Simulated, 3D gaming environments have been used for a wide-range of applications including training, entertainment, and experimentation in an assortment of domains for some time. This can be attributed to their unique ability to emulate multifaceted situations that may be difficult to control, while affording participants the opportunity to operate in a relatively safe environment. In Cybersecurity research, investigation of insider threat behavior is an endeavor that has received little attention in terms of available environments and resources for experimental manipulation. This research effort aimed to close this gap.

A simulated, 3D gaming environment and accompanying scenarios were developed for utilization as a research application for a verification study. These constitute crucial components for proper development of insider threat detection tools and training applications. The aim was to use knowledge of performance, user stress state, and user perceptions of the simulation's graphic and usability qualities to verify the simulation for use in insider threat detection work. The objective of this simulated, 3D gaming environment and scenarios was to serve as a realistic and valid context for the development of insider threat identification methods. The scenario narrative involved a reenactment of computer system exploitation by an employee who is trying to acquire private financial information without authorization. In each scenario, the participant assumed the role of a financial investigator employed at a large financial institution. There were two conditions associated with this verification study (control and insider threat). Participants in the control condition performed all of their tasking as regular bank employees while participants assigned to the insider threat condition had to carry out a portion of their tasking as an insider threat.

Findings indicated that participants found the simulated, 3D gaming environment engaging, and the simulations graphics usable and immersive. Additionally, the role manipulation resulted in a significant difference in the time it took to perform critical tasking (tasking that was illicit in the insider threat condition). Role manipulation did not produce significant differences in stress between conditions, but it was influential regarding the perceptions of the stress sources. The results suggest that this simulated, 3D gaming environment meets the needs of insider threat investigation and can be used to advance understanding of the nature of insider threat behavior.

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Approved for distribution by Lauren E. Reinerman-Jones, Committee Chair, on May 15, 2017.

The public is welcome to attend.