Melanie Bancilhon, Ph.D.

Postdoctoral Research Scientist, Humans in Complex Systems, Army Research Laboratories
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Interdisciplinary Researcher with strong expertise in human-computer interaction, data visualization, human-AI teaming and decision-making. My work explores how individual differences shape behavior and performance across complex cognitive and interactive tasks.

RESEARCH INTERESTS

HCI | Human-AI Teaming | Data visualization | Visual Search | Cognition & Perception | Behavioral Science | Interactive Interfaces | Uncertainty Communication | User-Centered Design | Explainable AI

EDUCATION

Washington University in St. Louis August 2019 - May 2024
Ph.D. in Computer Science

Smith College
B.A. Computer Science and Architecture August 2015 - May 2019

RESEARCH EXPERIENCE

Postdoctoral Research Fellow August 2024 - Present
Army Research Laboratory & George Washington University | *Humans in Complex Systems, Washington DC*

- Conducted end-to-end research to uncover behavioral patterns in human-AI teaming.
- Designed and administered quantitative online behavioral assessments (HTML/ JS/ CSS/ Qualtrics) to investigate how individual differences in personality and cognitive traits impact performance and reliance on AI-augmented CAD in visual search tasks.
- Led AWS server management and the creation of new data processing pipelines, analytics, statistical modeling and data visualizations (Python/ R/ Excel).
- Fostered cross-institutional collaboration between academic and government stakeholders to advance applied human-AI interaction research.
- Managed SQL database containing big data from ~15.6M users of a visual search mobile game simulating airport security screening, ensuring data accessibility and integrity.

Research Intern June 2023 - August 2023
IBM | *AI, Yorktown Heights NY*

- Conducted in-depth interviews with software engineers to understand their use of existing microservice recommendation tools.
- Applied content and thematic analysis to uncover key pain points, including information overload, insufficient granularity and lack of explainability in existing microservice recommendation tools.
- Designed a human-in-the-loop framework for the AI-based system CARGO, enabling real-time refinement of microservice boundaries through user-driven labeling.
- Developed an interactive UI prototype integrating data visualizations (HTML/CSS/JS/D3.js) to support the proposed framework, facilitating drill-down exploration, uncertainty communication and human-centered functionalities.
- Designed and led usability testing and cognitive walkthroughs of the developed prototype with software engineers, using case

studies to evaluate real-world development workflows, resulting in key improvements in usability and effectiveness.

Research Intern June 2022 - August 2022
Adobe | *Document Intelligence, San Jose CA*

• Conducted in-depth interviews with knowledge workers to understand how they review contracts, identify workflow challenges, and evaluate their perceptions of AI-based contract reviewing tools.
• Designed a human-AI reviewing framework that facilitates high-stakes decision-making while reducing annotation time and mitigating cognitive demands.
• Developed a mixed-initiative UI prototype (HTML/CSS/JS/Dash.js) enabling knowledge workers to strategically inspect contracts using AI-generated clause predictions.

Research Intern June 2018 - August 2018
Nokia Bell Labs | Social Dynamics, Cambridge UK

• Conducted large-scale data mining and geospatial analysis to uncover historical, cultural, and societal patterns embedded in the naming of urban streets across major global cities
• Developed a data pipeline to extract, clean, and enrich street name datasets using natural language processing and entity linking with external knowledge bases (e.g., Wikidata)
• Identified geographic and temporal disparities in representation (e.g., gender imbalance in commemorative naming) and highlighted how urban toponymy reflects local values, politics, and identity

PhD Researcher in Human-Computer Interaction August 2019 - May 2024
Washington University in St. Louis | *St. Louis MO*

• Uncovered novel scientific insights on the impact of individual differences (i.e. spatial ability, numeracy, general risk propensity, working memory capacity) and situational factors (i.e. workload, time pressure) on perception, reasoning and decision-making
• Communicated research insights through papers, presentations and talks at top-tier conferences (ACM CHI, IEEE VIS, AAAI ICAPS).
• Developed ecologically valid novel gamified experiments to uncover how human factors mediate the effect of data visualizations on decision-making
• Modeled behavioral insights using statistical and computational methods to uncover decision-making patterns and quantify the role of individual differences.
• Mentored three junior researchers in experimental design, web programming (HTML, JavaScript, CSS), statistical analysis (R, Python) for large-scale online studies, and effective communication of technical results.
• Lectured and mentored a class of ~30 undergraduates in an introductory data visualization course, covering research methods and interactive dashboard design (D3.js, HTML, JavaScript).

PUBLICATIONS

Conference Proceedings

The Anatomy of a Plea: How Uncertainty, Visualizations & Individual Differences Shape Plea Bargain Decisions
Bancilhon M., Ottley A. & Jordan. A.
Proceedings of the ACM Conference on Human Factors in Computing Systems (CHI), 2025

Trust Calibration for Joint Human-AI Decision-making in Dynamic and Uncertain Contexts
Marusich L., Files B., **Bancilhon M.**, Rawal J., Raglin A.
Proceedings of the 27th International Conference on Human-Computer Interaction (HCII), 2025.

Why Combining Text and Visualization Could Improve Bayesian Reasoning: A Cognitive Load Perspective

Bancilhon M., Wright AJ., Sunwoo H., Crouser R J. & Ottley A.
ACM Conference on Human Factors in Computing Systems (CHI), 2023.

VizXP: A Visualization Framework for Conveying Explanations to Users in Model Reconciliation Problems
Kumar A., Vasileiou S., **Bancilhon M.**, Ottley A. & Yeoh W.
Proceedings of the International Conference on Automated Planning and Scheduling (ICAPS), 2021.

Let's Gamble: How a Poor Visualization Can Elicit Risk Behavior.
Bancilhon, M., Liu, Z. & Ottley, A.
IEEE Visualization Conference Short Papers, 2020.

Journal articles

Streetonomics: Quantifying culture using street names
Bancilhon M., Constantinides M., Bogucka EP., Aiello LM. & Quercia D.
PLoS ONE, 16(6): e0252869, 2021.

Cartographic Design of Cultural Maps
Bogucka, E.P., Constantinides, M., Aiello, L.M, Quercia, D., So, W. & **Bancilhon, M**.
IEEE Computer Graphics and Applications, 2020.

Workshop Papers

Beyond English: Centering Multilingualism in Data Visualization
Rakotondravony, N., Dhawka, P., & **Bancilhon, M**.
IEEE VIS Workshop on Visualization for Social Good, 2023.

Did You Get The Gist Of It? Understanding How Visualization Impacts Decision-Making.
Bancilhon, M. & Ottley, A.
IEEE VIS Workshop on Visualization Psychology, 2020.

Expectation Versus Reality: The Failed Evaluation of a Mixed-Initiative Visualization System
Ha, S., **Bancilhon, M**. & Ottley, A.
IEEE VIS Fail Fest: A Workshop on Celebrating the Scientific Value of Failure, 2020.

Book Chapters

Toward an Optimized Human-AI Reviewing Strategy for Contract Inspection
Bancilhon M., Siu A., Rossi R. & Lipka N.
The New Era of Business Intelligence, IntechOpen, 2024.

Improving Evaluation Using Visualization Decision-Making Models: A Practical Guide
Bancilhon, M., Padilla, L., Ottley, A.
In Visualization Psychology, Springer, 2023.

SKILLS

- Survey & Research Methods: Qualtrics | Survey Design | Quantitative Research | Qualitative Research | Usability Testing | User Interviews | Participatory Design
- Data Analysis & Visualization: Excel | Tableau | Data Visualization | Inferential Statistics | Machine Learning | Artificial Intelligence
- Programming & Development: Python | R | JavaScript | SPSS | HTML/CSS | SQL | PHP | Node.js | Swift | d3.js | Dash.js
- Prototyping & UI/UX: Interactive Interfaces | Rapid Prototyping | UI/UX | Human-AI Teaming
- Platforms & Tools: Git | AWS | Linux

• **Languages:** English (Bilingual Proficiency) | French (Native)

AWARDS & DISTINCTIONS

• IEEE VIS Inclusivity and Diversity Scholar (2022)
• Grace Hopper Celebration Scholar (2018)
• NSF SCH Workshop Smart Health in the AI and COVID Era Student Awardee (2021)

SERVICE & COMMUNITY

• Reviewer (ACM CHI, IEEE VIS, IEEE TVCG, CSCW, EuroVis, CRPI)
• Organizer (IEEE Visualization for Communication Workshop, EuroVis Short Papers International Program Committee)
• Outreach and Diversity (WashU First Gen Program Mentor, WashU Graduate Student Senate Representative, Tapia Conference Mentor, BrightPath STEAM Mentor)