In lieu of real patients, healthcare educators frequently use simulated patients. Simulated patients can be realized in physical form, such as mannequins and trained human actors, or virtual form, such as via computer graphics presented on two-dimensional screens or head-mounted displays. Each of these alone has its strengths and weaknesses. I introduce a new class of physical-virtual patient (PVP) simulators that combine strengths of both forms by combining the flexibility and richness of virtual patients with tangible characteristics of a human-shaped physical form that can also exhibit a range of multi-sensory cues, including visual cues (e.g., capillary refill and facial expressions), auditory cues (e.g., verbal responses and heart sounds), and tactile cues (e.g., localized temperature and pulse). This novel combination of integrated capabilities can improve patient simulation outcomes.

In my Ph.D. work I focus on three primary areas of related research. First, I describe the realization of the technology for PVPs and results from two user-studies to evaluate the importance of dynamic visuals and human-shaped physical form in terms of perception, behavior, cognition, emotions, and learning. Second, I present a general method to numerically evaluate the compatibility of any simulator-scenario pair in terms of importance and fidelity of cues. This method has the potential to make logistical, economic, and educational impacts on the choices of utilizing existing simulators. Finally, I describe a method for increasing the human perception of simulated humans by exposing participants to the simulated human taking part in a short, engaging conversation prior to the simulation.

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Approved for distribution by Gregory Welch, Committee Chair, on October 5, 2018.

The public is welcome to attend.