# WILLIAM D. KISTLER, PHD

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## Profile

Biostatistics and clinical research professional with a PhD in Neuroscience from UCL and the NIH. Experienced in trial design, exploratory data analysis, and applied machine learning for patient phenotyping, outcome modeling, and rehabilitation analytics, including work on MindMaze MindPod therapy trials. Strong background in statistical modeling, clinical data integration, and scientific communication.

## Key Skills

**Statistical Methods:** Missing Data Analysis, Evidence Synthesis, Longitudinal Analysis

**Clinical Trials:** Trial Design, Protocol Development, Protocol Management, Statistical Analysis Plans (SAP), Biomarker Analysis

**Data Analysis:** Exploratory Data Analysis (EDA), Time Series Analysis, Signal Processing

**Programming:** Python, C, Git, Bash, Cython

**Tools & Libraries:** PyTorch, scikit-learn, Pandas, SimCLR, HDBSCAN, UMAP, GPT APIs

**Infrastructure:** GCP, Docker, Secure Access Management, API Design

**Collaboration:** Interdisciplinary Communication, Statistical Reporting, Scientific Writing

## Research Experience

2020–2025 - PhD Fellow, National Institute of Neurological Disorders and Stroke, NIH, Bethesda, MD

2015–2019 - Lab Manager, Immersive Virtual Environment Testing Area, NIH, Bethesda, MD

2015–2019 - Volunteer, Functional Applied Biomechanics Lab, NIH, Bethesda, MD

2013–2014 - Technician, Psychophysics Lab, American University, Washington, DC

2011–2012 - Assistant, Center for Behavioural Neuroscience, American University, Washington, DC

2007–2009 - Post-Baccalaureate IRTA Fellow, National Institute on Aging, NIH, Rockville, MD

2005–2007 - Assistant, Child Development Laboratory, University of Maryland, College Park, MD

2005–2007 - Assistant, Motor Development Research Group, University of Maryland, College Park, MD

## Education

2025 - PhD, Neuroscience, National Institutes of Health & University College London, U.S. & U.K.

2012 - M.A., Visual Perception and Neuroscience, American University, Washington DC, U.S.

2007 - B.S., Psychology, University of Maryland, College Park, MD, U.S.

## Teaching & Mentorship Experience

### Teaching

Fall 2024 - 5th Queen Square Movement Disorders Short Course, UCL QS IoN (Guest Lecturer)

Summer 2024 - 11th Upper Limb Neurorehabilitation Course, UCL QS IoN (Guest Lecturer)

Spring 2012 - Cognitive Neuroscience, American University (Teaching Assistant)

Spring 2007 - Developmental Biopsychology, University of Maryland (Teaching Assistant)

### Mentorships

Summer 2019 - Summer Internship Program in Biomedical Research (SIP), NIH - Mentor to Sara Flash (Machine Learning for Human Behaviour)

Summer 2017 - Summer Internship Program in Biomedical Research (SIP), NIH - Mentor to Benjamin Shapiro (Computational Biomechanics)

## Honours & Distinctions

2018 - G.R.E.A.T. Award, National Human Genome Research Institute, NIH

2016 - Distinguished Achievement Award, National Human Genome Research Institute, NIH

2012 - Graduate Research Fellowship Award, American University

2012 - Graduate Division Travel Award, American University

2012 - Dean's Outstanding Achievement Award, American University

2012 - 2nd Place, Best Illusion of the Year Contest, Vision Science Society

2011 - Outstanding Scholarship at the Graduate Level Award, American University

2007 - Cum Laude, University of Maryland

## Professional Memberships

Neural Information Processing Systems (NeurIPS) (2022–Present)

Neural Control of Movement (NCM) (2019–Present)

Society for Neuroscience (SFN) (2013–Present)

Institute of Electrical and Electronics Engineers (IEEE) (2013–Present)

Vision Science Society (VSS) (2011–2015)

## Presentations

### Oral

Kistler W. (2022). At-home patient assessments and the synthetic data problem. National Institute of Mental Health & University College London Research Seminar, London, UK.

Kistler W. (2019). Novel collection methods for behavioural data in the home and machine learning assisted analyses. National Institute of Mental Health & University College London Research Seminar, London, UK.

Kistler W, Xiao B. (2015). Perceptual dimensions of material properties of fabrics in dynamic scenes. Vision Science Society, St. Pete Beach, FL.

Kistler W, Shapiro A, Rose-Henig A. (2014). Separating motion responses in human vision. European Conference on Visual Perception, Belgrade, Serbia.

Kistler W, Engel L, Stogner M. (2012). Make believe: how media is made to matter. American University, Washington, DC.

## Poster

Kistler W, Fakhreddine R, Hayward M, Rodriguez G, Buch E, Bestmann S, Cohen LG. (2022). Kinematic synergies rapidly update to support procedural skill learning. Society for Neuroscience, San Diego, CA.

Kistler W, Fakhreddine R, Hayward M, Rodriguez G, Buch E, Bestmann S, Cohen LG. (2022). At-home characterization of kinematic synergies supporting procedural skill learning. Neural Control of Movement, Dublin, Ireland.

Kistler W, Goldsmith D, Brennan P. (2019). Virtual Reality: Exploring Methods to Improve Dietary Choices. American Medical Informatics Association.

Persky S, Kistler W. (2017). Virtual reality in healthcare communication research (and practice). International Conference on Communication in Healthcare, Baltimore, MD.

Kistler W, Persky S, Bouhlal S, Sypher A. (2015). The Immersive Virtual Environment Testing Area: a virtual tour. National Institutes of Health, National Human Genome Research Institute, Social Behavioral Research Branch Quadrennial Review, Bethesda, MD.

Kistler W, Shapiro A. (2014). Facial-feature changes are hard to track in the color wagon-wheel illusion. Vision Science Society, St. Pete Beach, FL.

Kistler W, Shapiro A, Rose-Henig A. (2014). Hypocycloid variations and apparent motion. Vision Science Society, St. Pete Beach, FL.

Kistler W, Xiao B. (2014). Perceptual dimensions of material properties in dynamic scenes. European Conference on Visual Perception, Belgrade, Serbia.

Kistler W. (2013). Im/Material: Human vision and the digital concern. Society for Cinema and Media Studies, Chicago, IL.

Shapiro A, Kistler W, Flynn O. (2013). Contrast-contrast asynchrony effects in human vision. Vision Science Society, Naples, FL.

Shapiro A, Kistler W, Rose-Henig A. (2012). The color wagon wheel. Vision Science Society, Naples, FL.

## Publications

### Journal Abstracts

Xiao, B., **Kistler, W.** (2015). Perceptual dimensions of material properties of fabrics in dynamic scenes. *Journal of Vision*, 15(12), 938. DOI

### Journal Articles

**Kistler, W.\***, Mangalmurti, A.\*, Quarrie, B., Sharp, W., Persky, S., Shaw, P. (2020). Using virtual reality to define the mechanisms that link symptoms to cognitive deficits in ADHD. *Scientific Reports.* DOI

Yaremych H. E., **Kistler, W.**, Trivedi N., Persky S. (2019). Path Tortuosity in Virtual Reality: A Novel Approach for Quantifying Behavioral Process in a Food Choice Context. *Cyberpsychology,*

*Behavior, and Social Networking.* DOI

Persky, S., Ferrer, R., Klein, W., Goldring, M. R., Cohen, R., **Kistler, W.**, Yaremych, H. E., Bouhlal, S. (2018). Effects of Fruit and Vegetable Feeding Messages on Mothers and Fathers. *Annals of Behavioral Medicine.* DOI

Persky, S., Goldring, M., Turner, S., Cohen, R., **Kistler, W.** (2018). Validity of Assessing Child Feeding with Virtual Reality. *Appetite.* DOI

Persky, S., **Kistler, W.**, Klein, W., Ferrer, R. (2018). Internet versus Virtual Reality Settings for Genomics Information Provision. *Cyberpsychology, Behavior, and Social Networking.* DOI.

**Book Chapters**

**Kistler, W.** (2016). *Color Wagon-Wheel Illusion.* The Oxford Compendium of Visual Illusions. Oxford University Press.

**Patents**

**Kistler, W.** (2017). A composite ellipsoidal device facilitating one or more manual therapies and the control of a computer monitor. Filed November 20, 2017. Patent Pending.

## Software & Projects

**Lucy: A Dementia-Friendly AI Companion**
(Python, PyTorch, Flask, Zero-Shot Classification, Encryption, RBAC)
Developed "Lucy," an AI-driven conversational companion designed to assist dementia patients by engaging in supportive dialogues and monitoring changes in speech patterns over time. Implemented context-aware filtering to prevent misaligned AI responses and integrated security measures such as encryption and role-based access control to protect patient data. Utilized zero-shot classification techniques to detect and block adversarial prompt attacks, ensuring AI safety and reliability. The application is deployed using Flask, providing caregivers with tools to track communication patterns. GitHub

**Juno: Machine-Learning-Enabled Patient Scheduler**
(Python, scikit-learn, Pandas, Flask, GPT-3, PyTest)
Developed "Juno," a machine-learning system designed to optimise scheduling and planning for motor and physical rehabilitation timetables. Implemented hierarchical clustering with Gower distance to group patients with similar impairments, enhancing rehabilitation outcomes. Integrated a GPT-3 powered interface, enabling physicians to query schedules, request explanations, and override assignments in real-time. Ensured traceability of manual scheduling adjustments through a structured override system. The application provides dynamic scheduling by adjusting therapy groups as new patient data becomes available and generates comprehensive reports, including cluster summaries and adjustment logs. Incorporated a robust logging system and a full test suite using PyTest to ensure reliability. GitHub

**Stella: Self-Supervised Learning for Clinical Phenotyping of Pose Data**
(Python, SimCLR, UMAP, HDBSCAN, 1D CNN, LSTM)
Developed "Stella," a machine learning pipeline designed for self-supervised phenotyping of upper limb motor impairment using pose data collected from patient homes. Leveraged SimCLR for self-supervised learning, combined with a 1D CNN and LSTM to capture both local and long-range dependencies in upper limb motion. Applied UMAP for dimensionality reduction and HDBSCAN for unsupervised clustering of movement patterns, providing clinicians with an automated tool for tracking motor recovery and tailoring rehabilitation strategies. The system generates clinician-friendly summaries and visualizations, and its modular design allows easy adaptation to different pose datasets. GitHub

## Volunteering

2022–2024 - Volunteer, National Head Injuries Association (Headway) *Developed community-based outreach questionnaires and programmes for individuals recovering from stroke and brain injury.*

2017–2020 - Interactive Technologies Consultant, The Children's INN at NIH *Worked with on-site staff to place and make functional new immersive technologies for children and families residing at the INN.*

2015–2019 - Research Volunteer, Functional Applied Biomechanics Lab, NIH *Supported research on motor rehabilitation strategies for individuals with movement impairments.*

2016–2019 - STEM Outreach Speaker, NIH *Conducted neuro- and behavioural science workshops for under-represented students, introducing concepts in behavioural quantification and hypothesis generation.*

2016 - Tutor, Code.org *Mentored students applying to University at the intersection of coding, statistics, machine learning, and the fundamentals of hypothesis testing with real world, human behavioural data.*

2016–2020 - Welcome Desk Aid, The Children's INN at NIH *Welcomed families from thirteen countries to their new residence while they remained with the NIH for research.*

2014 - Event Assistant, Cerebral Palsy Foundation *Assisted administrative staff before and after two fundraising events for new technologies to aid mobility for children with cerebral palsy.*