

Jennifer Bertrand, PhD

Experimental HCI Researcher | Perception, Movement and Multimodal Interaction

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Currently based in Lille, France | Returning to Canada in early 2027 | Open to relocation

SUMMARY

Experimental HCI researcher with 10+ years of experience and a PhD in Neuroscience and Kinesiology, studying how visual perception and human movement shape interaction. Combines psychophysics, biomechanics, eye tracking, and multimodal sensing across touch, haptics, VR/AR, and digital health. Leads work end to end—from framing open-ended research and product questions and building experimental systems, through complex human studies and multimodal analysis, to translating findings into validated measures, usable technologies, and practical design decisions.

RESEARCH AND TECHNICAL SKILLS

Research Expertise: Cognitive science; human behaviour; visual perception; psychophysics; perception-action; eye-hand coordination; human movement and biomechanics; HCI; haptics

Study Design & Methods: Experimental design; protocol development and piloting; quantitative human-subject research; mixed-methods user research; laboratory, remote, browser-based, and crowdsourced data collection; metric development

Sensing & Prototyping: Laboratory and webcam eye tracking; optical and markerless motion capture; EEG; wearables; multimodal sensor integration and synchronization; VR/AR/MR; touchscreen, haptic, mobile, and cross-device systems

Data & Statistics: Advanced statistical modeling and inference; time-series and signal analysis; power and equivalence analysis; data quality and validation; reproducible analysis pipelines; data visualization

Software & Tools: Python; R; MATLAB; Unity; Git/GitHub; SQL; Figma; Labvanced; AI-assisted research, prototyping, and coding workflows

PROFESSIONAL EXPERIENCE

Postdoctoral Researcher - Experimental HCI and Multimodal Interaction

Oct. 2025 - Present

CNRS / CRIStAL, University of Lille

Lille, France

- Lead experimental HCI research examining gaze-hand coordination and multimodal feedback across direct-touch, virtual reality, augmented reality, and large-display interfaces.
- Design and execute controlled studies combining eye tracking, movement tracking, touch, haptics, and controller input to characterize how perception and action unfold and adapt during interactive tasks.
- Built a Python-based touchscreen research platform, extended Unity VR/AR systems, and integrated Magic Leap eye tracking with an ultrasonic haptic display using a custom synchronization workflow.
- Developed end-to-end data cleaning and analysis pipelines in MATLAB, Python, and R, introducing event-based measures that reveal how interaction strategies change beyond what overall movement time and accuracy capture.
- Translate behavioural findings into design guidance for multimodal interaction, identifying how feedback timing, haptic support, target demands, and interaction technique shape performance and eye-hand coordination.

Alberta Innovates Digital Health Innovation Postdoctoral Fellow

Feb. 2024 - Sept. 2025

Department of Medicine, University of Alberta

Edmonton, Canada

- Served as research and product lead for Ameya, a multimodal health-assessment platform developed through a \$500K+ Alberta Innovates-funded initiative for older adults with chronic disease.
- Led the scientific development and validation of automated markerless-motion-capture scoring for seven standardized physical-performance assessments, achieving good-to-excellent agreement with expert scoring and only 3.1% technology-related data loss.
- Led a 228-participant multimodal validation study end to end, integrating movement assessments, multiday wearables and nutrition data, surveys, and health records while coordinating participant operations, research staff, and data quality across modalities and maintaining 95% adherence.
- Directed product requirements and patient and clinician workflows across at-home movement testing, wearable sensing, nutrition tracking, dashboards, and reports, translating user research into wireframes and implementation guidance for a distributed 10+ person development team.

PROFESSIONAL EXPERIENCE CONTINUED

Graduate Researcher - Perception, Movement and Human-Computer Interaction

Sept. 2015 - Oct. 2023

Actions in Complex Environments Laboratory, University of Alberta

Edmonton, Canada

- Independently led the design, implementation, analysis, and communication of 10+ human studies examining visual perception, decision-making, movement, and digital interaction across more than 500 participants.
- Designed psychophysical and visuomotor experiments combining eye tracking, motion capture, EEG, and behavioural responses, and developed custom MATLAB pipelines for high-density gaze, neural, movement, cursor, and touchscreen time series.
- Transformed laboratory paradigms into scalable, unsupervised online experiments, including two hour-long webcam eye-tracking studies with 150 participants, extending complex perceptual and visuomotor research beyond the laboratory while maintaining participant engagement and data quality.
- Established a new laboratory's eye-tracking, motion-capture, and EEG infrastructure and trained or mentored 15+ junior researchers in experimental methods and participant testing.

PhD Intern - Product Research and Design

Sept. 2021 - Oct. 2022

Scicoverly GmbH (Labvanced and PageGazer)

Remote (Germany)

- Initiated and secured a \$45K MITACS-funded year-long industry R&D partnership with Scicoverly after developing deep expertise with its Labvanced research platform.
- Led day-to-day PageGazer product development, directing a distributed early-stage team of two developers, a graphic designer, and a support specialist under the CEO's supervision.
- Owned the product's research and UX direction, translating webcam eye-tracking methods and user and researcher needs into prioritized requirements, user flows, Figma wireframes, analysis metrics, dashboards, documentation, and advanced-user guidance.

EDUCATION

PhD, Neuroscience and Kinesiology | University of Alberta | **2023**

MSc, Neuroscience and Kinesiology | University of Alberta | **2017**

BSc, Kinesiology | University of Alberta | **2015**

SELECTED PUBLICATIONS AND MANUSCRIPTS

Bertrand, J.K., et al. (2026). Validation of a markerless motion capture app for automated scoring of standardized physical-performance tests. *PLOS Digital Health*.

Ouellette Zuk, A.A., **Bertrand, J.K.**, and Chapman, C.S. (2025). Continuous measures of decision-difficulty captured remotely: Mouse-tracking sensitivity extends to tablets and smartphones. *Computers in Human Behavior*.

Bertrand, J.K., and Chapman, C.S. (2023). Dynamics of eye-hand coordination are flexibly preserved in eye-cursor coordination during an online, digital object-interaction task. *ACM CHI*.

Bertrand, J.K., Wispinski, N.J., Mathewson, K.E., and Chapman, C.S. (2018). Entrainment of theta, not alpha, oscillations is predictive of brightness enhancement of a flickering stimulus. *Scientific Reports*.

Bertrand, J.K., and Rekik, Y. How haptic feedback shapes eye-hand coordination in direct-touch drag-and-drop. *Under review, ACM CHI 2027*.

Bertrand, J.K., and Rekik, Y. Characterizing the dynamics of eye-hand coordination in sequential touchscreen drag-and-drop interactions. *In revision, ACM ISS 2027*.

Additional current research: two ACM ISS 2027 manuscripts in revision on large-display pointing and in-pocket haptics; manuscripts in progress on VR/AR eye-hand coordination, multidimensional frailty, clinical movement kinematics, and webcam eye-tracking of decision difficulty.