Announcing the Final Examination of Jinchao Lin for the degree of Doctor of Philosophy

Time & Location: April 7, 2017 at 2:00 PM in Partnerships 2 301
Title: THE IMPACT OF AUTOMATION AND STRESS ON HUMAN PERFORMANCE IN UAV OPERATION

The United States Air Force (USAF) has increasing needs for unmanned aerial vehicle (UAV) operators. Automation may enable a single operator to manage multiple UAVs at the same time. Multi-UAV operation may require a unique set of skills and the need for new operators calls for targeting new populations for recruitment. The objective of the proposed research is to develop a simulation environment for studying the role of individual differences in UAV operation under different task configurations, and investigate predictors of performance and stress. Primarily, the study examined the impact of levels of automation (LOAs), as well as task demands, on task performance, stress and operator reliance on automation. Two intermediate LOAs were employed for two surveillance tasks included in the simulation of UAV operation. Task demand was manipulated via high and low frequency of events associated with additional tasks included in the simulation. The task demand and LOA manipulations influenced task performance generally as expected. The task demand manipulations elicited higher subjective distress and workload. LOAs did not affect operator workload, but affected reliance behavior. Also, this study examined the role of individual differences in simulated UAV operation. A variety of individual difference factors were associated with task performance and with subjective stress response. Video gaming experience was linked to lower distress and better performance, suggesting possible transfer of skills. Some gender differences were revealed in stress response, task performance, but all the gender effects became insignificant with gaming experience controlled. Generally, the effects of personality were consistent with previous studies, except some novel findings with the performance metrics. Additionally, task demand was found to moderate the influence of personality factors on stress response and performance metrics. Specifically, conscientiousness was associated with higher subjective engagement and performance when demands were higher. This study supports future research which aims to improve the dynamic interfaces in UAV operation, optimize operator reliance on automation, and identify individuals with the highest aptitude for multi-UAV control.

Major: Modeling and Simulation

Educational Career:
Bachelor’s of Applied Psychology, BS, 2011, University of Jinan
Master’s of Modeling and Simulation, MS, 2014, University of Central Florida

Committee in Charge:
Gerald Matthews, Chair, Institute for Simulation & Training
Lauren Reinerman-Jones, Institute for Simulation & Training
James Szalma, Psychology Department
Gregory Funke, Air Force Research Laboratory

Approved for distribution by Gerald Matthews, Committee Chair, on March 24, 2017.

The public is welcome to attend.