

NOT YOUR BODY, just my shadow;



Motion data has been used in many applications, including rehabilitation therapy, surveillance, dance, and animation. For example, Wayne McGregor trained an AI model to learn the movement style of 10 dancers. This application illustrates that movement holds an aspect of our identity.

Years after his passing, I vividly remember the slow nonchalant shuffle of my grandfather, hands clasped behind his back to quiet the tremor. If movement holds such intimate information, should it not be protected? Motion capture can change our interactions with technology, making them more physical and reducing user isolation. However, there must be caution in viewing movement as data, as it is an intrinsic expression of our personhood.

During the workshop, participants participated in an activity to reclaim ownership of their bodies. By looking at the shadows of dancing, we explored what elements of identity they hold. This was followed by a critical discussion, where participants contributed to multidisciplinary conversations about the ethics of motion capture technology and imagined future attitudes towards the value of our bodies.



Rehabilitation Therapy

Motion Capture Application



Visual Drawing application that uses motion capture (gyroscopic sensor) to provide **feedback** during **neurorehabilitation therapy**

Contributions of Motion Capture:

- Individual self-directed movement exploration with minimal instruction
- More **accessible**- does not rely on intricate interactions with a hand controller
- **Adaptable** to different conditions
- Feedback **makes tangible the work** the patients are investing
- Makes visible smoothness and spatiality of their movement
- **Flow state**- lose track of time
- Patients had an **identifiable movement style** just based on images

Reference: Worthen-Chaudhari, L., Whalen, C. N., Swendal, C., Bockbrader, M., Haserodt, S., Smith, R., ... & Mysiw, W. J. (2013). A feasibility study using interactive graphic art feedback to augment acute neurorehabilitation therapy. *NeuroRehabilitation*, 33(3), 481-490.

kaleidoscopic instincts

Motion Capture Application



An intermedia **dance performance** by Katie O'Loughlin that explores the **perception of reality** through the use of technology to experience movement



A **live camera** that projects delayed movement figures

Uses Motion Capture to Explore:

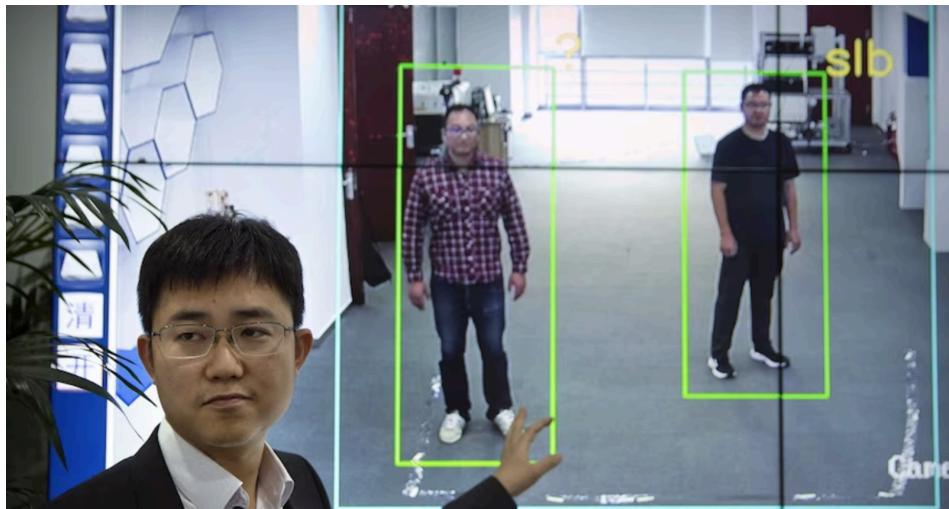


- How technology influences the **creative process**
- **Hierarchies** introduced from production, especially by technology
- **Agency** in how we are seen
- Real vs Fake
- **Multiple perspectives** of the human body

Reference: <https://accad.osu.edu/research-gallery/kaleidoscopic-instincts>

Gait Surveillance

Motion Capture Application



“We believe you are totally unique in the way you walk”

Using Computer Vision to identify people by **body shape** and **walk** for surveillance

“Already used by **police** on the streets of Beijing and Shanghai”

“Extracts a person's silhouette from video and analyses the **silhouette's** movement to create a **model of the way the person walks**”

“**Identify** people from up to 50 meters away, even with their **back turned** or **face covered**”

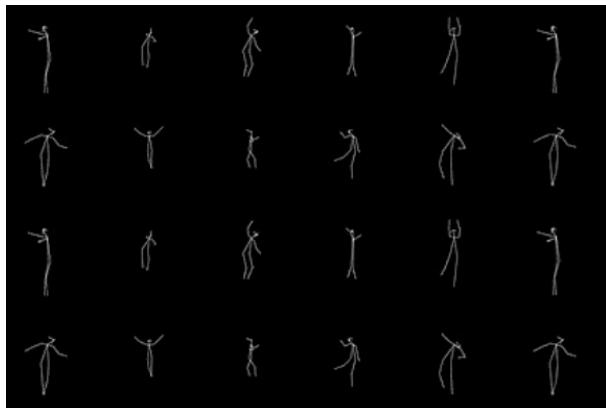
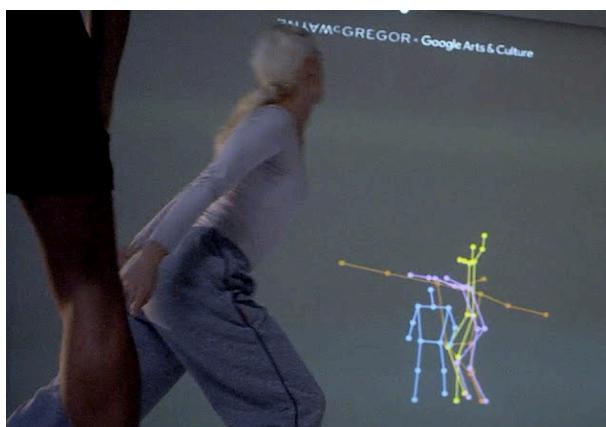
“It doesn't require special cameras — the software can use footage from surveillance cameras to analyze gait”

Reference:

<https://www.abc.net.au/news/2018-11-06/chinese-gait-recognition-tech-ids-people-by-how-they-walk/10469974>

Living Archive

Motion Capture Application



Dance performance choreographed with **generative AI**, trained on 25 years of dance footage.

- **Predicts** the dancer's next movement
- Uses a Recursive Neural Network (resource-intensive)
- Fed additional movement footage of 10 current company dancers to **learn their specific body language**
- Extracts **skeletons** from bodies of dancers
- A **creative tool** for choreographers
- “there is **always a human in the loop**, because there isn’t an algorithm that can judge the quality of the choreography”

Reference:

<https://artsandculture.google.com/story/living-archive-creating-choreography-with-artificial-intelligence-studio-wayne-mcgregor/1AUBpanMqZxTiQ?hl=en>

Digital Bodies

Motion Capture Application



Exploring motion capture for **animation** and generating a **database** of gestures.

“an actor can drastically **change form** and assume anything from abstract forms to **imaginative** creatures or animals”

“the challenges that arise when you, as an actor, play with a **fundamentally different body** than the one you are used to”

“**digital body** ... a new form of mask and make-up [or] digital "doll"

“Through the project, a structured database is created which can help robots and virtual assistants show **personality**”

Reference:

<https://www.kth.se/sv/navet/research/projects/digital-bodies-motion-capture-acting-1.977731>

VR in Dance Performance

Motion Capture Application



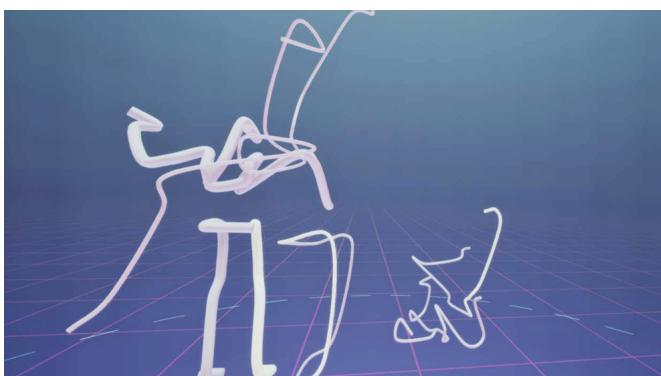
Use of **motion capture**, **video footage**, and **VR** to elicit an **intimate viewing** of a dance performance.

“arrest or ‘still’ the dancing body when we try to capture it”



Contrasting blurry and sharp projections to highlight fuzziness and sharpness of a **lived experience**.

“process of **cleaning** the data, making the **skeleton**, **modeling** the character/avatar and **editing** the sequences and phrases so that they can move and travel in a **virtual world**”



“we are seeing the motion capture itself **stripping away the person** and showing an **inside view**”

Reference: Gibson, R., & Roche, J. (2021). ‘And then again, I draw myself to the detail’: Capturing experiential states in contemporary dance making through Expanded Fields. *Performance Research*, 26(4), 71–77. <https://doi.org/10.1080/13528165.2021.2005955>

VR in the Context of the Minority Body

Erasure of the Body



The design of **VR** technology consistently **ignores non-normative bodies** in its design and intended use.

Medical model of disability: the body as something to be **fixed** and **improved**

Social model: disability as a deviation from societal norms where **systems fail individuals**

VR systems consist of **heavy** headsets and two **handheld** controllers and expect users to **stand**

Prohibitive to:

people who need to use one or both hands for mobility

people who have pain from supporting weight on the spine

people with fine motor issues

Reference: Gerling, K., & Spiel, K. (2021, May). A critical examination of virtual reality technology in the context of the minority body. In Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems (pp. 1-14).

Black Bodies in Dance

Erasure of the Body



“Because choreographic works are **corporeal** in nature, they carry strong ties to the bodies that generate them; dance-makers’ bodies are deeply implicated in the circulation of their choreography. The **threat** of dance circulation, therefore, is that it can enact a kind of **bodily commodification**, turning producers into products, **subjects into things.**”
(Kraut 2015)

The juxtaposition of highly valued “black rhythm” and hidden and excluded black bodies

The **appropriation** of **Lindy Hop**, an African diaspora dance form into contemporary **ballet** by famous choreographers like Balanchine

“Why, then, are there so few Black dancers in New York City Ballet’s history?”

“There is no dance **history** without Black history.”

References: Kraut, A. (2015). *Choreographing copyright: race, gender, and intellectual property rights in American dance*. Oxford University Press.

King, Gregory. Exclusion Is Oppression: From Pedagogy to Performance.
<https://www.dancemagazine.com/gregory-king-exclusion-black-dancers/#gsc.tab=0>

Care Ethics

Philosophical Perspectives

- Focuses on the **relationships** between people rather than an individual's moral character
- “morality necessarily involves the **intertwining** of **emotion**, cognition, and action”
- Views **care as a force for making decisions** and acting morally

Reference: Kuusela, O. (2011). Key Terms in Ethics. Continuum International

Felt Ethics

Philosophical Perspectives

- Ethics are an **implicit factor** in the design process- every designer brings their own **sensibilities** to their work and research.
- Rejection of **mind/body** duality

"Therefore, our **capacity to relate ethically** towards one another is also situated within the shared intercorporeal space of our **bodies**. It is only **later** that we are able to **express** or develop our ethical understanding through symbolic rules, **moral frameworks**, or linguistic prepositions "

Reference: Garrett, R., Popova, K., Núñez-Pacheco, C., Asgeirsdottir, T., Lampinen, A., & Höök, K. (2023, April). Felt Ethics: Cultivating Ethical Sensibility in Design Practice. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (pp. 1-15).

Discussion Questions

- Introduce yourselves: Names? Pronouns? Things that spark joy in your life? Weird small thing that annoys you?
- What feelings did you notice while playing with your shadow?
- How did it feel to lose autonomy over your shadow?
- In what ways does the technology you interact with regularly impact how you move your body and the freedom you have to do so?
- Have you ever used motion capture? How was that experience?
- What examples have you encountered in your life when someone's body gets erased or hidden?
- Should motion data be used to identify people? Why or why not?
- Having a thriving natural environment is good for our bodies but the storage of movement data and collection of material resources to make these technologies harm it. How can we balance these two seemingly opposite situations?
- How do you feel about the use of generative AI around our bodies?
- Does the use of motion-tracking technology separate the body owner from the body?
- How do we choose which bodies get to be recorded? Do we uphold unrealistic body image expectations by using dancers? What expectations are placed on the human form if only able-bodied people are recorded?
- When should motion capture be allowed and what safeguard should be around that data?
- Do certain applications justify the means?

