WoMan in the Mirror: Seeing and Interpreting Our Own Bodies During Movement and Performance

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Classical performance traditions put the dancer in front of an audience, after she has trained her own body in front of a mirror for feedback and reflection. Recent technologies enable live performance through avatar-based interactions, providing opportunities for performers to act as a character unlike themselves during both training and performance. How does the act of seeing themselves in a different form affect the way dancers improvise and perform? We describe research that probe the way that the process of seeing ourselves in a digital mirror may affect the way we act and perceive. This opens avenues for empathic engagements that enable performers to see perspectives of other body types, but also creates theoretical and ethical considerations for problems of access, marginalization, and stereotype. This paper contributes discussion to the evolving relationship between performers and technologies for mediating their performances in enabling alternative versions of themselves.

CCS Concepts: • **Applied computing** → **Performing arts**.

Additional Key Words and Phrases: Mirror, Avatar, Body, Movement, Performance

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1 ENABLING THE DIGITAL BODY

Mirrors that can be found in traditional dance studios often play a crucial role in dance training, providing a viewing point for dancers to observe their movements [5]. While mirrors are beneficial for traditional dance (e.g., ballet) that requires accuracy, they may induce negative feelings in contemporary dance, such as fear for mistakes, body objectification, and frustration [4, 5]. Nevertheless, the prevalence of mirrors in both dance studios and other public space prompts continuing interest in HCI research that uses them for augmentation on the body.

Prior research has explored augmented mirrors that can be used in dance practice and for movement training. For instance, researchers incorporated mirrors with Kinect to give real-time instructional feedback for dance training, such "Super Mirror" [13] and "YouMove" [1]. Recent work placed a virtual humanoid avatar in a mixed reality (MR) mirror as the dance instructor, providing intuitive instructions for training [16]. With the humanoid avatar, dancers could

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not only check their own poses like using traditional mirrors, but also view themselves more objectively like viewing another person [16].

Recent advances in motion capture (MoCap) technology and digital screens have introduced more possibilities to dance practice and performing arts (see Fig. 1). These systems offer deeper insights into embodied experiences by refining dancers' body schemas and performances through real-time feedback [7]. The generated avatars allow people to see a natural extension of inner self [9], with those of greater similarity improve the sense of embodiment [11] and differing ones alter emotional responses and behaviors [14]. Avatars can also help mitigate stereotypes [8] by allowing users to experience roles outside their usual identities, such as embodying different races [2], genders [14], or disabilities [12]. However, poorly designed avatars may also perpetuate negative stereotypes, misrepresent peoples' body types, or lead people to see negative versions of themselves (Figure 1).

Fig. 1. Avatars in digital spaces.

In recent work [15], we designed five avatars of underrepresented bodies in dance (i.e., different gender, body shapes, and physical limitations) for dancers to engage with during a MoCap-supported live improvisational performance (see Fig. 2). This embodied approach challenged dancers to distance from their habitual movements, seeing their own bodies and other bodies in new ways. Dancers reported feeling free to explore gendered or constrained motions, confronting biases and gaining insight into diverse identities, although focusing on avatars sometimes disrupted continuity in their performance as suggested by prior research [10]. By embodying physical limitations or opposing gender traits through the avatars, dancers experienced an embodied empathy with others' experiences as if viewed through their own bodies. By enabling the digital body, we enable more inclusive and creative movement practices.

Fig. 2. Movement with avatars of different body shapes, genders, and physical limitations.

2 POLITICS OF THE MOVEMENT ENVIRONMENT

Movement is inherently shaped by the environments in which it occurs. Traditional performance spaces, such as dance studios, are politically charged entities designed to enforce normative bodily practices. Mirrors, for instance, have long been central to dance training, providing real-time feedback for precision [16]. However, their use has also been critiqued for perpetuating body objectification and frustration, as dancers internalize external judgments through

constant self-surveillance [4, 5]. These physical spaces are not neutral; they encode cultural values that privilege certain body types and movement aesthetics while marginalizing others [12].

Recent advancements in digital technologies, such as MoCap and virtual reality (VR), have redefined the politics of movement environments. Virtual spaces now allow performers to embody avatars with non-normative physical attributes—such as disabilities or diverse body types—challenging traditional hierarchies of embodiment. For example, dancers interacting with wheelchair-bound avatars are compelled to reimagine lower-body movement possibilities, while those embodying avatars without arms explore upper-body constraints as creative catalysts [15]. Such digital environments transcend limitations of physical mirrors, enabling performers to detach from habitual movement patterns and engage in defamiliarization—a process of reinterpreting bodily agency through alternative perspectives [3].

The design of physical spaces has long been recognized as a mediator of human behavior. Studies show that seating arrangements in angular versus circular configurations influence social dynamics, with circular layouts fostering collective engagement (e.g., family-oriented advertising acceptance) and angular setups promoting individualism [17]. Similarly, lighting and color schemes modulate psychological states: red-lit environments enhance active learning, while blue-green hues encourage passive participation [6]. These principles extend to digital realms. In social VR platforms like VRChat, virtual mirrors serve dual roles as reflective surfaces and portals to alternate identities. Users employ mirrors not merely for self-viewing but as tools for perspective-taking, adopting avatars that challenge normative body standards [10].This aligns with findings that immersive environments can disrupt ingrained biases—for instance, embodying avatars with disabilities fosters empathy and reduces stigmatization [12].

While digital tools democratize access to diverse bodily experiences, they also risk reinforcing stereotypes. Marginalized groups, such as individuals with disabilities, often face tokenized representation in avatar platforms, where their digital forms are reduced to simplistic or exaggerated tropes [12]. Conversely, normative performers may unintentionally distort non-normative movements when embodying marginalized avatars, perpetuating misalignment between intention and representation. To address this, recent research calls for co-design frameworks that center marginalized voices in avatar creation, ensuring authenticity in movement translation [15].

3 OTHERBODIES AND NOBODIES

The previous discussion regarding avatars and environments illustrate the intricacies that can arise when digital representations of human bodies differ from reality. One consideration is the way that these avatar representations may distort or stereotype the body shapes of individuals who do not fit normative representations [12]. Although those with disabilities appear to want to show their avatars in disability-specific ways, work has yet to clarify how those with non-normative body types view avatars that look like themselves are treated by normative body types. The outstanding questions regarding politics here include the following:

- How do movements used by normative people differ from those by marginalized body types in performative contexts?
- How do marginalized individuals perceive the mismatch between their own movements and those represented by normative body types?
- How do normative and non-normative body type people perceive their own depictions in avatar form?
- How do we overcome challenges of stigma associated with marginalized body types represented in stereotyped form in conventional avatars?

- How do normative performers distort marginalized body types when they perform with avatars deemed to be non-normal?

A second branch of considerations is the way that people who perform may be able to learn from those with different body types through collaborative interactions with avatars. The questions here address how the constraints offered by limited body types [12] may actually be able to help conventional performers due to taking of different perspectives through avatar limitations and related questions:

- What unique movements can marginalized body types create that transcend behaviors by normative individuals?
- How can unique movements by marginalized body types inspire what normative practitioners do in their own work?
- How can normative and marginalized body type practitioners collaborate and learn from each other using avatar-based representations?
- What can be advantages and disadvantages of working with purposefully body type-limited avatars during conventional performance practice?
- How perspective-taking can be a paradigm for inspiration and ideation in movement research?

The twin positions of addressing marginalization of non-normative body types ("nobody" problem) and empowering inspiration from study of non-normative body types ("other body" problem) illustrate the challenges in body politics as performers continue to work more and more in the digital domain with customized avatars. Unlike the classic stage representation, avatar representations open up questions of body perception and interpretation previously neglected in traditional performance.

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