Prototyping bodies: a post-phenomenology of wearable simulations

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This article explores wearable simulations, which are analogue and low-tech tools that designers deploy to gain first-hand insight into the experiences of different users, including elderly and disabled people. Ranging from gloves and goggles to elaborate whole-body suits, wearable simulations are said to facilitate an inclusive and empathic design process by encouraging practitioners to seek affective and sensory connection with others. The article builds on post-phenomenological thinking to propose an alternative understanding, where wearable simulations are seen as prototypical compositions that generate unexpected bodily variations, which have the potential to sensitise designers to the limits of knowing bodies and invite experimentation with experience.

Keywords: post-phenomenology, simulation, perception, empathy, user-centred design

Wearable simulations, from gloves and goggles to whole-body suits, restrict the movements of the wearer to evoke, through a combination of affects and sensations, the experiences of a person having difficulties with performing certain physical tasks. Such simulations are claimed to develop awareness of the variability of users and are seen as belonging to a broader shift towards more empathic and involved ways of designing. They are particularly prevalent among those who identify with approaches such as 'inclusive design', 'universal design' and 'design for all', which have emerged as a response to diversifying populations in need of services, products and environments that are usable by the widest range of people, irrespective of their abilities (see Clarkson & Coleman, 2015).

Describing how wearable simulations are currently being developed and deployed, this article investigates them as socio-technical devices that bring out the various possibilities and limitations encountered by designers as they make different bodies knowable as part of their practices. Above all, wearable simulations enable a close examination of the knowledges, materialities and values implicated in efforts to evoke user experiences. Recent work suggests that design methods, such as models (Yaneva, 2009), prototypes (Danholt, 2005; Wilkie, 2014), concepts (Drazin, 2013) and personas (Wilkie & Michael, 2009), are never neutral, but always come to 'influence the

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possibilities of design' (Otto & Smith, 2013, pp. 15–16) by performing certain types of bodies and collectives into being. According to Fry (1999, p. 5), recognising the world-making capacities of design methods necessitates attending to the very 'designing of design', or the ways in which the processes and sites of design are themselves designed, as these shape what design can become.

Expanding on contemporary post-phenomenological thinking (see Ihde, 2012a, 2012b; Verbeek, 2005), this article illuminates wearable simulations and the experiences that they mediate as emergent entities, whose effects vary in relation to the materials, objects and practices that they draw together (Wilkie & Michael, 2009, p. 505). Rather than being ready-made artefacts, simulations are open-ended prototypes that introduce both possibilities and limitations into design. Possibilities in that simulations invite creative and collaborative renderings of user experiences by working as a flexible 'medium of interpersonal interaction' and 'a tool for discovery, insight and test' (Schrage, 2013, p. 19). Limitations as they reveal the fragility of simulation and the partial character of any endeavour to mediate bodies in design.

Instead of seeking to develop an exhaustive account of wearable simulations, the article concentrates on select cases to create a conceptual space in which to begin a critical investigation into how bodily diversity is and might be mediated in design. It builds on a review of existing academic literature and online promotional materials on wearable simulations, a series of in-depth interviews with three UK-based simulation designers, each involving an exploration of equipment at different stages of development, as well as interviews with three multinational corporations that currently employ simulations. The following discussion starts with an outline of common assumptions about wearable simulations, which indicates that these are sometimes portrayed as offering direct access to the experiences of others. The article then introduces post-phenomenology to propose an alternative argument that directs attention to the makers and users of simulations, and demonstrates that evoking user experiences is an uncertain process that results in unexpected enactments of bodies. Such complexities bring to the fore the unsettled character of design methods more broadly, which has crucial implications for practice.

1 *Wearable simulations and inclusive design*

Several academic entities have developed wearable simulations for research, teaching and commercial purposes. The Georgia Tech Research Institute has produced the Arthritis Simulation Gloves to evoke 'the reduction in functional capabilities experienced by individuals with moderate to severe arthritis'.[1] The AgeLab at Massachusetts Institute of Technology has created a whole-body suit, AGNES (Age Gain Now Empathy System), which is 'calibrated to approximate the motor, visual, flexibility, dexterity and strength of a

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