

The Slow Floor: Increasing creative agency while walking on an interactive surface

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ABSTRACT

Walking is a physical activity that most people do on a daily basis. It is often characterized as a utilitarian means of locomotion; our basic, habitual mode of getting around from place to place. Walking can also be considered a creative and expressive act, with the potential for inspiring the design of interactive surfaces to support and mediate these aesthetic aspects. We draw on understandings of walking from a range of perspectives including biomechanics, ecological perception, anthropology and dance to inform the design and evaluation of an interactive surface. This surface, the Slow Floor, is intended to encourage a reflective engagement with the act of walking. We present the design and initial user evaluation of the Slow Floor, a pressure sensitive sound-generating surface, with a group of Butoh dancers performing a slow walk. The evaluation reveals a unique creative agency when walking on the Slow Floor compared to the internal focus on awareness when slow walking without the interactive surface. This creative agency provides new knowledge on the role interactive surfaces can play in developing awareness of movement and internal felt experience contributing to the discussion around somatics and HCI.

Author Keywords

Design prototyping, embodied interaction, interactive surfaces, movement and perception, user evaluation.

ACM Classification Keywords

H.5.2 USER INTERFACES (Haptic I/O, Interaction styles, Prototyping, Theory and methods, User-centered design.

General Terms

Design; Human Factors

INTRODUCTION

Walking is a physical activity that most people do on a daily basis. It is often characterized as a utilitarian means

of locomotion; our basic, habitual mode of getting around from place to place. Despite the depth of research in human biomechanics on understanding the mechanical actions of walking [9, 13], little research to-date in human-computer interaction (HCI) has focused on the act of walking as a form of self-awareness and creative expression. There is a growing interest in somatics and HCI, an area of research exploring how interactive technology design can support the development of bodily and movement awareness and capabilities [19]. Even supposedly ordinary acts such as walking, can be viewed through a somatic lens to heighten kinaesthetic awareness of the intricacies of bodily organisation involved in walking. In this paper we conceptualise walking as an expressive and creative act from the position of the internal sense of bodily self-awareness. There is reasonable evidence from the arts, anthropology, the social sciences and philosophy to argue that walking is more than an act of simply utilitarian purpose and outcome. We draw on these understandings to inform the design and evaluation of an interactive surface, the Slow Floor, intended to encourage a reflective engagement with the act of walking.

This paper begins with an overview of walking from a range of perspectives and disciplines including biomechanics, ecological perception, anthropology and dance. It then presents the design and development of the Slow Floor and an initial user evaluation and analysis of the Slow Floor with Butoh dancers, performing a slow walk. The aim of this research is to gain knowledge of the relationship between walking movements, pressure sensitive interactive surfaces and designed sound responses. A second aim is to gain insight into how the design of such interactive surfaces could promote greater awareness of the walking movements and internal felt experience. Ultimately this awareness of bodily movement and felt experience will seek to benefit a Mindfulness style focus evident in bodily practices such as Tai Chi, Feldenkrais and expressive dance forms such as Butoh, which could be translated into technology-mediated applications such as the Slow Floor. The following sections will explain in more detail what walking actually is, how

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people perceive it and how walking can be seen as a creative exercise.

BIOMECHANICS OF WALKING

Our capacity to walk in a self propelled upright way is unique to the human. We are the only primates to have the anatomical configuration to enable a consistent upright stance and therefore walking on two legs to occur [12]. A simple definition of walking is to move at a regular pace by lifting and setting down each foot in turn, never having both feet off the ground at once [17]. Most of us walk everyday; this bodily skill we argue is taken for granted. However this skill is the result of our development and is in fact a complex combination of biomechanical, perceptual and arguably creative processes.

From a biomechanical perspective there are a number of models used to describe the act of walking, all of which use the single step cycle as a representation of the walking pattern that is repeated regardless of the gait factors of step length and frequency. The most useful of these models for this research is Geyer et al.'s [9] application of the Bi-pedal spring mass model. Fundamental to this model is *the body as point mass m at the centre of motion (COM) and describes the legs as two massless, linear springs of equal rest length and stiffness* [9, p.2861]. These springs, our legs, alternate in 4 phases within a full step cycle of: (1) left leg at stance taking full weight, right leg elevated above the ground reaching forward, (2) right leg touching down on the ground forward of the left leg resulting in both legs sharing the weight, (3) left leg touching off and transferring the centre of mass to the right leg but both legs still sharing support and (4) right leg in single support with the left leg elevated above ground reaching forward.

The Bi-pedal spring mass model is useful in understanding the forces in play when the legs and feet pass through the phases of the step cycle as a means of describing the micro-movements of the limbs particularly below the hips. Knowledge of these particular points in foot pressure and limb movement will assist in the further development of the Slow Floor as it aims to gain more accurate sensor approaches to track the subtlety of walking gaits for kinaesthetic awareness.

ECOLOGICAL PERCEPTION OF WALKING

To explain the act of walking from another perspective we turn to theories of Ecological Perception to outline the ways in which we are aware of the environment to walk within. We define perception in line with Gibson's [10] classifications of perceptual systems. Of this classification we are concerned with the basic orienting system, the haptic system as it relates to walking and moving. The visual system is another often cited when talking about our perception of the world to afford action from an ecological point of view [11]. However the focus of this paper is on the haptic and kinaesthetic aspects of perception as they fundamentally inform an awareness of the walking and moving body.

The Basic Orienting and Haptic systems

Gibson [10] states that the basic orienting system provides a general orientation of the body through the inner ear detecting acceleration and the direction of gravity. *The gravitational input covaries with that of touch, which is part of the haptic system, so that a double registration of the ground is possible* [10, p.53]. The haptic system is a complex network of mechano-receptors throughout the body and its surface [10]. Gibson [10] offers a description of how this network functions in the body as categories of a haptic perceptual subsystem, which are useful for this research.

The skin and deeper tissue can be stimulated together with movement of the joints. This would yield perceptions of haptic touch. And the combination of inputs from the vestibular receptors and the joints and the skin together would yield perceptions of oriented touch, that is, of objects in relation to gravity and the ground [10, p.109].

The earlier discussion on biomechanics presented walking as a series of step cycles [9]. In these cycles the relationship to gravity is fundamental to the way the hips and legs shift to move whilst staying upright and attaining an equilibrium. To this end Gibson's [10] notion of oriented touch describes the perceptual components that assist the act of walking. These are mass due to gravity through the vestibular receptor or inner ear, the joints of the legs for movement and the skin and receptors of the feet to negotiate the surfaces when walking.

Kinaesthetics

Kinaesthetics, provides us with our self-perception of movement and the felt sense of our bodies in motion [6, 1, 20]. Gibson [10, p.111] states that *kinesthesia literally denotes the pickup of movement. But refers exclusively to bodily movement, not movement of anything in the world*. He also states that *Kinesthesia cuts across the functional perceptual systems* discussed earlier [10, p.111]. Fogtman et al. [5] also provide a greater focus on the kinetic aspect to suggest that it is through the kinaesthetic sense that our bodies keep track of movement and limb position. For the purpose of this paper, we will use kinaesthetics to refer to the felt internal experience of the movement of one's body, which can include vibrational qualities and the feeling of stillness. Given its encompassing scope, we see kinesthesia along with the haptic system as being the fundamental aspects of the perception of walking in the context of designing the Slow Floor. Larrsen et al. [15], in discussing our bodies' relationship to technology interactions, claim that the kinaesthetic sense is fundamental to the "feel dimension" of technology interactions.

WALKING AS CREATIVE AWARENESS

Slavin [21] reveals the bodily negotiation when walking, in this case in a spiritual pilgrimage, as incurring rhythmic changes. Empirical accounts suggest that attaining the rhythm was a form of meditation, a form of creative embodied awareness. These experiences through walking

share some similarities with the active body in Mindfulness walking practices. Mindfulness advocates walking as a practice to achieve a grounding in the present moment, bringing attention to the feet and floor to heighten one's awareness and location in the moment [14]. Ingold [12, p.11] suggests that in rhythm the movements are continually and fluently responsive to an ongoing perceptual monitoring, and these rhythms and fluctuations are considered to be an attractive part of walking [24].

There is an argument here for walking to be considered as a form of self-expression, particularly when you consider the geography of the outdoors in its many formations and the required bodily response. Rather than a journey in the geographic sense; this research views walking as a means of creating a self-awareness and expression of the moving body. We now turn to the practice of Butoh dance as an example of creative engagement with the act of walking.

The Slow Walk in Butoh Dance

The expressive bodily practice of Butoh dance is a form of contemporary dance that originated in Japan post World War II [7]. In Butoh, the socially constructed body is dissolved in order to reveal the primal expression of the body. Even simple physical acts such as walking and standing are questioned. Changing and slowing down the speed of walking immediately takes it out of the everyday context and heightens the awareness of how the body negotiates the act of walking. There are various kinds of walks in Butoh, often using imagery as a transformative tool. For example, the Ash Pillar Walk involves moving very slowly and quietly as if your body is made of ash, *moving impossibly on the edge of disintegration* [8, p.55]. The heightening of awareness of how the body negotiates this moving in Butoh has been selected to examine the relationship between movement and sound on the Slow Floor interactive surface.

MOVEMENT AND SOUND INTERFACE DESIGNS

After having explained the different perspectives on, and experiences of, walking, we now move to design. In this section we briefly describe selected work that addresses the technical challenges of sensing bodily movement and translating these values into sound or auditory display. Auditory display is the correct term for sound in the context of this research as it includes all intentional, non-speech audio that is designed to transmit information between a system and a user [25]. We decided to explore sound and auditory display as the modality of choice for the representation of walking due to its capacity to offer spatially rich and interactively engaging information when coupled to sound processing software such as Max MSP.

Design approaches to the sensing and auditory display of body movements

Djajadinangrat et al. [1] talk about the need to design for movement flow in interactive systems by considering simultaneous postures in the body and the need to use multiple analogue sensors to track the richness of this

bodily movement. When considering the movement of the human body, Stienstra et al. [23] focus on the mapping between movement and continuous auditory data streams to represent speedskating strokes. Relevant work in walking style movement and awareness through sound includes Lightfoot [4], Z-Tiles [18] and the Multimodal sensing floor [22]. Common to these research projects are the use of high resolution pressure sensing in various floor substrate designs to generate movement values due to pressure and convert these to auditory feedback for a variety of contexts. This work informs the design of the Slow Floor from the perspective of pressure to sound mappings; particularly the decisions made about the pressure change and the ways that this change is mapped to sound qualities like pitch and volume to resemble qualities of the movement.

DESIGN STUDY - THE SLOW FLOOR

The Slow Floor was originally designed for a site-specific gallery installation as a propositional piece of interactive art that sought to encourage reflection on bodily awareness mediated through sound and video projection (see [3] for more detail on its design and development). The decision to examine walking came from a reflection on the stepping and moving activity observed in the Slow Floor installation. We decided on a study that systematically gained responses from participants on their embodied experience of walking on an interactive surface would be a useful way to begin to understand the actual experience of this unique walking. We also considered moving beyond the mechanistic description of the spring mass model offered in Geyer et al. [9], to gain an understanding of the ways the act of walking are freely negotiated and expressed. As it is the first design and evaluation study, in a series of four, it takes on an exploratory role and is as much about ways of capturing and understanding embodied knowledge from dancers as it is about gathering results to drive a design iteration of the Slow Floor interactive surface.

Physical and electronic design

The Slow Floor takes the form of six timber and foam interactive walking pads each with one force sensitive resistor, Interlink FSR 408, sandwiched between a top layer of plywood and EVA foam and a base layer of medium density fibreboard. The plywood top layer was laser cut in a grille like pattern to give a texture inspired by Japanese tatami mats. Each force sensitive resistor is connected to a microprocessor that measures footstep force and weight data and this is sent to a MacBook Pro laptop running the sound processing software Max/MSP. Once processed the sound is sent through a sound mixing desk and out to four speakers that surround the Slow Floor pad arrangement (see [3] for detailed diagram).

Sound choice and parameter mapping

The sounds and the parameters that are mapped to the pressure data within the Max MSP were recorded in a rural and domestic setting providing a rich natural soundscape.

We recorded and edited four (4) of sounds that we felt provided a variation in sonic characteristics. These sounds were, Sound A - Rubbing fingers through a velcro strip, Sound B - A crackling outdoor fire, Sound C - Bubbling water in a small brook, and Sound D - The sound of a car at a distance sound was wind like with the dominant vibration being the car tyres on a sealed road. These recordings were between 10 and 19 seconds in length and contained a diverse mix of both pitched and non-pitched materials. For example pitched materials include the sound of bird songs, or mechanical sounds such as church bells or even car horns. Non-pitched sound material is for example the sound of the wind through the trees.

This complexity of pitched and non-pitched sound material informed our decision to use granulation as the primary signal processing technique. The granulation parameter was a mapping between the rise in the force sensor data to vary the sampling grain of the sound. This occurred between 50 milliseconds, for the lowest pressure reading and 200 milliseconds for the highest-pressure reading. Using granulation in this way conserved some of the rich characteristics of the original sound source and created a level of perceived randomness to the sound as the grain size would always change relative to the pressure value which was always shifting due to the walking movements.

The other two parameters that were used to influence the sound included dropping the pitch of each of the sounds to a fixed value and also used the rise in force sensor data to increase the volume of the sound as each pad was stepped upon. Each of the six pads in the Slow Floor arrangement had the same sound and signal processing method. This method, of one sound over the six pads, we decided would give us a greater understanding of the sound response to the movement rather than more complex arrangements, for example a different sound and modulation setting for each pad, which could distract from the subtlety of movement and favour sound selection by dancing over the pads.

EVALUATING THE SLOW FLOOR

To enable an understanding of the intricacies of walking and moving to sound response we developed a study with Butoh dancers walking on the Slow Floor. The Butoh form of dance uses slow walking and movement as part of their dance practice, as we discussed earlier, therefore they are ideal participants to engage in this type of movement study.

Movement activity structure and methods

We recruited six dancers to take part in the first study at a specialised sound production space at RMIT University, Melbourne, Australia. The activities and data collected within the study include:

1. walking, for a 3 minute period, in a Butoh style, on the regular non-interactive floor, which was video-recorded and photographed
2. walking on the Slow Floor four times, for a 5 minute period with each sound option, immediately after each

walk a questionnaire was completed and each walk was video-recorded and photographed

3. after all of the walking activities, a video-cued recall interview on the participant's choice of sound option was conducted.

Analysis of the responses

The data collected from the first study was analysed from the mover, an experiential perspective, and the observer, an external perspective, adopted from [16]. This approach to analysis provides:

1. detailed descriptions of the *mover's perspective* through the analysis interview and written questionnaire responses with and without the Slow Floor
2. analysis from the *observer's perspective*, in the form of movement sequences extracted from the video and photographic footage.

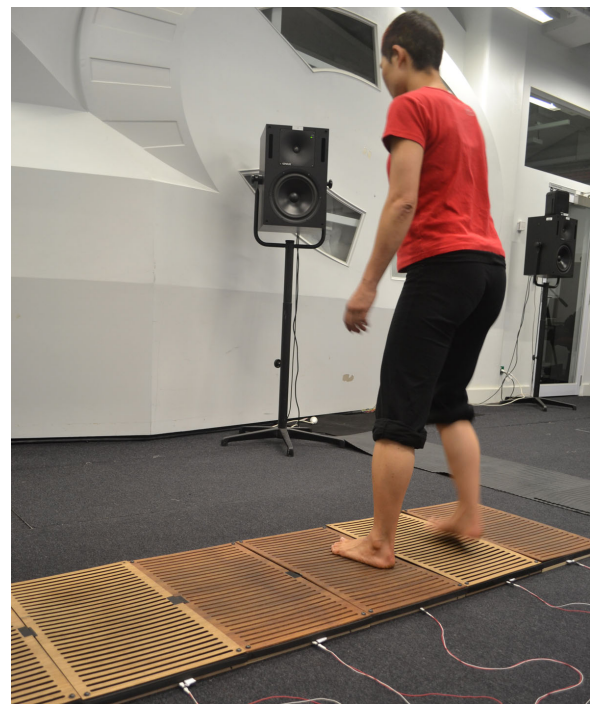


Figure 1. Participant 4 walking on the Slow Floor

ANALYSIS OF THE MOVER'S PERSPECTIVE

Walking without the Slow Floor

The analysis of the mover's perspective we present through two categories, Awareness of the Body and Imagery. These categories were created from an affinity diagram that also generated useful sub-categories.

Awareness of the Body

Awareness of the body includes all of the responses that make distinct reference to a region of the body, the rate of movement or the techniques used in this slow style of walking to heighten awareness. They tend to be mechanical accounts of what the participants were attending to and

experiencing in their bodies, and provide an initial insight into the embodied practices of walking. The subcategories we generated to further define this category are – Awareness of the feet, Awareness of speed and rhythm and finally Awareness of the fuller body. The detailed responses for each subcategory are as follows (with quotes from participants in italics):

Awareness of the Feet

A number of participants made reference to the feet possibly as the point of contact to the floor surface as a means of creating awareness of the legs, gravity and even the space around the body. Examples of quotes are:

- [P3] *“ahh well well it was quite interesting, mostly the technique of my feet in particular”*
- [P2] *“It gives you I guess time to be really able to really feel what your feet are doing and what your legs are doing you know, like I can feel the difference between my right and my left you know. Also I can acknowledge where my heel is hitting in different angles, and where my toes are hitting in different angles”*
- [P4] *“Butoh walk is a bit of, I don't know ... make it neutral but aware of gravity and space.”*

Awareness of Speed and Rhythm

The relationship between the speed and rhythm of the moving body was referenced a number of times.

- [P4] *“it's a concentrated totally slower not for the sake of slow motion, just if I take attention in detail as a result gets slower”*
- [P1] *“my centre, moving at a constant speed horizontally through space, the idea of awareness of what's behind me and pulling the space along with me and pushing the space ahead of me”*
- [P6] *“yeah just a rhythm, yep, a rhythm of um of ease or where things just naturally fall on the body.”*

Awareness of the Fuller Body

Attention towards the fuller body and some of the techniques used for awareness and focus were referenced.

- [P6] *“centering on the abdomen ... and dropping the knees”*
- [P4] *“trying not to be too relaxed just a bit more firm and simple, I mean neutralize it a little bit as walking”*
- [P1] *“scan my body at the same time and notice tensions I bring my attention to an awareness of the alignment of my spine.”*

Imagery

Imagery includes all of the responses that use metaphoric or spatial references in the descriptions of the walking experience - we developed the subcategories of metaphoric and spatial imagery to reflect this. In contrast to the Awareness category these responses are imaginary and also give us insights into the techniques and practices the participants use to focus their attention and awareness on

the act of walking. They were an important part of motivating the walk or describing the experience of the walk.

Metaphoric Imagery

The use of metaphor included:

- [P6] *“I guess the sense of, its almost a little bit like a sense of floating in water.... a sense of being carried”*
- [P5] *“but it's a great amount of freedom, you know like we have image when you walk your feet become like grass, soft and, or you just walk in an arctic way so you feel the cold feet, there are so many things to choose.”*

Spatial Imagery

We contrast metaphor with spatial descriptions as these were another interesting category of imagery:

- [P1] *“expanding my awareness both inside the body and out into the space around and try and keep both of those awareness's active all the time.”*
- [P4] *“my interpretation of butoh walk neutral is we are aware the space around us not just front and back but a perspective including 360 degrees.”*

Finally an interesting description that did not fit any of the categories was the need to *break walking habits* and that the Butoh walk was a means of creating a neutral state of *attention towards the breath, gravity and the 360 degrees of space around the body*.

Walking with the Slow Floor

Due to the explorative nature of this study we include responses from all of the sound options. We found that the Imagery category was strongly represented in the data as a creative response to the sound. The Awareness category we found was not as represented, however a similar category emerged that we entitled Creative agency of the body. Creative agency is concerned more with wanting to act with the interactive sound, and to move in particular ways, rather than a focus on internal awareness.

Creative agency of the body

This category included descriptions that had a distinct mechanical emphasis. We do not mean descriptions in strict biomechanical terms but rather suggestions of how their bodies had agency with the interactive sound of the Slow Floor. The sub-categories generated for further definition are: Pressure, The feet and balance, Speed and rhythm, and Silence. The details of the responses for each are as follows.

Pressure

An awareness of the pressure to sound relationship through stepping on the surface was evident in the responses, the participants articulated that:

- [P5] *“I went into a less physical 'dance/walk' changing pressure without big movements and muscularity”*

- [P2] “walking on different parts of my feet like the heels and the sides of my feet ... because I felt a bit more pressure on the side of the foot and seeing if it affected the volume”
- [P1] “finding ways to apply pressure to keep the sound continuously flowing.”

The Feet and Balance

A number of participants also indicated an awareness of the feet and whilst the agency of the foot resulted in a pressure change, and could be included in the category above, we include these as a separate category as it gives insights into Gibson’s notion of *Haptic and Oriented Touch* [10] we discussed earlier.

- [P3] “my feet were the most part of the body that was influenced”
- [P2] “my feet definitely the whole time aware of my feet and the balance.”

Speed and Rhythm

The relationship between the speed and rhythm of the steps and the effect on the sound was articulated through a number of interesting responses. These are:

- [P3] “exploration in rhythm playing around with slow to fast paces.”
- [P2] “to be able to play with weight distribution and uhhmm speeds and textures within your walk the awareness that comes from the sensation from the pad from the sound going all the way up you know”
- [P1] “the water sound was .. I associated with moving slowly .. with that and the buoyancy.”

Silence

There were a number of references to the silence achieved through not making contact with the pressure sensor. This was achieved by stepping on or around the break between the pads, shown in Figure 1. It resulted in an interesting outlier experience that we had not anticipated as being desirable.

- [P1] “how the movement affects the volume and intensity of the sound, seeking out moments of silence
- [P4] “I quite like the silence and the contrast from the sound.”

Creative response through imagery

The use of imagery to describe the experience was based on how the participants interpreted the characteristics of the sound and its subsequent affect on their embodied state. We found that the imagery was metaphoric with strong reference to place.

Metaphoric Imagery

- [P1] “with the echoing sound of a creature retiring deeper into the cave/ocean helped me to go to deeper places within myself”

- [P4] “gentle, soft, quiet, clean feeling, evoked some fragility and subtleness. The atmosphere was forest like so it influenced the move and feeling”
- [P6] “airy - a sense of atmosphere and pressure but much more subtle than the other sounds”
- [P3] “some [of] the sounds felt they created this really vast like open ... space with lots of room to move and explore you know a lot of time.”

ANALYSIS FROM THE OBSERVER PERSPECTIVE

For the observer perspective silhouettes were extracted from the photographic and video data showing movement sequences, see an example in Figure 2. These give a rapid impression of the form and sequence of movement to enable further analysis. We used the definition of the Bi-pedal spring mass model of walking [9] to determine what of this footage could be defined as walking. We found the participants had a range of outlier movements such as squatting, lying down on the floor and even standing on the head in one instance. To comply with the Bi-pedal model the movement needs to undergo four phases cycle of left and right leg support and apex as discussed earlier. We selected the footage and developed movement silhouettes that indicated instances of these Bi-pedal walking phases.

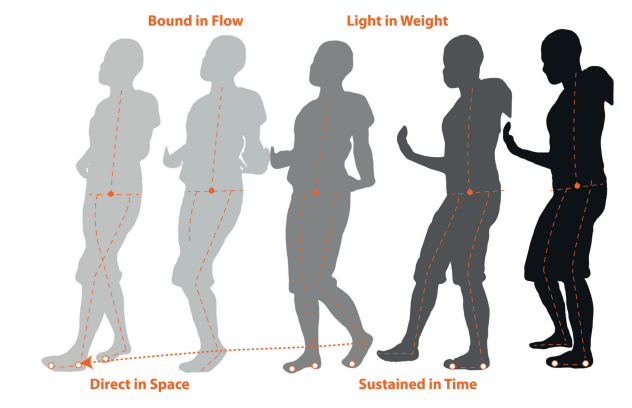


Figure 2. Movement silhouette, participant 4, sound D

Laban Effort descriptors, adopted from [2], have been applied to these silhouettes to categorise them in dimensions of *space, time, weight and flow*. In terms of the totality of responses from the dancers, the walks were:

Bound in Flow

All participants demonstrated their movements to be bound in flow, characteristic of this type of movement is the control and restraint the dancers exhibited in each of their movements on the Slow Floor.

Direct in Space

All participants, except P2 and P6, exhibited movements to be direct in space. Characteristic in these movements was the focus on the vertical or Z direction, the application of pressure through the feet, hips and torso. These movements all demonstrated the understanding the participants had

gained from exploring the floor and listening to its sound change due to volume increase and granulation value change.

Variance in Weight

All participants, except P2 and P6, demonstrated a change from light to strong in weight. Participant 4 moved in quite a vigorous fashion by flapping hands to help oscillate the vertical movement of the body to affect the sound. Participants 1, 3 and 5 moved more gradually in the vertical direction by rising on toes, whilst walking. This we conclude was to do with the desire to explore the vertical direction or pressure to change the sound through movement.

Sustained in Time

All participants, except for moments with P4, moved with a slow indulgence toward the sound. There were no rapid accelerations in movement but rather gradual changes in posture and position. Participant 4 would have moments of rapid acceleration contrasted by subtle slow enclosing movements.

DISCUSSION OF THE MOVER'S PERSPECTIVE

Awareness and Creative agency of the body

What is apparent from developing the affinity categories from the mover's responses is the shift from an awareness of the body when walking without the interactive surface to a creative agency when walking with it. Without this interactive coupling the *Feet* were a means to reflect on the *technique* of walking and the contact of the heel and toes at different angles. They also functioned to gain an awareness of the body's organisation whilst moving. Walking on the Slow Floor revealed ideas of the sound *feeding into the feet* and the *feet being the most part of the body being influenced*. We observed a shift to the creative agency they had in generating and responding to the sound. This phenomenon was also evident in the emergence of the category of *Pressure* with the Slow Floor experience. Pressure was something you could now manipulate due to the coupling to the sound response. This was interesting as the participants did not gain the ability to apply more downward pressure but rather the Slow Floor provided a means of presenting this in a new way.

Speed and Rhythm moved from an internal reference to how the movement *just naturally falls on the body* and a concentration on the body's centre to *move at a constant speed horizontally through space*, to a focus on weight distribution and the haptic sensation with the interactive surface when coupled to the sound response. There was also an agency provided with the interactive sound that enabled explorations of rhythms through variation in the speed and acceleration of the legs to vary the stepping and pressure to sound relationship. The fuller body was referenced in the non-interactive walk where body scans, spine alignment and a focus on the centre of the abdomen was articulated. A contrast to this was the ideas of balance and buoyancy that emerged as a factor in the interactive

walk. This suggests an awareness of balance was heightened in the pressure to sound coupling in the Slow Floor interface. The body had creative agency in its perception of balance through the shifts in haptic pressure to sound response. A relationship between the haptic capabilities of the feet and the capacity to sense balance through the inner ear, which Gibson terms as being *Oriented Touch* [10], was made and we argue this is through the creative agency encouraged by the Slow Floor. Silence was an interesting outlier category that also emerged from the interactive walk. It was used as a way to contrast the sound and *seek out moments* of repose during the walk. Again a creative and exploratory agency was encouraged as the participants actively tried to find moments of silence within the interactive walk.

Imagery

Metaphoric imagery was evident in both of the walking activities. Without the Slow Floor we saw it used technique to motivate an intentional walk and to describe the experience, *a sense of floating on water, a sense of being carried*. With the Slow Floor we saw greater usage of the imagination and reference to spaces and places, the emergence of creatures, forests and atmospheres that encouraged the participants to go deeper into this imagined space mediated by the sound. Spatial imagery was evident in the non-interactive walk as again a means to describe the actual experience and as a technique to encourage a deeper state of movement awareness. With the Slow Floor spatial references were less evident, although they were interspersed throughout the metaphoric descriptions.

DISCUSSION OF THE OBSERVER PERSPECTIVE

The observer perspective is still in its early stages. The movement silhouettes have raised our awareness of the subtle variation in walking style across the 6 participants. However there are limitations to these visual silhouettes and Laban analysis to understanding the subtlety of movement across all of the participants to uncover patterns to drive design iteration of the Slow Floor. In further studies we see the opportunity to develop an understanding of some of the patterns that might emerge by combining the visual footage with pressure and movement data readings. In this way we can understand the ideas of rhythm, speed and pressure that the participants articulated in their mover responses. In terms of design development we will explore ideas of balance though auditory feedback. This study has revealed that posture and tilt of the torso and hips are values we would like to sense through using accelerometers on the participants' bodies as they walk. This data will be both useful for establishing the nature of balance and also to add as a parameter in the auditory display as a contrast to the pressure sounds. In this way we would aim to give the walker richer feedback on the fuller body experience whilst walking to encourage even more creative agency.

CONCLUSION

This paper conceptualised walking as an expressive and creative act from the position of bodily self-awareness considering positions from anthropology, biomechanics, dance and ecological perception. The activity of walking was then presented as a focus for the design and evaluation of the Slow Floor with Butoh dancers. The responses to walking on the Slow Floor have revealed that the coupling of pressure data to auditory display encourages a unique creative agency in the body. Without the Slow Floor and its interactive auditory display the participants resort to an internal focus and a reliance on the visualization techniques they usually practice in Butoh. We see the value in the interactive surface not so much as an advancement or replacement of these established somatic practices but rather as a new set of experiences that foster greater embodied creative agency and potentially opportunities for people to learn more of their embodied selves. With maturation in this research focus we see potential applications for creative bodily therapeutic and awareness practices. The next study with the Slow Floor will be with Feldenkrais practitioners to evaluate the potential of walking pressure and auditory display with a greater focus on bodily organization awareness that characterizes this practice.

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