MADISON S. BARKER, PhD

□ Minneapolis, MN | madisonbarkerphd@gmail.com | ☏ 314.920.9179 | LinkedIn | UX Researcher| Mixed-Methods Researcher | Data Enthusiast

PhD-trained researcher with 9+ years of experience designing and leading user-centered studies that uncover how people communicate, process, and interact with information. Skilled in qualitative and quantitative research methods including interviews, surveys, usability studies, large-scale data collection, and advanced analytics. Experienced in leveraging NLP, machine learning, and computer vision to analyze speech, language, and visual data, and in translating findings into actionable insights.

Skills

Programming & Data Science: Python (pandas, NumPy, scikit-learn, statsmodels), R (lme4, ggplot2), MATLAB, SQL
Machine Learning & Statistics: Regression (linear, logistic), classification, clustering (k-means, decision trees, random forest), predictive modeling, PyTorch, TensorFlow (basic)
Natural Language Processing: spaCy, NLTK, WhisperAI (speech-to-text, prosody analysis), text classification, named entity recognition (NER), Whisper (OpenAI), Praat, Audacity
Computer Vision: OpenCV (image annotation, object detection, scene segmentation), Segment Anything
Research & Experimentation: A/B Testing, Statistical Analysis, Survey design, moderated & unmoderated usability studies, focus groups, user interviews, observational studies, psycholinguistic research, large-scale data collection, annotation pipelines, intercoder reliability, Qualtrics
Tools & Visualization: AWS, Tableau, Power BI, Git, LaTeX/Overleaf, Microsoft Office Suite, Adobe Creative Suite
Professional Strengths: Creative Problem Solving · Detail-Oriented · Mentoring · Tenacious · Fast Learner · Self-Motivated · Curious · Independent Contributor

EDUCATION

University of California, Davis || PhD in Psychology
Perception, Cognition and Cognitive Neuroscience Emphasis
Sept 2019 - Mar 2025

University of California, Davis || MA in Psychology
Sept 2019 – December 2021

University of Wisconsin-Madison || BA in Journalism
Sept 2015 - May 2018
Strategic Communications Emphasis

CERTIFICATIONS

• **SQL for Data Science** - *University of California, Davis* via Coursera, 2025

• **Fundamentals of Visualization with Tableau** – *University of California, Davis* via Coursera, 2025

• **Social & Behavioral Research** – *University of California, Davis* via CITI Program

SELECTED AWARDS & LEADERSHIP

Diverse Mentoring Initiative Award
UC-Davis (3x awardee; 2021-2023)
• Awarded for high quality engagement in mentoring and supporting underrepresented students in research and academia.

Duke's Travel Award for Academic Conferences
UC Davis (4x awardee, 2022-2024)
• Awarded funding to present important and novel independent research projects at academic conferences.

Dissertation Summer Research Fellowship (2022)
• Awarded 1 of 5 full-summer research funding to support independent dissertation research.

UG Research Scholar (2018)
• Awarded to undergraduate student who has produced an outstanding independent thesis project.

VOLUNTEERING

Psych Graduate Student Association
Vice President
• Organized and led academic conferences and fundraising events; collaborated across departments and external stakeholders to secure funding, manage logistics, and ensure compliance.
• Planned and executed quarterly fundraising events, collaborating with the financial officer to write small grants, manage budgets, and crowdsource funds to support departmental initiatives and academic events.

Psych Graduate Student Association
Event Coordinator & GSA Representative
• Led planning and execution of four major annual events, overseeing food and beverage sourcing, securing required licenses (venue, alcohol, noise), and managing fundraising initiatives to ensure continued university compliance and supportive funding.

WORK EXPERIENCE

University of California, Davis **Sept 2019 - March 2025**
Graduate Researcher

- Applied descriptive and advanced statistical analyses (regression, clustering, predictive modeling) to large datasets (>100k observations), identifying trends and anomalies that informed experimental and strategic decisions.
- Built multimodal data pipelines (MATLAB, Python, R) integrating text, speech, and image data; optimized data cleaning and transformation processes for high-quality, analysis-ready datasets.
- Developed dashboards and visualizations to communicate results to diverse audiences, ensuring clarity and alignment with project goals.
- Translated complex data insights into actionable recommendations, supporting decision-making and resource allocation across teams.

University of California, Davis **Sept 2019 – Dec 2024**
Graduate Teaching Assistant

- Translated advanced statistical and research concepts into accessible presentations for 300+ students, strengthening analytical and data literacy skills.
- Designed and iterated assessment tools to measure applied data interpretation, improving clarity and decision-making in educational contexts.

University of Wisconsin-Madison **May 2018 – July 2019**
Project Lead

- Designed and maintained a large-scale research database, applying statistical analyses to identify interdisciplinary collaboration trends.
- Conducted descriptive statistics and data visualization of co-authorship networks to uncover patterns and opportunities for strategic partnerships.
- Produced practitioner-focused reports that translated complex data into actionable insights.

University of Wisconsin-Madison **Jan 2016 – May 2018**
Undergraduate Researcher
• Identified knowledge gaps in language processing and conceived an independent research project, pitching the design to faculty mentors for approval.
• Defined research goals by scoping hypotheses, drafting IRB protocols, and planning participant recruitment strategies.
• Designed and developed experimental tools, programming tasks in PsychoPy and automating stimulus presentation with Python pipelines.
• Tested hypotheses through data collection and analysis, applying reaction time and error-rate measures to evaluate participant performance.

SELECTED PROJECTS

Project: Prosody in Naturalistic Speech
Tools: WhisperAI, spaCy, Wavelet Prosody Toolkit, Python, R
• Explored how prosody shapes unrehearsed speech, identifying gaps in existing theories focused on idealized, competence-based performance.
• Specified the need for a scalable method to quantify prosodic boundaries across spontaneous multi-utterance discourse.
• Adapted existing pipelines (WhisperAI transcription, spaCy parsing, Wavelet Prosody Toolkit) to process >900 scene descriptions from 30 participants.
• Applied quantitative analyses to align syntactic and prosodic boundaries, revealing ~50% mismatches.
• Produced a structured dataset and novel insights into performance-driven prosody (speech rate, pre-boundary lengthening, phrase-initial acceleration), informing speech-synthesis applications.

Project: Visual Scene Clustering in Language Production
Tools: OpenCV, AnyLabeling, Segment Anything, WhisperAI, ConceptNet Numberbatch, Python, R
• Investigated how speakers plan descriptions of visually complex indoor/outdoor scenes.
• Identified the need for a framework to link scene structure with linguistic sequencing in discourse.
• Built a multimodal pipeline integrating CV + NLP: segmented >900 objects with OpenCV/Segment Anything, transcribed speech with WhisperAI, and extracted semantic features with ConceptNet embeddings.
• Computed spatial and semantic similarity metrics to cluster objects; observed that within-cluster mentions occurred faster than cross-cluster shifts.
• Delivered a scalable CV+ASR+NLP framework supporting a foraging-based model of discourse planning and adaptable to multimodal AI, VQA, and HCI research.

Project: Multimodal Alignment of Speech, Vision, and Eye Movements
Tools: WhisperAI, spaCy, Python, OpenCV, KMeans, Eyetracking Analytics
• Explored how gaze patterns and event structure shape spoken scene descriptions.
• Established research goals to map alignment between linguistic event boundaries, visual objects, and eye movements.
• Developed a multimodal pipeline: amplified audio + WhisperAI transcripts, spaCy dependency parsing for event segmentation, and KMeans clustering of object centroids to generate Areas of Interest (AOIs).
• Integrated AOIs with eye-tracking data; modeled event structure and identified animacy as the strongest predictor of order of mention.
• Provided an integrated speech-vision-eye movement framework with implications for cognitive science and multimodal AI applications.