

Exponent®
Engineering & Scientific Consulting

Rachel Kelly, Ph.D.

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Professional Profile

Rachel Kelly, Ph.D., is an Exponent principal scientist and director of the User Sciences practice. She has over two decades of experience in human factors consulting, user research, usability, warnings and risk communication, and driver and pedestrian behavior. She advises manufacturers, product developers, and legal teams on understanding how people interact with products and technologies.

Dr. Kelly's experience spans consumer products, medical devices, wearables, and emerging technologies. Her work includes the design and execution of human subject research, usability and behavioral studies, and the application of human factors principles to product safety and litigation matters. She has served as a testifying expert on human factors issues in state and federal courts.

Consumer Product Human Factors

Dr. Kelly advises consumer product manufacturers, insurers, and legal counsel on how people perceive, understand, and interact with products, instructions, and safety information. Her consulting work spans research design, data collection, usability evaluation, and behavioral analysis across a wide range of products, from household appliances and industrial equipment to wearable technologies and digital health devices.

Dr. Kelly evaluates how users interact with products in real-world environments, applying human factors, cognitive science, and human performance principles to understand user behavior, product usability, and safe and intended use. Her work supports clients throughout the product lifecycle from user research and product design and evaluation to product safety, recalls, and product liability matters.

Medical Device Usability Research

Dr. Kelly supports medical device manufacturers and regulatory teams in designing and executing human factors and usability studies that are consistent with FDA guidance, including use-related risk analysis, formative evaluations, and human factors validation studies. Her expertise spans the full usability engineering lifecycle, from identifying intended users, use environments, use-related hazards, and critical tasks through protocol development, participant recruitment, data collection, and human factors validation testing.

She has conducted domestic and international usability studies evaluating how patients, caregivers, and healthcare professionals interact with devices across a range of therapeutic areas. Her work helps manufacturers demonstrate that intended users can use devices safely and effectively, supporting regulatory submissions, including 510(k) premarket notifications, De Novo classification requests, premarket approval (PMA) applications, and postmarket surveillance programs.

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Warnings and Safety Information Consulting

Dr. Kelly is a human factors expert with extensive experience in warnings, safety labels, and risk communication, evaluating how people notice, read, understand, and respond to warnings and safety information. She assesses consumer and industrial product warnings, instructions for use, and safety data sheets in the context of applicable standards and relevant industry guidance.

In litigation contexts, she provides technical expertise related to failure-to-warn claims, including the conspicuity and comprehensibility of warnings and the extent to which safety information supports appropriate user behavior. Her work applies principles of human perception, cognition, and behavior to help legal teams and manufacturers evaluate warning adequacy from a human factors perspective and understand how users perceive and respond to safety information.

Driver and Pedestrian Behavior Research

Dr. Kelly applies her expertise in perception, attention, and decision-making to the analysis of motor vehicle accidents and pedestrian incidents. She evaluates driver and pedestrian behavior in the context of visibility conditions, distraction, perception-reaction time, and situational awareness, drawing on established human factors principles and scientific research to evaluate the information that may have been available to road users and the perceptual and cognitive factors that may have affected their responses under the conditions experienced. Her analyses support personal injury, product liability, and premises liability matters involving automobiles, commercial vehicles, cyclists, and pedestrians, and she has served as a testifying human factors expert in matters involving driver and pedestrian behavior.

Academic Credentials & Professional Honors

Ph.D., Applied Physiology, Georgia Institute of Technology, 2015

B.S., Psychology, Georgia Institute of Technology, 2009

NIH Fellow for Prosthetics and Orthotics Research Training, 2012-2015

Georgia Institute of Technology Presidential Scholarship, 2010-2014

Georgia Tech (GTRIC) Travel Award, 2011

Academic Appointments

Visiting Professor, Georgia State University, 2015

Program Instructor, Anatomy, Physiology, and Medical Ethics, Duke TIP, 2015

Professional Affiliations

Digital Medicine Society (DiME)

Consumer Technology Association (CTA)

Human Factors and Ergonomics Society (HFES)

American Psychological Association (APA)

Publications

Keale JH, Freeman TR, Sala JB, Kelly RL. Simple vs. Detailed: Inherent Tension in Warning Design. Industry Today 2021.

Mizelle JC, Kelly RL, Wheaton LA. Ventral encoding of functional affordances: A neural pathway for identifying errors in action. Brain Cogn 2013; 82:274-282.

Kelly RL, Wheaton LA. Differential mechanisms of action understanding in left and right-handed subjects: the role of perspective and handedness. Front Psychol 2013; 4:957.

Kelly RL, Mizelle JC, Wheaton LA. Distinctive laterality of neural networks supporting action understanding in left- and right-handed individuals: an EEG coherence study. Neuropsychologia 2015; 75:20-29.

Presentations and Published Abstracts

Kelly R. Understanding the neurophysiology of action interpretation in right and left-handed individuals. Presented at the School of Applied Physiology on March 13, 2015. Dissertation defense.

Kelly R. Cortico-muscular network dependent on hand seen during action recognition. Presented at the School of Applied Physiology Brown Bag meeting on November 05, 2014.

Kelly R. Understanding the action encoding system: Towards a neurophysiological model of the motor simulation process. Presented at the School of Applied Physiology on March 05, 2014. Proposal presentation.

Kelly R. Handedness and perspective on action recognition: towards a neurophysiological model. Presented at the School of Applied Physiology Brown Bag meeting on December 2013.

Kelly R. Perspective and handedness on action recognition: towards a neurophysiological model of action simulation. Presented at the School of Applied Physiology Brown Bag meeting on February 27, 2013.

Kelly R. The progression of learning tool function through action recognition. Presented at the School of Applied Physiology Brown Bag meeting in March 2012.

Kelly ., Wheaton LA. Cortico-muscular network dependent on handedness and perspective during action recognition: Towards a neurophysiological model of action simulation. The Society for Neuroscience Annual Meeting in Washington, DC, November 15-19, 2014.

Kelly R, Mizelle JC, Wheaton LA. Effects of handedness and perspective during action recognition: towards a neurophysiological model of action simulation. GTRIC poster competition in Atlanta, GA, March 18, 2014.

Kelly R, Wheaton LA. Handedness and perspective during action recognition: towards a neurophysiological model of action simulation. The Society for Neuroscience Annual Meeting in San Diego, CA, October 12-17, 2013.

Mizelle JC, Kelly, R., Wheaton LA. A role for ventral stream brain areas in understanding errors in tool manipulation. The Society for Neuroscience Annual Meeting in San Diego, CA, October 12-17, 2013.

Kelly R, Wheaton LA. Looking at understanding the influence of perspective on handedness in action recognition in right handed subjects. The Cognitive Neuroscience Society meeting poster competition in San Francisco, CA, April, 2013.

Kelly R, Wheaton LA. Understanding the influence of perspective on handedness in action recognition. GTRIC poster competition in Atlanta, GA, February 12, 2013.

Kelly R, Wheaton LA. The Influence of perspective on handedness in action recognition. The Society for Neuroscience Annual Meeting in New Orleans, LA, October 12-17, 2012

Kelly R, Wheaton LA. The role of perspective and handedness in action recognition. GTRIC poster competition, Atlanta, GA, February 7, 2012.

Kelly R, Mizelle JC, Wheaton LA. Neuroimaging analysis of the functional understanding of tools. The Society for Neuroscience Annual Meeting in Washington D.C., November16-20, 2011.