

Katherine M. Rahill

Education

Ph.D. Applied-Experimental Psychophysics

July 2019

Concentration: Lunar Psychophysics
The Catholic University of America

M.A. Human Factors

January 2016

Concentration: VR Modeling
The Catholic University of America

B.S. Psychology

May 2013

Minor: Biology
The University of Dayton

Research Experience

National Aeronautics and Space Administration, Houston, TX

April 2020-Present

NASA Johnson Space Center
Human Research Program
Senior Scientist

- Senior Scientist for NASA's Human Research Program (HRP); directly report to NASA HRP Chief Scientist providing expert recommendations on Medical, Space Radiation, Human Factors and Behavioral Performance and Human Health Countermeasures.
- Lead Scientist for NASA's Research Announcement Research Program responsible for soliciting, selecting and awarding NASA funded research projects for all scientific elements in HRP.
- Leading integrative research across HRP scientific elements to inform NASA's decisions concerning approaches and strategies to mitigate the risk of deleterious physiological effects associated with long duration spaceflight.
- Monitoring human health and performance risks in NASA astronauts and provide strategic planning of integrated approaches to reduce those risks.
- Leading a team of NASA scientists to support Antarctic Trek in 2021 to support efforts in monitoring physiological, psychological and biological changes in response to stress over 2,000 mile/80-day expedition.

Aug 2019 – Mar 2020

The University of Central Florida, Orlando, FL

Department of Industrial Engineering and Management Systems
Laboratory for Autonomy Brain-Exchange (LabX)
Preeminent Postdoctoral Scholar

- Specialized in virtual modeling and simulation of Rayleigh and Complex Particle Light Scattering; these models supported ongoing need to better understand long-term impacts of changes in atmospheric scattering conditions (lunar and exoplanetary) on sensory perception within Applied Psychophysics/Engineering Psychology.
- Developed additional studies to expand dissertation findings on lunar psychophysics to further model psychophysical changes in extraterrestrial environments.
- Established a strong, diverse research group of graduate and undergraduate students dedicated to learning and implementing Virtual Reality modeling and simulations into engineering and technology.
- Engaged in collaborative work with USAFA and US Military Academy examining technology effectiveness to support multi-domain operations in line with the Army's Synthetic Training Environment Cross-functional Teams
- Postdoctoral research awarded 3rd place at NASA Human Research Program Investigator's Workshop Conference in 2020.

The Catholic University of America, Washington, D.C.
Department of Applied-Experimental Psychology
Lunar Psychophysics Virtual Reality Laboratory
PhD Candidate, Lab Director

Aug 2016-July 2019

- Founder/Director of Lunar Psychophysics Virtual Reality Laboratory; independently supervised 17 research assistants and 5 lab managers during Ph.D. candidacy for 2 years.
- Dissertation introduced **“lunar psychophysics”**: the study of optical properties of light on the Moon to study the underlying causes of the perceptual challenges experienced by Apollo astronauts.
- Presented new interdisciplinary work in VR to examine complex particle light scattering (CPLS) on ecological/biological structures of human perception on the Moon.
- Integrated applied models in atmospheric physics in VR to simulate the visual effects of non-lambertian reflectance properties of lunar regolith.
- Examined perceptual distortions of texture gradients, aerial perspective, linear declination and kinetic depth in Earth-like and Lunar-like conditions.
- Practical implications include the discussion of new methods with which to make accurate judgments, the development of training protocols and instruments to aid in overcoming future navigational difficulties.
- Received Outstanding Graduate Student Poster Award at CUA Research Day in 2017.
- Presented preliminary findings at NASA’s Annual Human Research Program Investigators’ Meeting in 2018.
- Research featured in Singularity University’s 2018 article: **“How One Researcher is Using VR to Help Our Eyes Adapt to Seeing in Space.”**

U.S. Army, Ft. Belvoir, VA
Army Research Institute for Behavioral and Social Sciences
Consortium Research Fellows Program
Doctoral Research Fellow

Aug 2013-Aug 2018

- Selected by the 2014 U.S. Army Chief of Staff's Strategic Studies Group (SSG) to participate in their review of Sikorsky's manufacturing contract for U.S. Military and Presidential aircraft.
- Participated in collaborations with NASA's team effectiveness and performance research programs for long duration space missions.
- Developed the Army Specific Items Module as an addendum to the existing DEOCS that is currently used by all Military services; operationalized 13 unidimensional constructs of Command Climate for the Army.
- Conducted research on the psychometric properties of organizational survey data and potential benefits of applying alternative approaches in survey design to reduce survey fatigue and increase response rates in the U.S. Army.
- Participated in the development of an integrative and comprehensive approaches to enhance unit performance, readiness and resilience.
- Developed a feasible application for learning management systems and online training programs to provide an accurate measure of skill-based predictors of performance and optimization of technology- delivered training environments in U.S. Army.

The Catholic University of America, Washington, D.C.
Department of A/E Psychology
Cognition and Virtual Reality Laboratory
Graduate Student/Researcher

Aug 2013-Dec 2015

- M.A. thesis work investigated the extraction of user characteristics in avatar modeling for virtual environments
- Thesis proposal awarded 2014 APAGS Junior Scientist Fellowship Grant
- Results provided quantitative estimates of the degree to which VE simulations can be individualized for high performance and minimal error practices.
- Theoretical contributions of thesis work address significant methodological gaps in the literature; expanded upon original heuristic-based conceptual models of presence and performance in VR.
- Thesis introduced a new operational definition of a personally adaptive VE in identifying the virtual elements that should be present, absent or accentuated in VE designs.

George Mason University, Fairfax, VA
Department of Psychology
Cerebral Hemodynamics Laboratory
Graduate Student/Researcher

Sept 2014-May 2015

- Collaborated with the Center of Excellence in Neuroergonomics, Technology and Cognition (CENTEC) to investigate the underlying factors of the vigilance performance decrement using Transcranial Doppler Sonography (TDS).
- Collected TDS data to analyze changes in cerebral blood flow velocity (CBFV) during vigilance/sustained attention tasks.
- Successfully developed a baseline measure of CBFV to quantify the rate of performance decrements in single, dual-task, and multi-tasking scenarios.
- Integrated a series of additional neural-based techniques, including electroencephalography (EEG), optical tracking and electric potential measurements to observe trends in physiological and cortical activity that attribute to individual differences in cognitive performance.

U.S. Air Force, Wright-Patterson Air Force Base, OH
Air Force Research Laboratory, 711th Human Performance Wing
War-Fighter Interface Division, Battlespace Acoustics Branch
Multi-Modal Communications Laboratory
Undergraduate Researcher/Lab Technician

May 2012-Aug 2013

- Awarded a three-month SCEP summer internship and subsequent 1-year ORISE undergraduate research fellowship to conduct research at AFRL.
- Oversaw the completion of five research studies in the Multi-Modal Communications Research Laboratory in the War-fighter Interface Division.
- Participated in a variety of mission-critical simulations to help flight controllers coordinate with multiple aircraft in dynamic, high stress environments.
- Responsible for troubleshooting all technical based data collection; acquired the technical skills to organize, analyze, interpret, and evaluate scientific data to develop solutions to system engineering problems related to human performance.
- Specialized in the development of multimodal communication and spatial audio displays for a network- centric communication management suite for command and control operators.
- Developed cyber interface tools to manipulate and experiment factors within human performance in cognitive multitasking; created software solutions for cyber security via experimentation of cyber disruption on team biases.
- Developed a post-error editing correction algorithm for automated speech recognition software to transcribe, determine gender and report stress levels for command and control operator audio files.
- Received the USAF Human Performance Wing Challenge Coin In Excellence for Leadership in recognition for research contributions to AFRL's cyberspace research program.

Teaching Experience & Curriculum Development

- Professional Development in Research, Publications and Conference Presentations (400 level; 1 semester)
- Biological Psychology (400 level; 1 semester)
- Sensation and Perception (400 level; 2 semesters)
- Cognitive Psychology (400 level; 1 semester)
- Research Methods (300 level; 1 semester)

Lead role in curriculum development for Applied-Experimental labs for the Department of Psychology. Responsible for all curriculum and syllabus development, textbook selection, and educational merit criterion in accordance with APA teaching guidelines.

- Biological Psychology (400 level)
- Sensation and Perception (400 level)
- Cognitive Psychology (400 level)
- Professional Development in Research, Publications and Conference Presentations (400 level)

Leadership Experience

The Catholic University of America, Washington, D.C.
American Psychological Association
Society of Military Psychology
Campus Representative

June 2017-July 2019

- Established the Society of Military Psychology (APA Division 19) organization at CUA.
- Led bi-weekly meetings with members to plan, discuss and organize Division 19 events.
- Served as liaison between all branches of the Military and the student/faculty caucus.
- Organized campus wide events to educate students and faculty on Military Psychology; invited active/veteran speakers from each branch discuss the impact of Military psychology across the different services.
- Successfully introduced CUA's first Military Psychology course (400/500 level) in Spring 2018.
- Organized Military Psychology Pentagon Tour with Assistant Secretary of Defense, Dr. Elise Van Winkle to introduce undergraduates on potential career paths in Military psychology.
- Organized meetings with VA Departments of Mental Health and Trauma, Integrated Health and Wellness, and the Women's Veterans' Health Pavilion to discuss research partnerships for CUA students interested in Military Psychology as a research career.
- Organized undergraduate research apprenticeships with Family Medicine and Medical and Clinical Psychology Health Sciences at Uniformed Services University; the recipient of a 1.2-million-dollar grant on Military Sexual Health.

The Catholic University of America, Washington, D.C.
Association for Psychological Science
Student Caucus Representative

June 2017-July 2019

- Established the Association of Psychological Science (APS) student organization at CUA.
- Started an undergraduate mentorship program for Psychology majors; paired 35 undergraduates with 20 graduate mentors the first year.
- Invited external speakers monthly to present topics of interest within APS, such as psychoneuroimmunology, psychophysiology, and neuroscience.
- Organized a series of graduate and undergraduate workshops for GRE prep, oral presentations and grant writing
- Led bi-weekly meetings with members to plan, discuss and organize APS events.
- Provided graduate students opportunities to present research and gain experience in public speaking through discussion and dissemination of research findings.
- Introduced the APS sponsored Behavioral Science Research Fair for undergraduates to present research, gain experience in public speaking through discussion and dissemination of research findings.

Publications and Proceedings

Rahill, K., Sebechts, M. (2020). Lunar Psychophysics: Effects of Atmospheric Light Scattering on Perceptual Distortion in a Lunar Virtual Environment. *Submitted to Journal of Aerospace Psychology*.

Rahill, K., Sebrechts, M. (2020). Personally Adaptive Avatar Modeling: The Effects of Characteristic Matching and Construction Source of Avatars on Interactive Gaming Performance. *Manuscript under review, Computers in Human Behavior*.

Adis, C., Byrd, C. Wisecarver, M., Horgen, K., Badger, J., Hoffman, R., **Rahill, K.** (2020). *Army Command Climate: The Viability of Single-Item Measures*. Technical Report No. 1381. U.S. Army Research Institute: Defense Technical Information Center.

Blair, E., **Rahill, K.**, Finomore, V., (2014). Best of Both Worlds: Evaluation of Multi-Modal Communication Management Suite. *Proceedings of the Human Factors and Ergonomics Society*, 58(1), 410-414.

Mancuso, V., Finomore, V., **Rahill, K.**, Blair, E., Knott, B. (2014). Effects of Cognitive Biases on Distributed Team Decision Making. *Proceedings of the Human Factors and Ergonomics Society*, 58(1), 405-409.

Finomore, V., Sitz, A., Blair, E., **Rahill, K.**, Champion, M., Funke, G., Mancuso, V., & Knott, B. (2013). Effects of cyber disruption in a distributed team decision making task. *Proceedings of the Human Factors and Ergonomics Society*, 57(1), 394-398.

Manuscripts in Preparation

Rahill, K., Gerohristodoulos (2020). Baseline Comparisons of Modality on Distance and Slope Perception in Static and Dynamic Virtual Environments. *Manuscript in preparation*.

Rahill, K. (2020). Exoplanetary Psychophysics: Perception Beyond Earth. *Manuscript in preparation*.

Presentations

Rahill, K. (2020). Lunar Psychophysics: Static and Dynamic Atmospheric Light Scattering on Perceptual Distortions in a Lunar Virtual Environment. Presentation at 2020 NASA Investigators Workshop, Galveston, TX.

Rahill, K., Mansure, K., Yeckley, C. Gerohristodoulos, A. & Sebrechts, M. (Feb, 2019). Perception in Space: The Impact of Kinesthetics and Sensorimotor Function on Perception in Microgravity. Presentation at 2019 Catholic University of America Research Day, Washington, D.C.

Rahill, K., Fioriti, C., Busog, D., Adoremos, I., Busog, D. & Sebrechts, M (Feb, 2019). A 3D Field of View: Effects of Immersive Displays on Perception and Experience in Virtual Reality. Presentation at 2019 Catholic University of America Research Day, Washington, D.C.

Rahill, K., Filiault, A., Ried, E. & Palmer, K. & Sebrechts, M. (Feb, 2019). Moving in Virtual Reality: The Impact of Particle Flow Fields and Peripheral Blending on Motion perception. Presentation at 2019 Catholic University of America Research Day, Washington, D.C.

Rahill, K., Incao, M., Johnson, R., Funk, M. Gualano, F., Miller, P. & Sebrechts, M. Feb, (2019). Rendering Planetary Atmospheres in Virtual Reality. Presentation at 2019 Catholic University of America Research Day, Washington, D.C.

Rahill, K., Hoffman, R., Darrow, J. (2018). Understanding the Relationship of Unit Outcomes with Ethical Leadership and Climate Strength. Symposium at American Psychological Association Conference, San Francisco, CA.

Hughes, E., **Rahill, K.**, Darrow, J., Hoffman, R., (2018) Military leader and peer support relationships within the dimensions of disciplinary action, stress, and withdrawal. Poster presentation at American Psychological Association Conference, San Francisco, CA.

Rahill, K., Sebrechts, M. (2017, Apr). Lunar Psychophysics: Effects of Atmospheric Light Scattering on Perceptual Distortions in a Lunar Virtual Environment. Poster presentation at 2017 Catholic University of America Research Day, Washington, D.C.

Rahill, K., Sebrechts, M. (2016, May). Virtual Adaptability: Personally Adaptive Avatar Modeling Leads to Improved Game Performance. Poster presentation at Association for Psychological Science Convention 2016, Chicago, IL.

Rahill, K., Sebrechts, M. (2015, Apr). Personally Adaptive Avatars Improves Game Performance. Poster presentation at 2015 Catholic University of America Research Day, Washington, DC.

Rahill, K., (2014, Oct). Best of Both Words: Evaluation of Multimodal Communication Management Suite. Slide presentation at 2014 Human Factors and Ergonomics Society 2014, Chicago, IL.

Mancuso, V., **Rahill, K.**, (2014, Oct). Effects of Cognitive Biases on Distributed Team Decision Making. Slide presentation at Human Factors and Ergonomics Society 2014, Chicago, IL.

Rahill, K. (2014, Jun). Disability Experience Workshop: The Benefits of Assistive Technologies for Skill Retention. Full day workshop at U.S. Army Research Institute, Fort Belvoir, VA.

Rahill, K. (2014, May). Command Climate: U.S. Army and Organizational Culture. Presentation at APA Division 19 Society for Military Psychology Chapter, Catholic University of America, Washington, D.C.

Rahill, K. (2014, Mar). Direct Manipulation in Virtual Reality: Distinguishing Between User Preference and Performance. Presentation at Technology and Human Performance Seminar, Washington, D.C.

Champion, M., Finomore, V., Sitz, A., Blair, E., & **Rahill, K.** (2013, Aug). How Reliable is Your Information? The Effects of Deceptive Communication on Information. Presentation at RH Human Effectiveness Presentation Day, WPAFB, OH.

Rahill K. (2013, Jul). ELICIT 2.0: Technical Manual for Scenario Development and Coding Analysis for Distributed Team Decision Making. Slide presentation for AFRL Annual Experimenter Review, WPAFB.

Finomore, V., Sitz, A., **Rahill, K.**, Blair, E., & Champion, M. (2013, May). Effects of an Advanced Communication Management Suite for Team Collaboration and Message Detection. Presentation at International Symposium on Aviation Psychology, WPAFB, OH.

Rahill, K., Finomore V. (2013, Mar). Human Computer Interaction & Decision Making in Cyber Security: The “Cognitive Malware” Effect. Slide presentation at Experimenter’s Brown Bag, Wright State University, Beavercreek, OH.

Rahill, K. (2013, Feb). Consciousness Rising for Human Trafficking: The epidemiology of re-victimization and over-sexualization in American culture. Slide presentation at Consciousness Rising Social Justice Organizational Convention, Dayton, OH.

Zois, C., **Rahill, K.**, Schmidt, A. (2012, Nov). Sexual Abuse and Mental Health: Re-victimization and the “Silencing the Self Scale”. Presentation at University of Dayton, Dayton, OH.

Awards, Honors & Achievements

APA Briggs Dissertation Award in Applied-Experimental/Engineering Psychology (2020)

NASA Postdoctoral Research Poster Award: 3rd Place (2020)

APA Society of Military Psychology: Presidential Citation in Leadership Award (2020)

NASA Astronaut Applicant (2016, 2020)

UCF Preeminent Postdoctoral Scholarship: Industrial Engineering (2019)

APA Society of Military Psychology Outstanding Student Chapter Award (2018)

APA Society of Military Psychology Travel Grant (2018)

CUA Excellence in Teaching and Leadership Award (2017)

CUA Outstanding Graduate Student Poster Presentation (2017)

CUA Department of Psychology Beryl Anderson Travel Award (2016)

American Psychological Association Graduate Student Psi-Chi Fellowship-Grant (2014)

CUA Department of Psychology Graduate Teaching Assistantship (2015-2019)

U.S. Army Consortium Doctoral Research Fellowship (2013-2018)

U.S. Air Force Challenge Coin of Excellence in Leadership for Human Performance (2013)

Reverend Raymond Roesch Award of Excellence to the Outstanding Students in Psychology (2013)

Oak Ridge Institute for Science and Education (ORISE) Undergraduate Internship (2012)

U.S. Air Force Student Career Experience Program (SCEP) Federal Internship (2012)

