals, computational circuit modeling, and human brain assembloids to infer mechanisms of brain-state change and translate them into monitoring tools, neuromodulation strategies, and prospective therapeutic trials.

EDUCATION

PhD in Neuroscience, University of California, Berkeley, 2019.

BA in Philosophy, Certificate in Neuroscience, Princeton University, *Magna Cum Laude*, 2013.

Selected honors: NSF Graduate Research Fellowship; NIH Ruth L. Kirschstein NRSA F32 Postdoctoral Fellowship.

ACADEMIC APPOINTMENTS

Assistant Project Scientist, Neural Circuit Development and Dynamics Lab, UCLA, March 2026 – present. Run an externally funded research program in AI-driven mechanistic inference and therapeutic discovery for neurological disease.

Postdoctoral Scientist, UCLA, 2020 – 2026 (concurrent joint appointment across two laboratories): Higher Cognition, Language, and Consciousness Lab (Advisor: Martin M. Monti, PhD), 2020 – 2026; and Neural Circuit Development and Dynamics Lab (Advisor: Ranmal A. Samarasinghe, MD, PhD), 2022 – 2026.

Graduate Researcher, D'Esposito Lab, UC Berkeley (Advisor: Mark D'Esposito, MD), 2016 – 2019.

Clinical Research Associate, Halo Neuroscience, San Francisco, CA, 2014 – 2015.

Lab Manager, Cognitive Affective Neuroscience Lab, UC Berkeley, 2013 – 2014.

Research Assistant, Koch Laboratory, Caltech, 2013.

Research Assistant, Computational Memory Lab, Princeton University, 2010 – 2013.

RESEARCH FUNDING

LouLou Foundation CDKL5 Program of Excellence Pilot Grant. "AI-driven digital twins of CDKL5 deficiency disorder." Role: co-I (scientific lead and grant writer). May 2026 – April 2027.

Cures Within Reach. "Clinical Trial to Validate AI-Driven Drug Repurposing" (Phase IIA saxagliptin trial). Role: co-I (scientific lead and grant writer). January 2026 – January 2029.

UCLA Broad Stem Cell Research Center, Transformative Technology Development (TTD) Award. "AI-guided robotic platform for human brain assembloids." Role: co-I (scientific lead and grant writer). January 2026 – January 2027.

NIH Ruth L. Kirschstein National Research Service Award (NRSA) F32 Postdoctoral Fellowship. Role: Fellow. 2023 – 2026.

National Science Foundation Graduate Research Fellowship (NSF GRFP). Role: Fellow. 2016 – 2019.

HONORS AND AWARDS

Nominee, UCLA Chancellor's Award for Postdoctoral Research, 2024.

Excellence in Research Award, UCLA Life Sciences, 2022.

Outstanding Graduate Student Instructor Award, UC Berkeley, 2019.

PUBLICATIONS

Google Scholar: 1,206 citations, h-index 11 (06/01/2026).

Toker, D., McCrimmon, C.M., Cao, Q., Pandey, A., Guzman, A., Shriram, A., Hudson, A., Monti, M.M., & Samarasinghe, R.A. Human brain assembloids model anaesthetic-induced neural dynamics. In press, *British Journal of Anaesthesia.*

Toker, D., Zheng, Z.S., Thum, J.A., Guang, J., Annen, J., Miyamoto, H., Yamakawa, K., Vespa, P.M., Laureys, S., Schnakers, C., Bari, A.A., Hudson, A., Pouratian, N., & Monti, M.M. (2026). Adversarial AI reveals mechanisms and treatments for disorders of consciousness. *Nature Neuroscience*.

Guzman, A. R., McCrimmon, C. M., **Toker, D.**, Novitch, B. G., Watanabe, M., & Samarasinghe, R. A. (2026). Protocol for characterization of spatiotemporal network dynamics in cortical and hippocampal assembloids. *STAR protocols*.

Toker, D., & Monti, M.M. (2025). Different diseases, same circuits: lessons from rare and overlooked causes of disorders of consciousness. *Brain Communications*.

McCrimmon, C.M.*, & **Toker, D.***, Pahos, M., Lozano, K., Lin, J.J., Parent, J., Tidball, A., Zheng, J., Molnár, L., Mody, I., Novitch, B.G., & Samarasinghe, R.A. (2025). Modeling cortical versus hippocampal network dysfunction in a human brain assembloid model of epilepsy and intellectual disability. *Cell Reports*.

** co-first authors, author order determined randomly*

Toker, D., Chiang, J.N., Vespa, P.M., Schnakers, C., & Monti, M.M. (2025). The dipeptidyl peptidase-4 inhibitor saxagliptin as a candidate treatment for disorders of consciousness: a deep learning and retrospective clinical analysis. *Neurocritical Care*.

Toker, D., Müller, E., Miyamoto, H., Riga, M.S., Lladó-Pelfort, L., Yamakawa, K., Artigas, F., Shine, J.M., Hudson, A., Pouratian, N., & Monti, M.M. (2024). Criticality supports cross-frequency cortical-thalamic information transfer during conscious states. *eLife*.

Thum, J.A., Malekmohammadi, M., **Toker, D.**, Sparks, H., Alijanpourotaghsara, A., Choi, J.W., Hudson, A.E., Monti, M.M., & Pouratian, N. (2024). Globus pallidus externus drives increase in network-wide alpha power with propofol-induced loss of consciousness in humans. *Cerebral Cortex*.

Frohlich, J., Crone, J.S., Mediano, P.A., **Toker, D.**, & Bor, D. (2023). Dissociations between neural activity and conscious state: a key to understanding consciousness. *Frontiers in Human Neuroscience*.

Frohlich, J., Chiang, J.N., Mediano, P.A., Nespeca, M., Saravanapandian, V., **Toker, D.**, Dell'Italia, J., Hipp, J.F., Jeste, S.S., Chu, C.J., & Bird, L.M. (2022). Neural complexity is a common denominator of human consciousness across diverse regimes of cortical dynamics. *Communications Biology*.

Toker, D., Pappas, I., Lendner, J.D., Frohlich, J., Mateos, D.M., Muthukumaraswamy, S., Carhart-Harris, R., Paff, M., Vespa, P.M., Monti, M.M., Sommer, F.T., Knight, R.T., & D'Esposito, M. (2022). Consciousness is supported by near-critical slow cortical electrodynamics. *Proceedings of the National Academy of Sciences*.

Frohlich, J., **Toker, D.**, & Monti, M.M. (2021). Consciousness among delta waves: a paradox? *Brain*.

Luppi, A.I., Cain, J., Spindler, L.R., Górska, U.J., **Toker, D.**, Hudson, A.E., Brown, E.N., Diringer, M.N., Stevens, R.D., Massimini, M., Monti, M.M., Stamatakis, E.A., & Boly, M. (2021). Mechanisms underlying disorders of consciousness: bridging gaps to move toward an integrated translational science. *Neurocritical Care*.

DiCesare, J.A., Malekmohammadi, M., Sparks, H., **Toker, D.**, Monti, M., Hudson, A., & Pouratian, N. (2020). Pallidocortical connectivity changes with anesthetic loss of consciousness in Parkinson's disease patients. *Neurosurgery*.

Toker, D., Sommer, F.T., & D'Esposito, M. (2020). A simple method for detecting chaos in nature. *Communications Biology*.

Jarreau, P., Cancellare, I., Carmichael, B., Porter, L., **Toker, D.**, & Yammine, S. (2019). Using selfies to challenge public stereotypes of scientists. *PLoS ONE*.

Toker, D., & Sommer, F.T. (2019). Information integration in large brain networks. *PLoS Computational Biology*.

Lositsky, O., Chen, J., **Toker, D.**, Honey, C.J., Poppenk, J., Hasson, U., & Norman, K. (2016). Neural pattern change during encoding of a narrative predicts retrospective time estimates. *eLife*.

Bishop, S.J., Aguirre, G.K., Nunez-Elizalde, A.O., & **Toker, D.** (2015). Seeing the world through non-rose-colored glasses: anxiety and the amygdala response to blended expressions. *Frontiers in Human Neuroscience*.

INVITED TALKS

Advancing coma research without animal models: human-derived and computational approaches. *Johns Hopkins 12th Annual 3Rs Symposium*, 2025.

Incretin-based therapies for disorders of consciousness: AI, retrospective observations, and preclinical data. *UC and Western Neurotrauma Symposium*, 2024.

Criticality supports thalamocortical information processing during conscious states. *USC MoBI Seminar Series*, 2023.

Edge-of-chaos criticality supports neural information processing during conscious states. *Tiny Blue Dot Foundation Annual Meeting*, Allen Brain Institute, 2022.

Putting measures of integrated information to the test. *Northern California Consciousness Conference*, 2016.

CONFERENCE PRESENTATIONS

Toker, D. Modeling cortical versus hippocampal network dysfunction in a human brain assembloid model of epilepsy and intellectual disability. *Cold Spring Harbor Laboratory Development and 3D Modeling of the Human Brain Conference*, 2024. (Selected talk)

Toker, D., McCrimmon, C., Pahos, M., Lozano, K., Molnár, L., Mody, I., Parent, J., Novitch, B.G., & Samarasinghe, R.A. SCN8A mutations and circuit-level dysfunction in DEE-13 hippocampal organoids. *American Epilepsy Society Annual Meeting*, 2023. (Poster)

Toker, D., Tobias, B., Lozano, K., Taitano-Johnson, C., Monti, M., Hudson, A., & Samarasinghe, R. Human cortical organoids recapitulate hallmarks of anesthesia. *International Anesthesia Research Society Annual Meeting*, 2023. (Poster)

Toker, D., Sommer, F., & D'Esposito, M. A simple method for detecting chaos (or its absence) in the brain. *Society for Neuroscience Annual Meeting*, 2019. (Poster)

Toker, D., & Sommer, F. Integrated information in large brain networks. *Society for Neuroscience Annual Meeting*, 2017. (Poster)

PATENTS

Wingeier, B., Lin, R., & **Toker, D.** (2021). "System and method for individualizing neuromodulation." U.S. Patent No. 11,097,097. Washington, DC: U.S. Patent and Trademark Office.

TECHNICAL SKILLS

Programming and machine learning: Python, PyTorch, scikit-learn, NumPy/SciPy, Matlab.

Neural data analysis: EEG and intracranial EEG analysis (FieldTrip), spectral and information-theoretic methods, biophysical neural-field and circuit modeling, genetic-algorithm optimization.

Genomics and wet-lab: single-nucleus RNA-seq analysis, human pluripotent stem-cell culture, brain organoid and assembloid generation, multielectrode-array recording, local field potential recording.

Clinical and translational data: electronic health record (EHR) phenotyping, retrospective cohort analysis, clinical-trial design.

Laboratory automation: robotic liquid handling and automated cell-culture workflows.

TEACHING AND MENTORING

Teaching

Graduate Student Instructor, **Circuits, Systems, and Behavioral Neuroscience**, UC Berkeley, 2018 (Instructors: Hillel Adesnik, Yang Dan, Kristin Scott).

- **Received UC Berkeley's Outstanding Graduate Student Instructor Award**

Graduate Student Instructor, **The Evolution of the Human Brain**, UC Berkeley, 2016 – 2017 (Instructor: Terrence Deacon).

Mentoring

Mentored junior post-doctoral fellows and graduate researchers at UCLA (2020 – present) in computational modeling, stem-cell culture, and brain-assembloid techniques. Trainee names: Alessandra Dalla Vecchia, Amman Klair, Madiha Mohsen Chowdhury

Mentored undergraduate researchers in computational neuroscience at UC Berkeley (2016 – 2019). Trainee names: Helen Kang, Nika Sepehri

LEADERSHIP AND SERVICE

Institutional

Academic Chair, UCLA Psychology Postdoctoral Committee, 2023 – 2025. Organized annual networking and career-development events for psychology postdocs across UCLA.

Peer Review and Editorial

Guest Editor, *Frontiers in Human Neuroscience*. Manuscript reviewer for *Brain*, *Neurology*, *NeuroImage*, *PLoS Computational Biology*, *Journal of Cognitive Neuroscience*, *Communications Biology*, *Patterns*, *Neuroscience of Consciousness*, *Entropy*, *PLoS ONE*, and *PLoS Mental Health*.

DIVERSITY, EQUITY, AND INCLUSION CONTRIBUTIONS

Inclusive mentorship. Founded and ran an online mentorship program (2022 – 2025) for students facing significant barriers to science related to gender identity, ethnicity, or limited access to resources in their home countries. Mentored diverse undergraduate, graduate, and incoming postdoctoral trainees across UCLA and UC Berkeley. Compiled and published resources for aspiring scientists who are disabled, international, or from underrepresented minority groups, distributed via thebrainscientist.com.

Inclusive science communication. Co-designed and ran a study on using social media to counter stereotypes of scientists (Jarreau et al., *PLoS ONE*, 2019). Highlight historical and contemporary contributions of marginalized groups to science on my social media platforms, and feature neuroscientists from underrepresented backgrounds on my podcast.

OUTREACH AND PUBLIC ENGAGEMENT

Writer, *Mind Field* documentary series (2017 – 2019); Daytime Emmy nomination for Outstanding Writing.

Science communication across social media platforms (combined audience of 197,000+), focusing on neuroscience and AI.

SELECTED MEDIA COVERAGE

Big Think, "Inside a neuroscientist's quest to cure coma" (2025).

Big Think, "Inside the search for a universal signature of unconsciousness" (2025).

Popular Mechanics, "We may finally have a 'cure' for coma" (2025).