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# *hipDisk*: Understanding the Value of Ungainly, Embodied, Performative, Fun.

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## **Abstract**

*hipDisk* is a wearable interface that extends the hips and torso horizontally to give the moving body musical capabilities. The device prompts wearers to move in strange ways, bypassing norms of self-constraint, to actuate sound. As the wearer bends and twists their torso, causing the disks to touch, a single tone may be triggered through the integrated speakers. The result is sonically and physically ungainly, yet strangely compelling, and often prompts spontaneous laughter. *hipDisk* emerged from an embodied, performative research approach. It began as a single user device, and evolved to support social interaction and co-creation, as well as creatively engaged, embodied discovery and learning. The focus in this paper is on the third, participatory, phase of the project, and the value of emergent, performative research.

## **Keywords**

Embodied engagement; performative research; wearable technologies; awkwardness; poetics; play; learning.

## **ACM Classification Keywords**

H.5.2 [Information Interfaces and Presentation]: User Interfaces - Interaction Styles, Theory and Methods, User-centered Design

## **General Terms**

Design, Human Factors.



**figure 1.** First-time wearers of *hipDisk* experiment and play

## Introduction

Movement is at the core of life. We come into the world moving. Yet it is difficult to articulate the affective experience of the body in motion [17]. Contemporary society privileges intellectual approaches to knowledge acquisition and sharing, and tends to posit the body as a complex machine rather than a rich resource for intuitive knowledge generation. Yet *hipDisk* and related research demonstrates that bringing focus to the aesthetics of embodied engagement results in heightened attention that may shift people's capacity to think, learn and play [22].

Qualities of attention impact our ability to learn new things [12]. As we learn we not only increase what we know, but we increase our brain's capacity to learn [12]. Similarly, embodied engagement results in residual spin-off of sensations [17] and the qualities of attention generated through poetically engaged kinaesthetic discovery may support residual spin-off of creative enquiry [22].

Levisohn argues that the body should be an integral element of interactive systems [9]. *hipDisk* emerged from an embodied, performative research process [6], and uses core-driven embodied engagement as a means to creative expression. The system brings wearers and observers experientially into the rich (if ungainly) centrality of embodied experience.

## Device design

*hipDisk* consists of two disks that extend the body horizontally, one above and one below the waist. The disks house a simple, electronic circuit and integrated speakers. Soft switches strategically placed around the



**figure 2.** Triggering four different notes

perimeter of the disks allow the wearer to play a one-octave chromatic, pentatonic, major or minor scale, by bending their body to make the disks touch.<sup>1</sup> Moving thus allows them to play simple melodies, one ungainly note at a time (fig. 2).

The sonic output of *hipDisk* is unrefined, electronically primitive, reedy and simplistic. The device demands an inordinate amount of effort to play, yet results in comparatively feeble sound output. The inherent contradiction seems both humorous and engaging.

### Motivation

*hipDisk* emerged from the desire to inspire people to explore and extend the range of movement of their hips. The objective was to move beyond limb and digit-triggered switches and explore core- or full-body movement for actuation. The result is a mechanical extension that requires gestural extension, to extend the body sonically. Importantly, the sounds motivate and give meaning to the wearer's movement. The resulting body-sound system interconnects choreography and composition in a fundamental way.

<sup>1</sup> Each set of disks is programmed as a different musical scale.

## Development

Development of *hipDisk* has occurred over three phases. In the first phase, the designer (and author) was the only person to wear the device. In phase two, *hipDisk* was used by an ensemble of performers to (unsuccessfully) develop public presentation. In phase three, the system was reframed for participatory use by the general public. Phase one and two are discussed in detail elsewhere [20, 21]. I focus here on the shift through the different phases, to phase three.

### *From solo to ensemble...*

A single *hipDisk*-ed participant may only play one note at a time. An ensemble collectively may play chord structures, harmonize, provide counterpoint, and play a range of notes in rapid succession – so create rhythmically and sonically more complex works. An ensemble is also better placed to explore the choreographic potential of the device (eg. fig. 1-3). To test these notions, *the hipdiskettes* (fig. 3), a group of professional performers with a range of musical and movement skills, was formed. They attempted to learn the Bossa Nova standard, *The Girl From Ipanema*,<sup>2</sup> but failed miserably despite extensive rehearsals [21]. Their process was not a failure though as it led to numerous insights about the interface as a tool for embodied discovery and learning [21]. When conference attendees viewed video of *the hipdiskettes'* most valiant attempt to play the *Girl From Ipanema*,<sup>3</sup> the response was overwhelmingly positive despite the pathetic nature of the performance. Many people expressed a desire to try *hipDisk* for themselves (personal correspondence, December 8-12, 2008).

<sup>2</sup> by Antonio Carlos Jobim, arranged for *hipDisks* by the author

<sup>3</sup> at OZCHI08 [14] during presentation of [21]



**Figure 3.** *The hipdiskettes* in an early rehearsal

This surprising result prompted numerous conversations with conference attendees, and suggested that the struggle of playing *hipDisk* was as compelling as it is ungainly and difficult, and that mastery (demonstrated, for example, through a polished performance) may not be quite as interesting. *hipDisk* was subsequently reframed for open participation. Four sets of devices were prepared and tested on three separate occasions.

### *Participation, co-creation and play*

The first experiment was a demo at a Human Computer Interaction (HCI) conference.<sup>4</sup> The event lasted one hour. Nine people tried the disks including professors of HCI and Computer Science, a number of student volunteers and other conference participants. One group of participants used the musical score of *The Girl From Ipanema* (which I provided) to identify and form various chord groupings, which they demonstrated with much excitement and little awareness of how awkward they appeared. Other participants randomly played together, worked alone, mimicked each other or

<sup>4</sup> OZCHI09 [14]



**Figure 4.** Dressing a participant

undertook opposing experiments. One participant later commented that the act of being dressed into the disks (as in fig. 4) felt an important, almost ritualized, part of the process, which she wanted to share with others, by dressing them in turn. This response was corroborated by other participants during later discussions (Personal correspondence). I was curious to see if these varied, and apparently deeply felt, ways of interacting would be repeated in a different context.

In the second experiment, the same four sets of disks were demonstrated at a Postgraduate Art and Design Colloquium<sup>5</sup> (fig. 1). There were seven participants and between six and twenty observers<sup>6</sup>: all mature and emerging artists, art researchers and theorists. These participants brought different understandings of the aesthetics of the device than the HCI researchers of the first experiment. Yet their behaviors and reactions seemed to echo those of the HCI-focused participants. The *hipDisk*-ed individuals worked together or alone,

<sup>5</sup> at Monash University, Faculty of Art and Design, Melbourne.

<sup>6</sup> The number of observers changed as people came and went. Approximately twelve observers stayed throughout the discussion with participants at the end of the session.

they mimicked other participants or did opposing experiments and seemed unaware of, or undisturbed by, how awkward or clumsy they appeared. They rarely removed the devices in under half an hour, and when they did remove them, seemed highly energized. All participants expressed a desire to describe their experience playing with the disks and discuss how their use compared to that of other participants. Many also expressed a desire to use the disks again at any time it might be possible in the future.

In both of these experiments I was able to observe what Sheets-Johnstone describes as 'residual spin-off of movement': 'Feelings of aliveness, in a personal and existentially vibrant sense' experienced during and after active embodied engagement [17]. Curiously, these feelings seemed to be experienced by the observers, as well as the participants.

A third, slightly different experiment allowed me to investigate this outcome further. For the third experiment there were only three participants, and the observers were myself and a television film crew.<sup>7</sup> The event took place in a public thoroughfare, not far from where experiment two had occurred some months earlier. Despite lacking the ambience of a public event, outcomes echoed and confirmed all outcomes from the previous two experiments, and confirmed the "spin-off" feelings of aliveness to be equally present in participants and observers, including the television crew, whose energy levels and discussion of the work shifted radically after observing the interface in use.

<sup>7</sup> *hipDisk* was featured on ABC TV's New Inventors Program [1]. The crew consisted of the producer, a sound engineer and a camera operator.



## Reflections

From these experiments I have been able to conclude that the *hipDisk* interface prompts people to move in new ways, and frames the body so unusually that it affords radically different qualities of attention in both wearer and observer. The combination renders the body clumsy, aesthetically attractive and fills people with a sense of aliveness that supports residual spin-off effects such as creative discovery and learning [20,21].

*hipDisk* cannot be put down, moved through, or otherwise decoupled from the body. Interaction is initiated and engagement realized through this extended body, which alternately becomes present at hand or ready-to-hand [7] as focus shifts between physical actions and the results of actions, as expressed through the technology. These attentional shifts prompt conceptual repositioning in relation to the body, as it is continually reframed, as well as intense and inhabitual qualities of focus, and ungainly movement.

We commonly assume that pleasure and fluency are the targets for movement experience, yet “newness” requires the unfamiliar, and discovery is epitomized by mistaken, erroneous, clumsy and inappropriate sensations [23]. With *hipDisk*, the awkwardness pulls focus to the body and brings to light the aesthetic nature of the experience. The attention of both wearer and observer cycles between the body in action and the effects of physical engagement as expressed sonically. This cycling of focus seems to engender the necessary qualities of attention to support embodied learning.

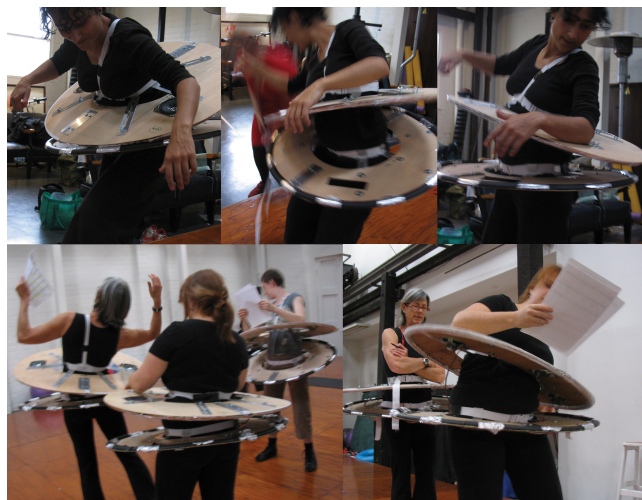
As noted in the introduction, qualities of attention impact our ability to learn new things [12]. As we learn

we not only increase what we know, but we increase our brain’s capacity to learn [12]. Similarly, embodied engagement generates residual spin-off of sensations [17] and my research suggests that the qualities of attention generated through imaginative, expressive, artistically engaged kinaesthetic discovery supports residual spin-off of creative thinking [22].

### *Learning through embodied engagement*

*hipDisk* vividly brings to light idiosyncrasies in posture and flexibility. It also provides nuanced information about individual body-centric learning preferences, as people instinctively look for the most comfortable way to learn how to navigate the device behaviour, socially or individually – through visual supports; physically: proprioceptively and kinaesthetically; with tactile support from others; through sound; or observation. Some participants even use spatial orientation, though the interface is self-contained and centred on the body, ensuring that no matter which direction the wearer faces the behaviour of the device is consistent [21]. This seemingly anomalous behaviour supports Rauscher et al.’s assertion that musical and spatial intelligences draw on common abilities. [15] (fig. 5).

Learning directly through any medium or framework can only be a good thing. What is arguably more interesting is the capacity of a device to support ongoing, residual spin-off of learning and creative-enquiry after the activity has finished. Further research is needed to corroborate if and how such outcomes might be consistently generated through devices such as *hipDisk*, but qualitative evidence strongly suggests this may be possible [22].



**Figure 5.** *hipDisk* supports intrapersonal and interpersonal learning: the *hipdiskettes* are shown working kinaesthetically, visually, vocally, aurally, spatially and haptically.

The intense physical effort required to play *hipDisk* reminds us of Mueller et al.'s exertion interfaces [11], though *hipDisk* is concerned with playful exploration rather than competitive sport-related activities. The non-competitive nature of the device supports open, free-form, creative engagement and allows wearers to find personal strengths, identify difficulties and design idiosyncratic frameworks for learning and discovery. The uncommon nature of the experience of playing the device encourages camaraderie, interpersonal engagement, social interaction. It also generates much laughter and smiling on the part of participants and observers [20, 21]. Visually *hipDisk* is not unrelated to Maubrey's Audio Ballerinas [10], though the interaction bears little similarity [20]. The work is perhaps more closely related to Laurie Anderson's early body sound

interface experiments, where body movement is an integral element of the hybrid interface [5].

#### *Democratising participation*

Using *hipDisk* is an uncommon experience. It is engaging, fun and inclusive. The freedom from strict definitions or notions of skill and grace seems liberating. The absence of solutions or required outcomes means that failure is irrelevant. *hipDisk* bypasses usual patterns of self-censorship and opens up unusual experiences that have poetic valence for both user and viewer, as well as rich opportunities for playful interaction, regardless of the abilities or challenges a person might have<sup>8</sup> [22]. Embodied-ness is implicit. Skilled, unskilled and clumsy play are democratized. Additionally, there is no need to fear looking silly, as everyone looks silly, but clearly seems to be having lots of fun [22].

Engagement is further democratized by the DIY aesthetic of the devices when they are made available for public use. The disks are made of laser cut MDF, hand-drilled and marked for construction and assembly. They are assembled in the demo area before use, in full view of potential participants (fig. 6). Undertaking this process in public demonstrate that a person does not have to be highly skilled to assemble *hipDisk*. Anyone can be augmented and thus enabled so long as they are physically able to be fitted with the device and are capable of moving. The devices seem robust and, in the unlikely event that a person might damage one, they do not seem expensive to replace. These characteristics combine to nullify common excuses or reluctances to engage.

<sup>8</sup> On condition that they are physically able to wear the device.



**Figure 6.** Assembling the disks before a demo.

#### *Making meaning through movement*

*hipDisk* supports deeply reflective, playful and ambiguous experiences. Cognitive and kinaesthetic load are tightly coupled. The body is engaged through creative discovery, and the imagination through movement, and everything is packaged in an unusual activity that engenders heightened awareness. Gaver et al speak of ambiguity leaving space for meaning-making. [4] *hipDisk* and related works enhance engagement not only in cultural contexts such as performance and culturally framed play, but show potential for enhanced engagement in more pragmatic contexts, such as rehabilitation, disability and learning, where opportunities for investing movements with meaning are highly welcome, as are opportunities for embodied reflection and discovery (Lovitt, Monash Medical Centre, Melbourne, personal correspondence) [19, 22].

#### *The emergent performative methodology*

*hipDisk* began as a single user sonic body extension for improvised performative demonstration; evolved into a context for multi-user choreographed performance; and

from there evolved once more into a framework for open-ended free-form play by random collections of interested participants. This process was echoed in the parallel evolution of my role as designer from investigator-creator-participant; to outside eye/creatively involved observer; to enabler (i.e. the person who assembles the artifacts, personally augments the participants, mindfully observes their interactions and listens to their feedback). This evolution of roles and relationships supported embodied reflection from a range of perspectives, for all involved. It also helped frame deep reflection that shaped the emerging performative methodology.

According to Chris Salter, “everything has become performative” [16]. “Performance as practice, method, and worldview is becoming one of the major paradigms of the twenty-first century, not only in the arts but also the sciences” [16]. *hipDisk* is inherently performative. It emerged from a Performative Research methodology [6] that was incidentally undertaken in a University department of Art and Design and a national scientific research centre [3, 3]). The results illustrate the fundamental (new) performativity of wearable technologies [18]. If, indeed, “everyone [is] speaking of embodiment, situatedness, presence, and materiality” [16], and “everything has become performative” [16], how might this performativity best be supported, experienced and leveraged?

#### *Embodied Discovery as a Framework for Learning*

A recent investigation led by Brian J. Caldwell, Professor Emeritus at the University of Melbourne, found that as little as one hour of art classes a week led to a rise in national literary tests equivalent of having an extra year in school; attendance soared on days



when art classes were held, and children's emotional and social wellbeing, particularly their resilience, rose significantly. [2] Art privileges embodied discovery. These results have enormous implications, and challenge researchers to develop strategies for supporting artistically-engaged embodied discovery across the fabric of society.

#### *Future Directions*

*hipDisk* provides a framework for collaborative, embodied learning. A series of assembly kits that afford device construction by children or adults with varying skillsets are envisioned to broaden and better leverage this potential. The range of spin-off benefits attributed to *hipDisk* also point to value in undertaking extended research into awkwardness, and its ability to provide access to diverse forms of bodily intelligence in an entertaining and engaging manner. Applications in disability, rehabilitation and learning contexts [8, 22], as well as in the free-form collaborative play space discussed herein support this direction [22]. Importantly, research with neuroplasticians expert in learning may assist in validating, and better leveraging the embodied discovery and "spin off" outcomes identified, no matter the context.

#### **Conclusion**

*hipDisk* is an unusual activity, without common points of reference or precedence. The interface emerged from an embodied process, affords core-driven embodied interaction, and the results prompt deep reflection on what might constitute an embodied practice. The outcomes discussed illustrate the underlying performativity of wearables and other body-devices, as well as the potential for performative research to result in rich, broadly-relevant experiential outcomes.

Marcus Foth describes the conventional methodological approach for HCI research and development as outcome and impact driven, adopting both qualitative and quantitative methods and research instruments as a means to distill findings, insights and requirements to serve the purpose of informing the best possible design outcome for a given context, persona group, or environment (personal communication, February 1, 2012). He goes on to say that this may suit examiners of research theses, assessors of funding grants, and ideally, end-users. The question is, does this approach best serve the purpose of research, to not only establish facts, but reach *new* conclusions?

Theories of performative research [6] illustrate how the design approach may be process driven rather than driven by pre-set outcomes and goals, as is typical of applied design research. *hipDisk* (and the umbrella investigation *Swing That Thing : moving to move...*[22]) embodies these ideas, and demonstrates their value. What may be described as *soft outcomes* (arguably lacking in *hard data*) result in *new* opportunities for meaning-making, and experientially rich resources through which to undertake qualitative and quantitative evaluations if desired.

When we are born, movement precedes language [17]. With this in mind, it is not incoherent for an embodied, performative process to precede quantitative and qualitative analysis, and arguably seems to better reflect the instinctive way that humans engage in discovery to understand their emerging worlds. If performative research were considered an integral element of, or important precursor to more traditional forms of applied design research, researchers may be better placed to arrive at surprising outcomes.

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